



MODEL LONG-RANGE
TRANSPORTATION PLANS:
*A Guide for Incorporating
Performance-Based
Planning*

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16. Abstract This Guidebook informs State departments of transportation (DOTs), metropolitan planning organizations (MPOs), and regional transportation planning organizations (RTPOs), as well as their planning partners such as transit agencies, local governments, and Federal agencies, about effective practices for incorporating performance-based planning into the development of a long range transportation plan. A performance-based plan sets the foundation of goals, objectives, performance measures, and targets that support decisions for long-range investments and policies, and guides programming, as well as shorter-range decisions that move toward achievement of desired system performance outcomes. This document identifies key components present in a "model" transportation plan, as well as process elements that are necessary to reflect the priorities of the community and support attainment of desired performance outcomes for the multimodal transportation system. Examples and case studies illustrate the Guide's key points.			
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1. Introduction

Performance-based planning and programming (PBPP) has become a focus in the transportation community, as transportation agencies around the country work to ensure that scarce resources are used effectively and transparently to achieve desired agency, regional, state, and national goals. PBPP refers to the application of performance management principles within the planning and programming processes of transportation agencies. PBPP is a data-driven, strategic approach, providing for public and stakeholder involvement and accountability, in order to make investment and policy decisions to attain desired performance outcomes for the multimodal transportation system.

The FHWA and FTA *Performance Based Planning and Programming Guidebook*¹ was developed to provide transportation agencies with useful information to help them establish a performance-based planning and programming process that leads to investment decisions that are based on performance information. This Guidebook on *Model Long-Range Transportation Plans* is a companion document to the PBPP Guidebook to provide detailed information about developing a performance-based statewide long-range or metropolitan transportation plan.

While a PBPP approach can be applied within a wide range of transportation planning documents, the statewide long-range transportation plan (LRTP)² and metropolitan transportation plan (MTP)³ are critical documents in the transportation planning and investment decisionmaking process, identifying key desired outcomes and strategies for the transportation system and setting a framework for all of the investments made within a State or region. Within this Guidebook, the term “transportation plan” is used to refer both to statewide LRTPs and MTPs.

At both the statewide, nonmetropolitan, and metropolitan levels, the transportation plan is envisioned by regulation to be a central document that establishes agreed upon goals, policy decisions, and strategic investment to achieve the goals. It coordinates with investment plans, related planning documents and processes (e.g., Strategic Highway Safety Plans, Asset Management Plans, Congestion Management Process, State Freight Plans, etc.), and programming documents, including the State and metropolitan Transportation Improvement Programs (STIP/TIP). As a result, a performance-based transportation plan sets the foundation of goals, objectives, performance measures, and targets that support decisions for long-range investments and policies, and guide programming, as well as shorter-range decisions that move toward achievement of the desired system performance outcomes.

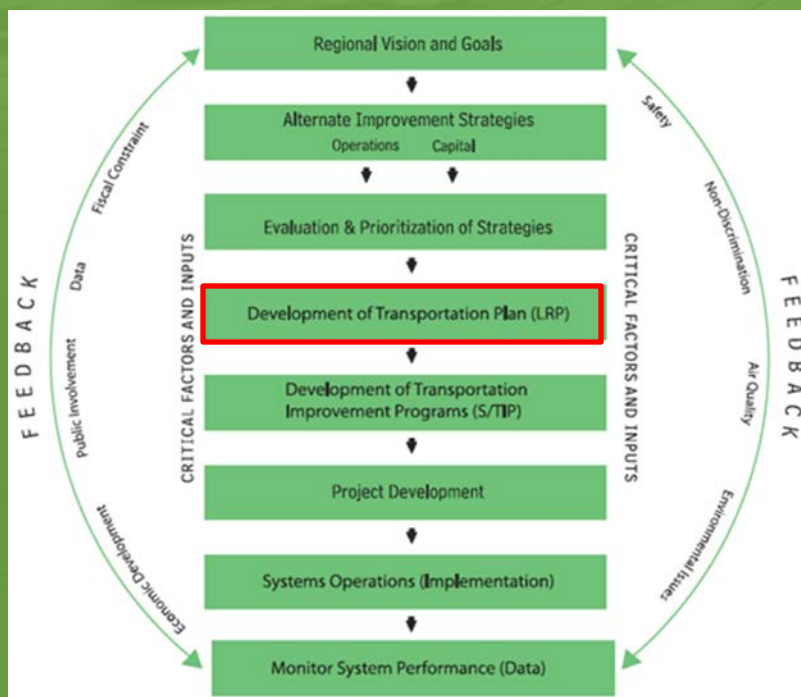
¹ Available at: http://www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook/.

² 23 USC § 135 (f).

³ 23 USC § 134 (i).

KEY ROLE OF THE TRANSPORTATION PLAN

The statewide and metropolitan transportation plan play a critical role in the overall transportation investment decisionmaking process, and guide the development of Transportation Improvement Programs (STIP and TIPs) and projects.




Source: FHWA, *The Transportation Planning Process: Key Issues – A Briefing Book for Transportation Decisionmakers, Officials, and Staff*, available at:
<http://www.planning.dot.gov/documents/briefingbook/bbook.htm>

Guidebook Purpose

This Guidebook is intended to provide staff at State Departments of Transportation (DOTs), Metropolitan Planning Organizations (MPOs), and Regional Transportation Planning Organizations (RTPOs) or Rural Planning Organizations (RPOs) – as well as their planning partners within transit agencies, local governments, the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and stakeholders – with useful information for developing a performance-based transportation plan.

The Guidebook provides a framework within which agencies can:

- 
- ▶ Strengthen the ways in which they use and analyze performance information to advise and engage decision-makers, stakeholders and the public;
 - ▶ Guide improved implementation of the transportation plan to achieve plan outcomes;
 - ▶ Understand effective practices for developing a performance-based transportation plan;
 - ▶ Create better alignment of performance monitoring between States, MPOs, and transit agencies, along with coordination with FHWA and FTA field staff; and
 - ▶ Revisit the performance measures and targets developed in previous planning cycles to ensure the measures and targets continue to reflect the agency's goals and any changing circumstances, if relevant.

This document identifies the key components that would be present in a “model” transportation plan, as well as process elements that are necessary to ensure the development of a well-reasoned, balanced plan that reflects the priorities of its community and supports attainment of desired system performance outcomes for the multimodal transportation system. Examples drawn from statewide and metropolitan transportation plans are provided for illustrative purposes, but are not meant to be prescriptive or one-size-fits-all models. Individual States and MPOs can utilize different approaches, reflecting differences in Federal requirements between State LRTPs and MTPs, as well as the unique situations and practices of agencies.

Background

Transportation agencies have been increasingly incorporating performance-based approaches into their planning activities, seeking to improve performance in areas that matter to the public and stakeholders. Transportation plans (MTPs and LRTPs) serve as guiding documents in metropolitan and statewide transportation decisionmaking, and are subject to various Federal requirements.

The MTP required of MPOs describes the ways the region plans to invest in the transportation system. The MTP addresses topics such as: policies, strategies, and projects for the future; a systems level approach by considering roadways, transit, nonmotorized transportation, and intermodal connections; projected demand for transportation services over 20 years; regional land use, development, housing, and employment goals and plans; cost estimates and reasonably available financial sources for operation, maintenance, and capital investments; and ways to preserve existing roads and facilities and make efficient use of the existing system. MTPs must be

updated every five years in air quality attainment areas and every four years in nonattainment or maintenance areas.⁴

Statewide LRTPs are required to “provide for the development and integrated management and operation of transportation systems and facilities (including accessible pedestrian walkways and bicycle transportation facilities) that will function as an intermodal transportation system.”⁵

Statewide transportation plans contain many of the same elements as metropolitan transportation plans, but vary more significantly by State and are subject to fewer formal requirements.

Statewide long-range transportation plans can be policy-, corridor-, or investment-based, and they may refer to specific projects, but are not required to do so. Moreover, statewide LRTPs do not have a Federally-defined update requirement.

The passage of Federal legislation, the Moving Ahead for Progress in the 21st Century Act (MAP-21), in 2012 strengthened the growing focus within transportation agencies on using performance-based approaches in transportation planning. The law established national goals and calls for the use of performance-based approaches within metropolitan transportation planning and statewide and nonmetropolitan transportation planning to support those national goals. It also requires that agencies set targets in relation to a set of national performance measures, and calls for coordination of target-setting between States and MPOs to ensure consistency.


FEDERAL REQUIREMENTS FOR PERFORMANCE-BASED PLANNING

Metropolitan transportation planning: “[MPOs]..., in cooperation with the State and public transportation operators, shall develop long-range transportation plans and transportation improvement programs through a performance-driven, outcome-based approach to planning.” 23 USC § 134(c)(1); 49 USC § 5303(c)(1). “The metropolitan transportation planning process shall provide for the establishment and use of a performance-based approach to transportation decisionmaking to support the national goals....” 23 USC §134(h)(2); 49 USC § 5303(h)(2).

Statewide and nonmetropolitan transportation planning: “The statewide transportation planning process shall provide for the establishment and use of a performance-based approach to transportation decisionmaking to support the national goals...and the general purposes [of the public transportation program]. The performance measures and targets established [in relation to national performance measures] shall be considered by a State when developing policies, programs, and investment priorities reflected in the statewide transportation plan and statewide transportation improvement program.” 23 USC § 135(d)(2); 49 USC § 5304(d)(2).

⁴ FHWA, The Transportation Planning Process: Key Issues – A Briefing Book for Transportation Decision-makers, Officials, and Staff, <http://www.planning.dot.gov/documents/briefingbook/bbook.htm>.

⁵ 23 USC §135(a)(2).



In addition to new Federal requirements related to performance-based planning, there are a wide range of other requirements associated with transportation plan development that remain unchanged. A performance-based plan, consequently, should address system performance outcomes within the context of these established requirements -- addressing issues such as public involvement, agency consultation, and environmental mitigation – and recognizing the significant experience that MPOs and State DOTs have in developing and updating their transportation plans.

Moreover, many transportation agencies have been increasing their use of data and performance measures within planning, including use of visualization, scenario planning, and other tools to communicate performance information within transportation plan development. As agencies around the country continue to advance approaches to use and communicate performance information in transportation planning, this Guidebook highlights good practices related to performance-based transportation plan development.

Organization of Guidebook


The guidebook starts with an overview of key elements of a performance-based transportation plan and the role of stakeholder participation and agency collaboration in this process. It then is structured to loosely reflect the steps associated with development of a performance-based transportation plan.

Chapter 2: Overview of Developing a Performance-Based Transportation Plan discusses key elements of a performance-based plan. These elements include goals and objectives, performance measures, targets, system performance reports, and investment strategies. This chapter also discusses the range of issues addressed by the transportation plan.

Chapter 3: Public and Stakeholder Participation and Agency Collaboration discusses the vital role of public, stakeholder, and agency engagement throughout the plan development process. A performance-based plan, in particular, will engage agency partners, the public, and stakeholders in discussions about desired performance outcomes, understanding how performance will be measured and is changing, and in making tradeoffs associated with investment decisions.

Chapter 4: Scoping and Baseline Information captures the significant amount of background work necessary at the beginning of plan development. Some agencies refer to this as a scoping step where supporting materials are collected and baseline information is gathered, including a description of the multimodal transportation system, existing system performance, anticipated challenges, and revenue forecasts.

Chapter 5: Strategic Vision, Goals and Objectives addresses the strategic elements of the transportation plan. Plan development often includes visioning in order to engage communities and stakeholders in defining what they want their State, region, or community elements to look



like. Goals and objectives identify desired outcomes and are used as a basis for selecting performance measures.

Chapter 6: Performance Measures and Targets addresses the use of measures and targets as focal points for investment decisionmaking in a performance-based transportation plan. Performance measures will include national measures established by US DOT, as well as community-driven measures, as desired. Target-setting methods are based on factors including available resources, trend analysis, and data.

Chapter 7: The System Performance Report discusses the existing performance of the transportation system, State, or region, in relation to established performance measures and targets. As agencies integrate on-going information collection into cycles of plan development, the system performance report may serve as a key component of the baseline information that informs future plan development cycles and as a tool to communicate with the public and other stakeholders.

Chapter 8: Identification of System Needs, Potential Strategies, and Costs discusses approaches used to identify investment needs to meet desired performance outcomes, to identify and screen strategies and projects concepts, and estimate costs.

Chapter 9: Investment Analysis and Selection discusses scenario analysis, and identifies approaches for assessing and selecting investment priorities in the transportation plan based on performance information.

Chapter 10: Beyond the Transportation Plan: Connecting to the STIP/TIP and Measuring Progress discusses how the transportation plan can be translated into programming decisions that reflect priorities identified through the planning process.

Chapter 11: Case Studies provides more in-depth examples of development of two MTPs (developed by the Metropolitan Transportation Commission in the San Francisco Bay Area and the Pikes Peak Area Council of Governments in the Colorado Springs region), two statewide LRTPs (Michigan DOT's Statewide Transportation Plan, and Arizona DOT's long range plan), and the project prioritization process used by a rural transportation planning organization (the North Central Pennsylvania Planning and Development Commission).

The **Appendix: Federal Requirements for Transportation Plans** documents **Federal transportation planning requirements** for MPOs and State DOTs, specifically focused on their transportation plans.

A **Resources** section at the end of the Guidebook provides links to the resources identified in each section of the document.



2. Overview: Developing a Performance-Based Transportation Plan

A performance-based transportation plan is the centerpiece of a comprehensive performance-based transportation planning process, and serves as an umbrella document that guides development of STIPs, TIPs, and capital programs.

Building on current practice and based on Federal requirements for these documents, there are variations in how States and regions develop, structure, and present their transportation plans. This flexibility enables State DOTs, RTPOs, and MPOs to develop their transportation plans in ways that meet and respond to the needs of their communities. Historically, State LRTPs have often been strategic documents, which lay out key priorities, policies, and strategies, but may not identify a specific set of planned investments. State DOTs often include more detailed strategies and investment plans in supporting documents, including modal plans, operations plans, freight plans, and the like. By contrast, MTPs generally include more detailed information on specific investments and involve more extensive modeling and analyses of alternatives. This is in response to Federal requirements to demonstrate that improvements will address system deficiencies as well as meet fiscal constraint. Moreover, in regions where transportation air quality conformity is part of the requirements, this detailed analysis is conducted to demonstrate conformity.

Similarly, a performance-based transportation plan may be developed and organized in different ways – there is no one formula or standardized approach to use. However, there are some common elements that make a transportation plan performance-based.

Key Elements of a Performance-based Transportation Plan

As a strategic document that lays out a vision for the future, a transportation plan may be designed in a fairly simple format to communicate key issues to the public. The transportation plan is developed with a minimum 20-year forecast period at the time of adoption that provides for the development and implementation of the multimodal transportation system. It also may encompass a range of more technical information. Regardless of how a transportation plan is structured and whether it is developed for a State, rural area, or metropolitan area, a performance-based transportation plan plays a key role in a performance-based planning and programming process, as shown in Figure 2-1.


Figure 2-1. Framework for PBPP



Source: FHWA Performance-based Planning and Programming Guidebook, Page iv.

In fact, the development of a performance-based transportation plan encompasses all of the key elements shown in Figure 2-1 under “Planning.” It includes the setting of a strategic direction (“where do we want to go?”), which encompasses goals and objectives and performance measures. This step is built on a foundation of data from monitoring and evaluation of system performance (the feedback loop from implementation activities, answering the question, “where are we now?”). The development of a performance-based plan includes analysis of how the State or region will move toward achieving identified goals and objectives through investments and policies (“how are we going to get there?”). The resulting transportation plan identifies achievable targets and investment priorities, including capital and operating strategies that will be carried forward into programming.

Transportation agencies typically are already undertaking many of the actions identified in “PBPP” so developing a performance-based transportation plan builds on existing practice. What a model performance-based approach brings is a more systematic approach to using information on



transportation system performance – past, present, and anticipated future – in order to develop investment priorities.

A performance-based transportation plan should include the following:

1. Baseline information on the transportation system

- a. Identification of elements of the integrated multimodal transportation system⁶ – Existing transportation facilities, including major roadways, transit, multimodal and intermodal facilities, pedestrian walkways and bicycle networks, and intermodal connectors. Particularly for States, the plan should address commercial motor vehicle, waterway, and/or aviation facilities, particularly with respect to intercity travel.
- b. A compilation of baseline data – the latest available estimates and assumptions for population, land use, travel, mode share, employment, congestion, and economic activity current and forecasted transportation and land use conditions and trends.
- c. Consideration of applicable planning studies, policies, performance-based plans (such as the State Strategic Highway Safety Plan⁷, State Asset Management Plan⁸, MPO Congestion Management Process⁹, Transit Asset Management Plan¹⁰, or State Freight Plan¹¹), disaster preparedness plans, conservation plans, inventories of natural or historic resources, and modal plans such as rail plans, pedestrian and bicycle plans, and transit plans. Key regional equity and environmental justice issues such as access to jobs and affordability should also be considered.
- d. Consideration and analysis of revenue projections based on realistic assumptions about funding all capital, operating, and maintenance costs associated with the surface transportation system. This may be a somewhat iterative process, revisited as new information and forecasts are developed through the plan development.

- 2. Goals and objectives** – The transportation plan lays out a vision for the future of the area (State or region). In a performance-based approach, the transportation plan clearly identifies goals and objectives, which play a critical role in driving a performance-based approach to decisionmaking. Goals reflect key priorities for desired outcomes for the

⁶ 23 USC § 134 (i)(2)(A) and 23 USC § 135 .


⁷ 23 USC § 148.

⁸ 23 USC § 119(e)(4).

⁹ 23 USC § 134 (k)(3).

¹⁰ 49 USC § 5326(c).

¹¹ 23 USC § 167.



transportation system and/or for society as a whole. Supporting objectives are specific, measurable statements that support achievement of goals, and play a key role in shaping investment and policy priorities. Goals and objectives should reflect State or regional priorities and policy directions, while considering the Federally-required planning factors and supporting national goal areas specified in law. Goals and objectives may be derived from other transportation or related plans and processes.

3. **Performance measures** – A performance-based transportation plan includes performance measures that are used to support objectives and help in making informed investment and policy decisions. Performance measures serve as a basis for comparing alternative improvement strategies and for tracking performance over time. The selection of performance measures is a critical selection that will guide the analysis and selection of policies and investment strategies.
4. **Preferred Trends and Targets** – The transportation plan should identify the intended direction (e.g., reduce, increase, maintain) for each measure, and/or identify specific targets (numerical levels) to attain. These preferred trends and targets are used to compare plan alternatives against the desired level, and serve as a basis for tracking progress over time. Federal law requires States and MPOs to set targets in relation to a set of national performance measures; these targets are required to be included in the MTP and should be included in the statewide LRTP.¹² Identifying specific targets will be informed by analysis of financial resource constraints, as well as expected trends in population and other factors.
5. **System Performance Report** – A performance-based transportation plan includes a discussion of conditions and performance of the transportation system, relative to the targets and desired trends identified in the document. This information can serve as baseline information within the plan, and typically will include tracking of progress over several years to show recent trends in performance. As planning occurs through multiple cycles, the system performance report serves as a baseline in development and refinement of plan goals, objectives, and targets. For instance, information from the performance report can be used to support refinement of targets associated with the time-frame of the transportation plan as well as near-term or mid-term targets. A system performance report evaluating the condition and performance of the transportation system with respect to

¹² 23 USC § 134 (i)(2)(B) and 23 USC § 135 (f)(7)(A).

performance targets established for the national performance measures is required for the MTP and should be included in the statewide LRTP.¹³

6. **Forecasts of Future Conditions and Needs**¹⁴ – In addition to documenting past performance, the transportation plan should identify future factors and conditions that will impact performance, and needs. Anticipated trends in population, mode share, employment, freight movement, and other factors – as well as expected revenues for transportation investments and stressors on the transportation system (such as a backlog of maintenance needs) – will affect the future of a State or region, including the ability to attain desired outcomes. Needs relate to the ability to attain targets or preferred trends, and address the shortfall between expected performance and desired conditions. Taken together, needs reflect the investment required to bring the system to the level of performance at which all targets would be achieved during the time horizon of the plan.
7. **Strategies and Investments**¹⁵ – The transportation plan should identify policies, strategies, and investments that will support the attainment of performance targets and desired trends, ultimately helping to support desired goals. These will include operational and management strategies, capital investment and other strategies, and transit enhancement activities. In addition, bicyclists and pedestrians shall be given due consideration in the comprehensive transportation plans developed by each MPO and State.¹⁶ In a performance-based approach, scenario analysis may be a useful approach to compare alternative transportation investment and land use options, as well as alternative levels of funding. Priorities should have a clear link to the goals and objectives stated earlier in the plan, and should be used to guide project priorities including in the STIP and TIP.
8. **Financial plan** – To determine how the adopted strategies in the transportation plan can be implemented, the transportation plan should indicate resources from public and private sources that are reasonably expected to be made available to carry out the plan, potentially including additional financing strategies. A financial plan is required in MTPs, and may be included in the statewide LRTPs.¹⁷

¹³ 23 USC § 134 (i)(2)(C) and 23 USC § 135 (f)(7)(B).

¹⁴ 23 USC § 134 (i)(2)(F) &(G) and § 135.

¹⁵ 23 USC § 134 (i)(2)(F) & (G) and 23 USC § 135 (f)(8).

¹⁶ 23 USC § 217; see also http://www.fhwa.dot.gov/environment/bicycle_pedestrian/overview/policy_accom.cfm.

¹⁷ 23 USC § 134 (E) and 23 USC § 135 (F).

Federal law calls for statewide LRTPs and MTPs to include a description of the performance measures and targets associated with the national performance measures established by U.S. DOT.¹⁸ However, a performance-based transportation plan should not only address national goals and performance measures, but also be driven by the State or region’s own priorities. Building on public input and coordination with stakeholder agencies and organizations, a performance-based transportation plan addresses a full range of transportation system and societal performance outcomes selected for the plan.

The table below identifies how Federal code describes these performance-based elements of transportation planning.

Table 2-1. Performance-based Elements of Transportation Planning Specified in Federal Law

Plan Element	State	Metropolitan
	Planning Process	
Performance-based approach	“The statewide transportation planning process shall provide for the establishment and use of a performance-based approach to transportation decisionmaking to support the national goals...” (23 USC §135(d)(2)(A)) “The performance measures and targets established [in relation to national performance measures] shall be considered by a State when developing policies, program, and investment priorities reflected in the statewide transportation plan.” (23 USC §135(d)(2)(D))...	“The metropolitan transportation planning process shall provide for the establishment and use of a performance-based approach to transportation decisionmaking to support the national goals...” (23 USC §134(h)(2)(A)) “[MPOs]..., in cooperation with the State and public transportation operators, shall develop long-range transportation plans and transportation improvement programs through a performance-driven, outcome-based approach to planning.” (23 USC § 134(c)(1))
Performance targets	“Each State shall establish performance targets that address [the national performance measures], where applicable, to use in tracking progress towards attainment of critical outcomes for the State.” (23 USC §135(d)(2)(B))	“Each metropolitan planning organization shall establish performance targets that address [the national performance measures], where applicable, to use in tracking progress towards attainment of critical outcomes for the region of the metropolitan planning organization.” (23 USC §134(h)(2)(B))
Integration of other performance-based plans¹⁹	“shall integrate into the statewide transportation planning process, directly or by reference, the goals, objectives, performance measures, and targets described in this	“shall integrate in the metropolitan transportation planning process, directly or by reference, the goals, objectives, performance measures, and targets described in other State

¹⁸ 23 USC § 134(i)(2)(B) and 23 USC § 135 (f)(7)(A).

¹⁹ Examples of other performance-based plans include the National Highway System asset management plan (23 USC § 119(e)); the Transit Asset Management Plan (49 USC § 5326); applicable portions of the Highway Safety Improvement Program, including the Strategic Highway Safety Plan (23 USC § 148); the Public Transportation Agency Safety Plan (49

paragraph, in other State transportation plans and transportation processes, as well as any plans developed pursuant to chapter 53 of title 49 by providers of public transportation in urbanized areas not represented by a metropolitan planning organization required as part of a performance-based program.” (23 USC § 135(d)(2)(C))

transportation plans and transportation processes, as well as any plans developed under chapter 53 of title 49 by providers of public transportation” (23 USC § 134(h)(2)(D))

Transportation Plan Component

Performance measures and targets

Encouraged – “...should include...a description of the [national] performance measures and performance targets used in assessing the performance of the transportation system...” (23 USC § 135(f)(7)(A))

Required – “A description of the performance measures and performance targets...[for the national measures]” (23 USC § 134(i)(2)(B))

System performance report

Encouraged - “...should include...a system performance report and subsequent updates evaluating the condition and performance of the transportation system with respect to the performance targets [for the national measures]” (23 USC § 135(f)(7)(B))

Required – “Evaluating the condition and performance of the transportation system with respect to the performance targets [for the national measures]” (23 USC § 134(i)(2)(C))

Strategies

Encouraged - “Should include capital, operations, and management strategies, investments, procedures, and other measures to ensure the preservation and most efficient use of the existing transportation system.” (23 USC § 135(f)(8))

Required to include:

- Operational and management strategies (23 USC § 134(i)(F))
- Capital investment and other strategies (23 USC § 134(i)(G))
- Transportation and transit enhancement activities (23 USC § 134(i)(2)(H))

Financial plan

Encouraged - “May include...a financial plan that “(i) demonstrates how the adopted statewide transportation plan can be implemented; “(ii) indicates resources from public and private sources that are reasonably expected to be made available to carry out the plan; and (iii) recommends any additional financing strategies for needed projects and programs.” (23 USC § 135(f)(5)(A))

Required – “A financial plan that--(I) demonstrates how the adopted transportation plan can be implemented; (II) indicates resources from public and private sources that are reasonably expected to be made available to carry out the plan; and (III) recommends any additional financing strategies for needed projects and programs.” (23 USC § 134(i)(2)(E))

USC § 5329(d); the Congestion Mitigation and Air Quality Improvement Program performance plan (23 USC § 149(l)); the State Freight Plan (MAP-21 sec. 1118); and the congestion management process.

It is important to note that in addition to the performance-based elements noted above, a transportation plan must meet all Federal transportation planning requirements, which include the following:


- ▶ Eight planning factors,²⁰ which must be considered in the planning process (and may be used as a basis for developing plan goals, objectives, and performance measures)
 - (A) support the economic vitality [of the United States, the States, nonmetropolitan areas, and metropolitan areas], especially by enabling global competitiveness, productivity, and efficiency;
 - (B) increase the safety of the transportation system for motorized and nonmotorized users;
 - (C) increase the security of the transportation system for motorized and nonmotorized users;
 - (D) increase the accessibility and mobility of people and for freight;
 - (E) protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;
 - (F) enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
 - (G) promote efficient system management and operation; and
 - (H) emphasize the preservation of the existing transportation system.
- ▶ Consultation with various interested parties, including:
 - With respect to each area of the State under the jurisdiction of an Indian tribal government, consultation with the tribal government and the Secretary of the Interior²¹
 - Consultation with other agencies, which include State and local agencies responsible for “land use management, natural resources, environmental protection, conservation, and historic preservation”²²
 - Coordination with air quality agencies, required in metropolitan areas that are in nonattainment for ozone or carbon monoxide²³

²⁰ 23 USC § 134(h)(1) and 23 USC § 135(d)(1).

²¹ 23 USC § 135(f)(2)(C).

²² 23 USC § 134(i)(5)(A) and 23 USC § 135(f)(2)(D).

²³ 23 USC § 134(i)(3).

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- ▶ Participation by interested parties – “provide citizens, affected public agencies, representatives of public transportation employees, freight shippers, providers of freight transportation services, private providers of transportation, representatives of users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, and other interested parties with a reasonable opportunity to comment” on the plan.²⁴
 - ▶ A discussion of environmental mitigation activities and potential areas in which to carry out these activities.²⁵ Identification and assessment of human and natural environment should occur, including but not limited to community assessment, cultural resources, historic resources, farmlands, wetlands and/or ecosystem and wildlife habitat as appropriate.
 - ▶ Analysis of equity and environmental justice - Title VI of the 1964 Civil Rights Act (42 U.S.C. 2000d-1) and agency implementing regulations prohibit recipients of Federal financial assistance from taking actions that discriminate on the basis of race, sex, color, national origin, or religion. Title VI bars intentional discrimination as well as disparate impact discrimination (i.e., a neutral policy or practice that has a disparate impact on protected groups). Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, further amplifies Title VI by providing that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." These requirements apply not only during project development, but as well to the processes and products of statewide and metropolitan transportation planning, including development of transportation plans.²⁶

The guiding EJ principles followed by DOT are briefly summarized as follows:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

²⁴ 23 USC § 134(i)(6) and 23 USC § 135(f)(3).

²⁵ 23 USC § 134(i)(D) and 23 USC § 135(f)(4)(A).

²⁶ For more information, see: FHWA, “Implementing Title VI Requirements in Metropolitan and Statewide Planning” at http://www.fhwa.dot.gov/environment/environmental_justice/facts/ej-10-7.cfm.



Formats for Performance-based Transportation Plans

Given the different Federal requirements for transportation plans at the statewide and metropolitan levels, a performance-based plan may take on different formats and include different levels of detail.

A MODEL PERFORMANCE-BASED TRANSPORTATION PLAN

A model performance-based transportation plan identifies goals, key performance measures and targets; discusses existing system performance; and identifies a prioritized set of investments and policies that support attainment of targets, based on a financial plan. Based on MAP-21 requirements, MPOs must incorporate performance measures, targets, a system performance report, and financial plan directly into their transportation plans. State L RTPs also may use this approach.

An example of a model performance-based metropolitan transportation plan is Plan Bay Area, adopted in 2013 by the **Metropolitan Transportation Commission (MTC)**, the MPO for the San Francisco Bay Area, and the Association of Bay Area Governments (ABAG). Plan Bay Area is an integrated land use, transportation, and housing plan. Plan Bay Area was developed within a framework of performance measures, and includes 10 key and ambitious targets adopted based on input from a broad range of stakeholders engaged in the process. Two of the targets are mandated by State law – addressing greenhouse gas emissions and adequate housing – and the other eight voluntary targets seek to promote healthy and safe communities, as well as equity concerns, economic vitality, and transportation system effectiveness. With the targets clearly identified, MTC and ABAG formulated possible scenarios — combinations of land use patterns and transportation investments — that could be evaluated together to see if (and by how much) they achieved (or fell short of) the performance targets. An iterative process of scenario-testing yielded preferred alternatives, both for transportation investments and a land use strategy, which were adopted in the plan. The transportation component of the plan lays investment strategies and identifies specific projects and programs to be implemented over the duration of the plan timeframe. The plan also contains a chapter on “performance,” which describes how the plan performs against each of the targets.²⁷

²⁷ For more information, see: Plan Bay Area, <http://www.onebayarea.org/regional-initiatives/plan-bay-area/final-plan-bay-area.html>, as well as the case study on MTC in Chapter 11.

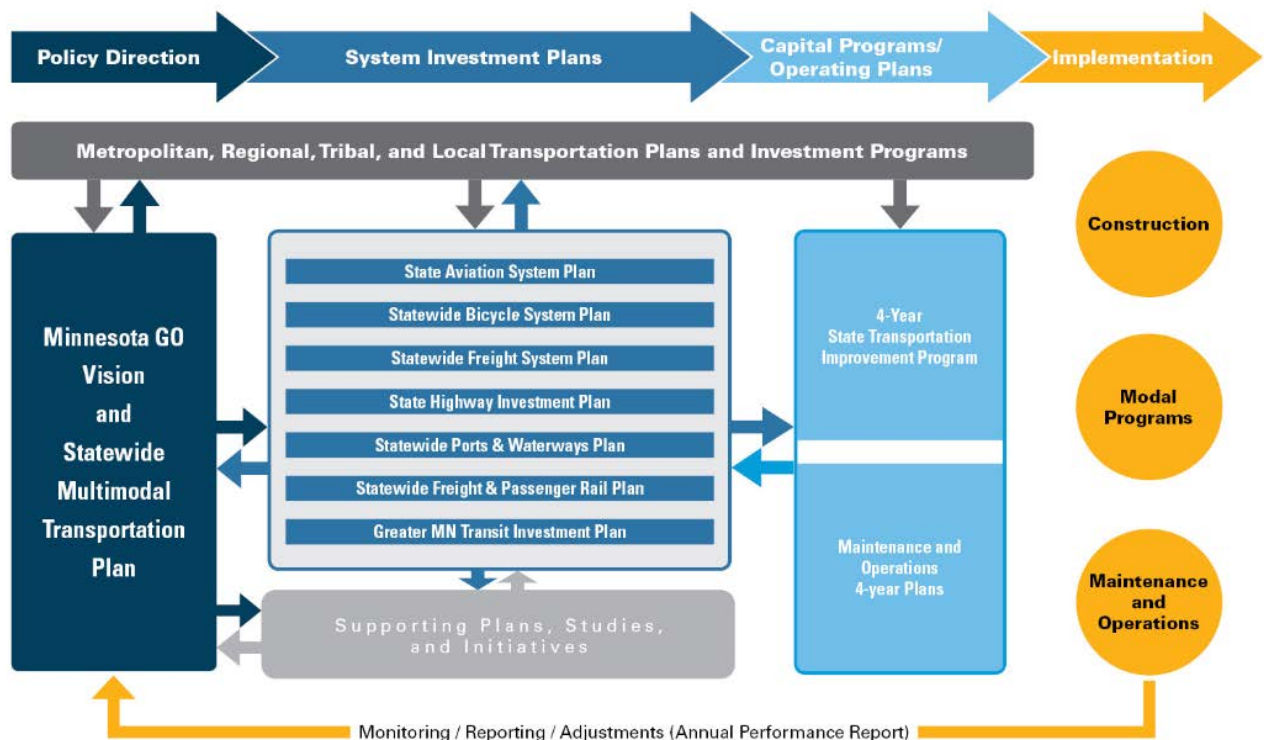
A DOCUMENT THAT PROVIDES STRATEGIC DIRECTION TO A “FAMILY” OF PLANS OR THE PROGRAMMING PROCESS

As a strategic document, an alternate approach sometimes used by the State DOT is for the statewide LRTP to set the direction for investment decisionmaking by laying out goals, objectives, and performance measures, and connect to more detailed modal or investment plans or to the STIP, which includes more detail on targets, specific investments, and prioritization processes. For instance, a high-level policy or strategy document in the transportation plan may be combined with more detailed investments plans that cover portions of the transportation system.

As an example of this approach, **Minnesota DOT (MnDOT)** shows a strong connection among a family of plan documents that together link the transportation plan to more detailed planning and programming using a performance-based approach, as shown in Figure 2-2.

Figure 2-2: MnDOT Family of Plans

MnDOT Plans and Programs



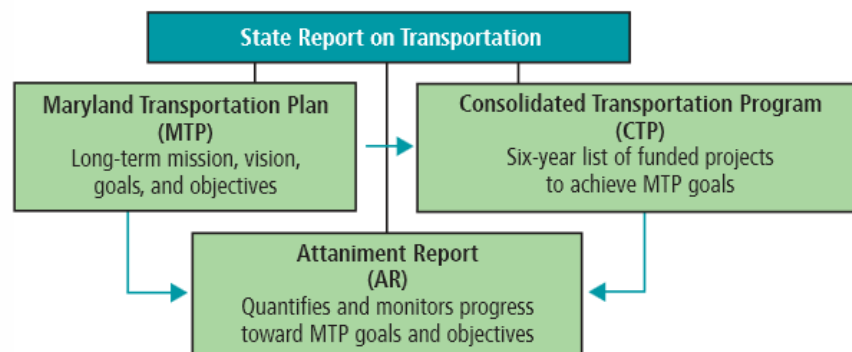
Source: Minnesota Department of Transportation, *Minnesota State Highway Investment Program*, Page 11.

The MnDOT approach is based on a 50-year vision, and has four tiers. The first tier consists of policy direction, which guides the agency. Policy direction comes from the Statewide Multimodal

Transportation Plan (SMTP), which is updated every four years, and describes statewide policy objectives and strategies to help MnDOT and its partners make progress toward the Minnesota GO 50-year vision. Each SMTP objective is accompanied by a performance measure or collection of performance measures that track the effectiveness of SMTP strategies. The second tier is the State’s modal investment plans (State Highway Investment Plan, the Highway Systems Operations Plan, the Greater Minnesota Transit Investment Plan, the State Aviation System Plan, and others), which are updated every four to six years, and use measures and targets to assess system performance, identify needs, and establish spending priorities. The third tier is the Statewide Transportation Improvement Program (STIP), which is updated annually and documents projects to be funded and implemented over the upcoming four years. The fourth tier is implementation of capital projects, modal programs, and operations. The State’s annual performance report is the main mechanism through which up-to-date information informs the other tiers in the planning process.

As another example of a performance-based transportation plan that is largely policy-based, the **Maryland DOT** focuses on system performance outcomes with clear connections across three key documents: the Maryland Transportation Plan (MTP), the Consolidated Transportation Program (CTP), and the annual Attainment Report (AR), as shown in the following diagram.²⁸


Figure 2-3: Connections between MTP, CTP, and AR in Maryland



Source: Maryland Department of Transportation.

The MTP lays out a strategic direction for the State’s transportation investments, and identifies key goals and strategies and performance measures. In recent years, Maryland DOT has made an explicit connection between the MTP and the projects in the CTP. For each project in the CTP, each

²⁸ For more information, see: Maryland DOT, http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/Maryland_Transportation_Plan/index.html.



of the modal agencies of Maryland DOT must identify which of the MTP's goals (one or more) the project supports. Moreover, as of 2010, Maryland DOT requires all localities submitting their requested list of projects to provide information on which MTP goals the project would support. By placing more responsibility on local governments to consider how their priorities support State goals, Maryland DOT hopes agencies throughout the State will increasingly see the MTP as a plan that guides not only the State DOT but works broadly to advance the State goals. The Attainment Report is developed annually and tracks progress toward MTP goals and objectives using performance data. The Attainment Report identifies specific targets that have been developed for many of the objectives by the modal agencies.

Process of Developing a Performance-based Transportation Plan

The process of developing a performance-based transportation plan relies on data to inform decisions, as well as stakeholder engagement and interagency collaboration. While there is no one schedule or flow diagram for development of a transportation plan that applies to all agencies, the process of developing a performance-based transportation plan typically involves the following key steps: visioning through public and stakeholder outreach (with performance information used in communications), establishing a baseline (including information on existing conditions, revenue forecasts, and future challenges and needs), setting goals and objectives, identifying performance measures, setting targets, analyzing investment scenarios, establishing an investment and financial plan, and monitoring progress toward plan goals through the collection of performance information. These steps may not all be sequential, but generally are somewhat iterative. Public and stakeholder participation, as well as communication and collaboration among agencies, should occur throughout the process.

Below are two examples of transportation plan development processes that include the key steps discussed throughout this guide, yet also reflect the diversity in ways in which a performance-based plan may be developed (more details on these examples are available in the case studies in Chapter 11).

MPO Example: Pikes Peak Area Council of Governments' MTP

The ***Pikes Peak Area Council of Governments (PPACG)***, the MPO for the Colorado Springs, CO region, used a performance-based approach in developing its *Moving Forward Update: 2035 RTP*, relying on data and public, stakeholder, and agency engagement to develop investment priorities. Its process involved the following steps:

- ▶ Step 1: Establish the Foundation for Decision Making: Development of a Vision, Mission and Principles

- Each of the advisory committees reviewed PPACG's vision, mission, and principles and made some minor changes from the last update in 2008.
- ▶ Step 2: Develop Transportation Goals and Performance Measures
 - Through workshops, stakeholders identified their key issues and expressed desired goals and measures; this resulted in 17 goals. PPACG then used additional public involvement techniques, such as focus groups and attendance at numerous community events to increase input on the goals and measures.
- ▶ Step 3: Gather Baseline Conditions
 - The PPACG transportation team obtained data assembled from local, State and Federal agencies, along with many feasibility and environmental studies conducted in the region. The team then identified data needs for evolving the agency's knowledge of investment types, locations, and impacts.
- ▶ Step 4: Define Evaluation Criteria and Assign Weighting
 - PPACG developed criteria to evaluate projects relative to each goal. PPACG then created a customized Multi-Criteria Analysis (MCA) process to assist decision-makers in evaluating the relative importance of each goal in relation to the other goals. Input for this process was obtained from the Technical Advisory Committee, the Community Advisory Committee, and a random dial telephone survey.
- ▶ Step 5: Develop Regional Modeling System
 - Using a variety of forecasting and analysis tools (travel models and other software), PPACG staff developed materials to inform stakeholders and the public on investment alternatives. Limitations to the approach were identified to be addressed in future planning cycles.
- ▶ Step 6: Create Preferred Planning Scenario
 - Using a facilitated process, three (trend, in-fill, and conservation) alternative future socio-economic scenarios were developed. These scenarios were then evaluated using the PPACG modeling tools against the adopted goals and by staff from participating agencies to identify issues with their goals and plans.
- ▶ Step 7: Evaluate and Score Projects
 - Project scoring was discussed with project applicants and potential scoring process and criteria adjustments were considered. The board-approved goal weightings were used to show the relative importance of each goal. Staff scored each submitted project using the modeling tools for three scenarios (preferred, in-fill,

conservation/sprawl) and found that 75 percent of the top-scoring projects were top-scoring regardless of which scenario was employed.

- ▶ Step 8: Create a Fiscally Constrained Project List
 - The PPACG plan participants used the scores and financial plan to create a fiscally constrained project list. The agency also considered how to enhance flexibility and target known problem areas. This list was approved with some modifications by the Board of Directors.
- ▶ Step 9: Identify Methods to Minimize and Mitigate Undesirable Impacts
 - PPACG identified ways to reduce potential impacts and eliminate fatally-flawed projects. Staff emphasized that further refinement of this process to ensure context sensitive solutions would be necessary in future planning cycles.
- ▶ Step 10: Ongoing Monitoring of the Moving Forward Update 2035 RTP
 - PPACG evaluated monitoring techniques and sought public input on them. The agency has identified monitoring techniques as an area with high potential for future improvement.

By involving various stakeholders and technical committees, and laying out clear criteria for project scoring, PPACG was able to bring additional transparency to its planning process and enhance plan readers' understanding of how the plan were created and refined. For more process details, see Chapter 2 of PPACG's Moving Forward Update.²⁹

State DOT Example: Arizona LRTP

In 2011, **Arizona DOT** completed its statewide long-range transportation plan, *What Moves You Arizona*, with a horizon year of 2035. The LRTP is strategic in nature, and provides direction to guide future investments; it does not examine or recommend specific projects. It takes a performance-based approach by documenting existing conditions, as well as future trends that could influence system performance and investment needs; defining State transportation system goals, objectives, and performance measures that reflect input from stakeholders and partner agencies; assessing future needs and anticipated revenues; considering an array of programmatic investment choices to illustrate likely future system performance under different investment mixes; and establishing a preferred investment option that is based on a realistic revenue forecast (fiscally-constrained). The plan also builds on the comprehensive 2050 land use and multimodal transportation vision developed in the *Building a Quality Arizona (bqAZ)* plan.

²⁹ Available at: http://www.ppacg.org/files/TRANSP/LRTP-Jan2012/chap2_planning.pdf.


The plan was developed based on the following “Building Blocks,” with public and stakeholder involvement at each key step of its process:

Figure 2-4: Arizona Plan Development Process: Building Blocks



Source: Arizona DOT, *What Moves You Arizona: 2010-2035 Long-Range Transportation Plan* (2011), Page 14.

- ▶ **Plan Requirements and Vision:** The LRTP’s initial activities involved acknowledging previous and concurrent plans, Federal and State requirements, and existing conditions, as developed in the *Transportation in Arizona Report*. Initial activities also included the development of Plan goals, objectives, and performance measures. The six *Building a Quality Arizona* principles were adopted as “bedrock goals,” while goals for system preservation, partnership, and fiscal stewardship were added as Arizona DOT’s priorities. Arizona DOT then developed modal objectives for each goal area and high-level performance measures. In this step, Arizona DOT also identified its role (owner-operator, partner, participant, or none) in achieving each plan goal.
- ▶ **Plan Technical Analysis:** Technical analysis was conducted in order to determine a Recommended Investment Choice (RIC).
 - First, 25-year baseline revenues were estimated, along with an estimate of multimodal transportation needs and the cost to meet these needs. These needs were explained and analyzed by mode.
 - Using the projected available revenues and 25-year multimodal needs as a base, Alternative Investment Choices (AICs) were developed and considered by ADOT and were vetted through a Plan committee structure and extensive stakeholder and public outreach. AICs were defined at revenue baseline by considering investment



mixes between preservation, modernization, and expansion improvements. Plan performance measures – including mobility and accessibility, system preservation, economic development, linking transportation and land use, environmental performance, safety, and investment in alternative modes – then were used to compare the outcomes of Plan implementation and develop a RIC. The RIC emphasizes preserving and modernizing the existing highway system, with limited expansion – a significant departure from historic investment patterns.

- The Plan also involved analysis of revenues that would be required to meet two additional scenarios: “full state needs” and “vision” (implementing the first 25 years of the 2050 *bqAZ* vision).

▶ **Plan Implementation** - The LRTP recognized that implementation will occur over time and will require commitment to delivering a capital program that is responsive to LRTP recommendations. A final step in the LRTP process involved identification of new and enhanced policies in areas like access management, context sensitive solutions, complete streets, enhanced data and technical methods, and processes to reflect the focus on preservation and modernization. Policies for monitoring implementation of the plan over time were also identified.

For more information about Arizona DOT’s plan development process, see Chapter 2 of *What Moves You Arizona*.³⁰

These two examples highlight that although the two plans are quite different in scope – the PPACG Plan identified specific projects, while the Arizona Plan identified general investment priorities – both MPOs and State DOTs can use a performance-based approach to the development of their transportation plans, and will involve many similar steps.

³⁰ *What Moves You Arizona: Long-Range Transportation Plan, 2010-2035*: <http://www.azdot.gov/docs/default-source/planning/lrtp-2011-1129.pdf?sfvrsn=2>.

3. Public and Stakeholder Participation and Agency Collaboration

Public and stakeholder participation, and cooperation and consultation with other government agencies, are hallmarks of effective transportation plan development. The “cooperative” aspect of transportation planning has been included in the Federal regulations since ISTEA as a part of the 3-C (continuing, cooperative and comprehensive) process. The development of a transportation plan must include participation by interested parties, including the general public, transportation providers, and representatives of system users.³¹ State DOTs and MPOs also must consult with other agencies and governments in the development of the transportation plan. For instance, in the development of the MTP, MPOs are required to consult “with State and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation,”³² as appropriate. When public lands or Indian Tribal lands are within a metropolitan area, the MPO shall ensure appropriate involvement for affected Federal agencies and Indian Tribal governments.³³ State DOTs are required to coordinate with MPOs, regional transportation planning organizations (RTPOs), and Indian tribal governments, as applicable, in the development of the statewide LRTP, as well as State and local agencies.³⁴

The development of a performance-based transportation plan is supported by this cooperative and consultative process. A performance-based approach provides both a challenge and an opportunity by introducing a data-driven aspect that must be effectively communicated to a range of participants in the planning process. Key benefits include a better-informed public and stakeholders, agreement on common goals and desired performance outcomes among agencies, and in turn, improved investment decisions that meet the needs of the traveling public, businesses and industry, and communities.

³¹ 23 USC § 134 (i)(6) and 23 USC § 135 (f)(3). MPOs and States “shall provide citizens, affected public agencies, representatives of public transportation employees, freight shippers, providers of freight transportation services, private providers of transportation, representatives of users of public transportation, representatives of users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, and other interested parties a reasonable opportunity to comment on the proposed plan.” Also, States “shall provide nonmetropolitan local elected officials or, if applicable, through regional transportation planning organizations...an opportunity to participate.”

³² 23 USC § 134 (i)(5).

³³ For more information, see: <http://www.tribalplanning.fhwa.dot.gov/consult.aspx>, which includes all relevant statutory and regulatory references.

³⁴ 23 USC § 135 (f)(2).

Engagement in a Performance-based Plan

Engagement of the public, stakeholders, and other agencies should occur throughout the process of developing a performance-based transportation plan – from the early steps of setting of a strategic direction through the analysis of investment options and selection of a preferred investment approach. While the following sections of this guidebook discuss these steps in more detail, this section highlights some key roles for this engagement within the development of a performance-based plan:

- ▶ Defining a vision, goals, and objectives,
- ▶ Identifying performance measures that reflect key goals and objectives,
- ▶ Selecting preferred trends and targets, and
- ▶ Making trade-offs to develop investment priorities.

Defining a Vision, Goals, and Objectives

While most transportation plans involve the public and stakeholders in defining a vision, a performance-based plan places increased importance on developing clear agreed-upon goals and objectives, since the strategic direction of goals and objectives will be used in defining performance measures. Consequently, it is critical for public involvement to engage participants in defining desired *outcomes*. In a performance-based plan, the public and stakeholders are involved in not just providing general concepts, but clearly defining or prioritizing goals and specific objectives, which will lead to performance measures and achievable targets that are used in assessing plan options and/or selecting investments.

Identifying Performance Measures

While selection of performance measures in a performance-based plan is often thought of as a “data-


ARIZONA'S STATEWIDE PLAN

In preparing *What Moves You Arizona*, the 2035 long range plan for the state, Arizona DOT conducted extensive public outreach to engage participation in determining goal plans. A formal public participation plan was developed in 2009 to guide the outreach process. The Councils of Government and Metropolitan Planning Organizations in the state helped to design the plan, which was also open to public comment.

The Plan focused on public involvement during two key phases: Goals and Objectives and Alternative Investment Choices. Facebook, surveys, videos and radio, TV and newspaper advertising were all used to engage and inform the public to participate in the planning process. For instance, a survey was distributed to collect community input in the goals and objectives for the LRP. Workshops with special interest groups were conducted to review and discuss goals and objectives.



Source: Arizona DOT, *What Moves You Arizona: 2010-2035 Long-Range Transportation Plan* (2011), Page 23: <http://www.azdot.gov/docs/default-source/planning/lrtp-2011-1129.pdf?sfvrsn=2>



driven” process, the public and stakeholders play a critical role in helping to define performance measures to be used in the transportation plan. Therefore, it is important to work with the public and stakeholders to clearly define what is *important* and *meaningful* to measure.

In public engagement, it is important to have the engaged participants help to define what is meant by different objectives and what metric is most appropriate. Goals associated with mobility, livability, and quality of life can manifest themselves in different ways, and stakeholders may have different views of what these terms mean. Working with stakeholders to define how to measure performance helps to clarify what is most critical to the public, and guides the analysis of strategies in the plan.

The public participation plan should therefore actively and continuously strive to use plain language and to ensure that measures used in the plan are understood by the stakeholder community. It is also valuable to make explicit links between how the transportation system affects areas such as livability and quality of life in the discussions of performance outcomes.

Selecting Preferred Trends and Targets

In a performance-based plan, interagency coordination in the development and selection of performance targets across State DOTs, MPOs, and public transportation agencies is important to ensure consistency.³⁵ The public may not play a direct role in setting specific targets, as targets will need to be developed based on technical analysis of historical data, expected future performance, resource constraints, and available strategies. However, the public and stakeholders should play an important role in determining the appropriate direction or desired trends associated with selected performance measures and in helping to inform the priority placed on different goals and objectives.

Making Tradeoffs and Identifying Priorities

Finally, in a performance-based plan, the public and stakeholders will play a key role in examining alternative investment and policy scenarios, and various governments and agencies will provide input to inform the selection of preferred strategies. Within this process, stakeholders can rely upon performance information and the results of analysis to help in understanding the implications of different investment and policy scenarios, and can react to these results and express preference.

³⁵ 23 USC § 134(h)(2)(B)(i)(II).

The following sections describe techniques that can be used to support public and stakeholder participation and interagency collaboration, with a focus on these performance-based aspects of a transportation plan.

Public and Stakeholder Participation

The adopted public participation plan (PPP) associated with a State or regional transportation plan should identify opportunities for engagement as well as useful techniques to employ. Existing communication approaches in the PPP should be evaluated in relation to the type of information and engagement techniques that will be most effective to support the incorporation of performance information in the process of developing the transportation plan.

The PPP includes a process for soliciting information and considering the needs of all affected parties including those traditionally underserved by existing transportation systems, such as low-income and minority households.³⁶

Therefore, appropriate communication of performance-related information should be targeted to each stakeholder need, and should consider effective ways to engage the community in a discussion about desired system performance outcomes and priorities. For example, staff presenting information about the transportation system and expected performance should avoid using technical jargon understood only by transportation professionals. In addition, it should be made clear that the discussion addresses all modes of transportation, including walking, biking, and transit.

FEDERAL REQUIREMENTS FOR PARTICIPATION


Metropolitan transportation planning: MPOs must develop a participation plan “in consultation with all interested parties” and “provide that all interested parties have reasonable opportunities to comment on the contents of the transportation plan” (23 USC §134(i)(6)(B))

Statewide and nonmetropolitan transportation planning: States must develop a consultative process involving regional transportation planning organizations, if available, and “provide that all interested parties have reasonable opportunities to comment on the contents of the transportation plan” (23 USC § 135(f)(3)(A))

Sample Engagement Techniques in a Performance-based Plan

Both the "what" and "how" of engaging the public, stakeholders and other partners must be thoughtfully identified so that the agency receives the kinds of information it needs to advance a performance-based approach. There are a wide range of resources on public involvement techniques, such as the report *Public Involvement Techniques for Transportation Decision-Making*,

³⁶ 23 CFR § 450.210 (a)(1)(vii) and 316 (a)(1)(vii).



which provide useful ideas for engaging audiences.³⁷ The USDOT Public Involvement Reference Tool also includes a wide array of resources and links to 52 State and territories' transportation agency public involvement related websites.³⁸

Because the engagement needed for a performance-based plan extends into more detailed considerations of performance measures and tradeoffs among strategies, it may involve multiple steps and components that go beyond what agencies have conducted in the past. For instance, the ***Champaign Urbana Urbanized Area Transportation Study (CUUATS)***, a division within the ***Champaign County Regional Planning Commission*** in Illinois, developed an extensive array of public involvement strategies for the development of its performance-based LRTP, *Sustainable Choices 2040*. Strategies applied included a roving “community conversations bus,” public meetings, and web site input.³⁹

The public participation plan, therefore, should provide a road map of important steps and sequences, a schedule, identify resources, and assign responsibilities for implementation. This will help frame the outreach and media plan, the number and type of meetings involved, where meetings are held, the types of engagement strategies being used, including web and other input mechanisms, and the anticipated outcomes. Two key components of these strategies in a performance-based plan are to *communicate information* and to *gather information* from the public and stakeholders.

COMMUNICATING INFORMATION


Communicating information is characterized by a flow of information from the planning agency. Within a performance-based planning process, the goal is to provide objective information to the public and other interested parties on relevant issues in a manner that can be easily understood by the target audience. Performance reporting provides transparency that can enhance an agency's credibility in the eyes of policymakers and the general public. Sample methods of information giving include direct marketing (email and mail), factsheets, newsletters, flyers, brochures, and websites.

Making performance information available on a web site can be important in encouraging effective and meaningful communication with the public in developing a performance-based plan. In a performance-based approach, website information can communicate existing and forecasted future system performance, and show the expected performance results or impacts of different packages of strategies or scenarios.

³⁷ See FHWA, http://www.fhwa.dot.gov/planning/public_involvement/publications/techniques.

³⁸ See FHWA, http://www.fhwa.dot.gov/planning/public_involvement/get_involved/aboutpirt.cfm.

³⁹ For more information, see: <http://www.cuuats.org/lrtp/public-involvement>.



Communicating expected future performance can also be helpful for the public and stakeholders to understand and provide informed input to prioritize alternative investment options. As an example, in order to facilitate an understanding of the practical implications of each of the three Minnesota State Highway Investment Plan (MnSHIP) Investment Approaches, **Minnesota DOT** analyzed and included in its outreach materials a fictitious scenario of a seven-hour driving trip from Winona to Bemidji. The “folios” were used to illustrate the key differences in system performance and how the public would experience the transportation system across the three alternative approaches. For instance, the folios note:

- ▶ Under Approach A, pavement condition on the drive is generally good but congestion is a problem for a large portion of the drive. In terms of bicycling conditions, bike trails are available in some areas but generally not well marked or protected.
- ▶ Under Approach B, pavement conditions on interstates and major roads are good, while the condition on local roads varies. Congestion has worsened under this approach, but additional lanes allow for more passing opportunities. Bicycling conditions are generally poor, with bicycle lanes that are unprotected, in poor condition, or nonexistent.
- ▶ Under Approach C, interstates are in good driving condition but other roads are not, causing significant wear and tear on vehicles. Some additional capacity reduces congestion and improves traffic flow. Bicycling conditions are good, with well-marked bike paths, abundant signage, and protected highway crossings for bicyclists.

This hypothetical example was used to help the public understand what conditions it could expect under each of the scenarios, allowing participants to provide meaningful input based on a more thorough understanding of the approaches.⁴⁰

Visualization is a technique that helps translate data into more easily understood graphics and images to more effectively communicate information. Visualization is highly useful in a performance-based planning process to help communicate performance information, particularly for complex, spatially relevant transportation data.⁴¹ The intent of visualization in public engagement is to help the public understand the context, to add insight to problem solving and to communicate with the public. It is used to communicate performance measures, trends and impacts of strategies to the transportation system. Visualization also can help communicate the complex nature of trade-offs between investing in various types of transportation projects and programs. For example, investments in capacity expansion may relieve some congestion, but

⁴⁰ For more information, see: <http://www.dot.state.mn.us/planning/mnship/investment.html>.

⁴¹ According to statute, to the maximum extent practicable, States and MPOs shall employ visualization techniques to describe plans. 23 USC § 135 (f)(3)(B) and § 134 (i)(6)(C). For more information, see FHWA’s Visualization website: www.fhwa.dot.gov/planning/scenario_and_visualization/visualization_in_planning/visplanning.cfm.

could increase asset management costs in the future, as maintenance work may be deferred to pay for capital projects. By presenting information graphically, it is possible for the participants to interpret information more effectively.⁴²

GATHERING INFORMATION

In addition to sharing information, the process of developing a transportation plan involves gathering information from the public and stakeholders on attitudes, opinions, and preferences. Gathering information is critical to assist decision making by providing insight into issues in which the public and other interested parties have a stake. In developing a performance-based plan, information gathering should involve use of techniques to gather input on values, goals, and priorities, with the public understanding implications on system performance. This could involve soliciting input on the most appropriate measures of performance, and using techniques to understand how the public would make tradeoffs in relation to system performance outcomes. Sample methods of information gathering in relation to goals, objectives, performance measures, and investment priorities include blogs, citizen's panels and user groups, town hall meetings, qualitative research (interviews, focus groups, workshops, etc.), and quantitative research (polling, surveys, etc.).

Gathering qualitative and quantitative information on the public's priorities can involve ranking different goals or outcomes to help support making tradeoffs and prioritizing investments. For instance, in developing its transportation plan *Moving Forward Update*, **PPACG** conducted a statistically-valid random phone survey to query the public on how they would rank the importance of each evaluation criteria, which were used in selecting projects to include in the transportation plan along with results from the MPO's Transportation and Community Advisory Committees.⁴³


METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS – FOCUS GROUPS

Recognizing that traditional public meetings often bring out stakeholders with specific interests, MWCOG worked with America Speaks, a consultancy focusing on inclusive and deliberative public decisionmaking, to engage a demographically representative group of residents in the development of the National Capital Region's Financially Constrained Long-Range Transportation Plan (CLRP). Due to this structured approach to representative engagement of constituents, elected officials were particularly interested to hear the results of these focus groups, and gained additional perspectives that had not been provided in other venues.

Source:

<http://americaspeaks.org/projects/topics/planning-growth/mwcog-congestion-forums/>

⁴² Effective Visualization Techniques for Public Presentation of Transportation Projects. http://www.netc.uconn.edu/pdf/netcr48_00-6.pdf



Scenario planning is a process that can help transportation professionals to prepare for what lies ahead by providing a framework for developing a shared vision for the future by analyzing various forces. The *FHWA Scenario Planning Guidebook* provides assistance on how to use scenario planning to help develop a transportation plan. The Guidebook features six main phases that can be used in scenario planning:

- ▶ “Phase 1: How Should We Get Started? Scope the effort and engage partners.
- ▶ Phase 2: Where Are We Now? Establish a baseline analysis. Identify factors and trends that affect the State, region, community, or study area.
- ▶ Phase 3: Who Are We and Where Do We Want to Go? Establish future goals and aspirations based on values of the State, region, community, or study area.
- ▶ Phase 4: What Could the Future Look Like? Create baseline and alternative scenarios.
- ▶ Phase 5: What Impacts Will Scenarios Have? Assess scenario impacts, influences, and effects.
- ▶ Phase 6: How Will We Reach Our Desired Future? Craft the comprehensive vision. Identify strategic actions and performance measures.”⁴⁴

Scenario planning offers an analytic approach to developing a vision, goals, and objectives. As part of scenario planning, stakeholders shape alternative descriptions or scenarios of what the future could look like. These alternative scenarios are then assessed using transportation models, sketch-planning tools, or other quantitative methods to estimate the impact of the alternative visions of the future on performance measures or indicators of desired outcomes. Several scenario planning tools such as CommunityViz, Envision Tomorrow, and I-PLACE3S are GIS-based and allow for 2-D or 3-D visualization.⁴⁵ The results of this assessment allow stakeholders to explore the trade-offs between future scenarios, the impacts of external factors such as the economy and growth, and select a future vision and/or investment priorities that bring them closest to their desired performance outcomes.

A website can also be used to provide the public with opportunities to **provide feedback based on performance information**.⁴⁶ For example, the *Delaware Valley Regional Planning Commission (DVRPC)* used an online platform called “Choices and Voices,” which allowed visitors to its site to determine their preferred future building pattern, develop an investment budget, and investigate

⁴³ For more information, see: http://www.ppacg.org/files/TRANSP/LRTP-Jan2012/chap2_planning.pdf.

⁴⁴ FHWA Scenario Planning Guidebook, October 2010. Available at:

http://www.fhwa.dot.gov/planning/scenario_and_visualization/scenario_planning/scenario_planning_guidebook/

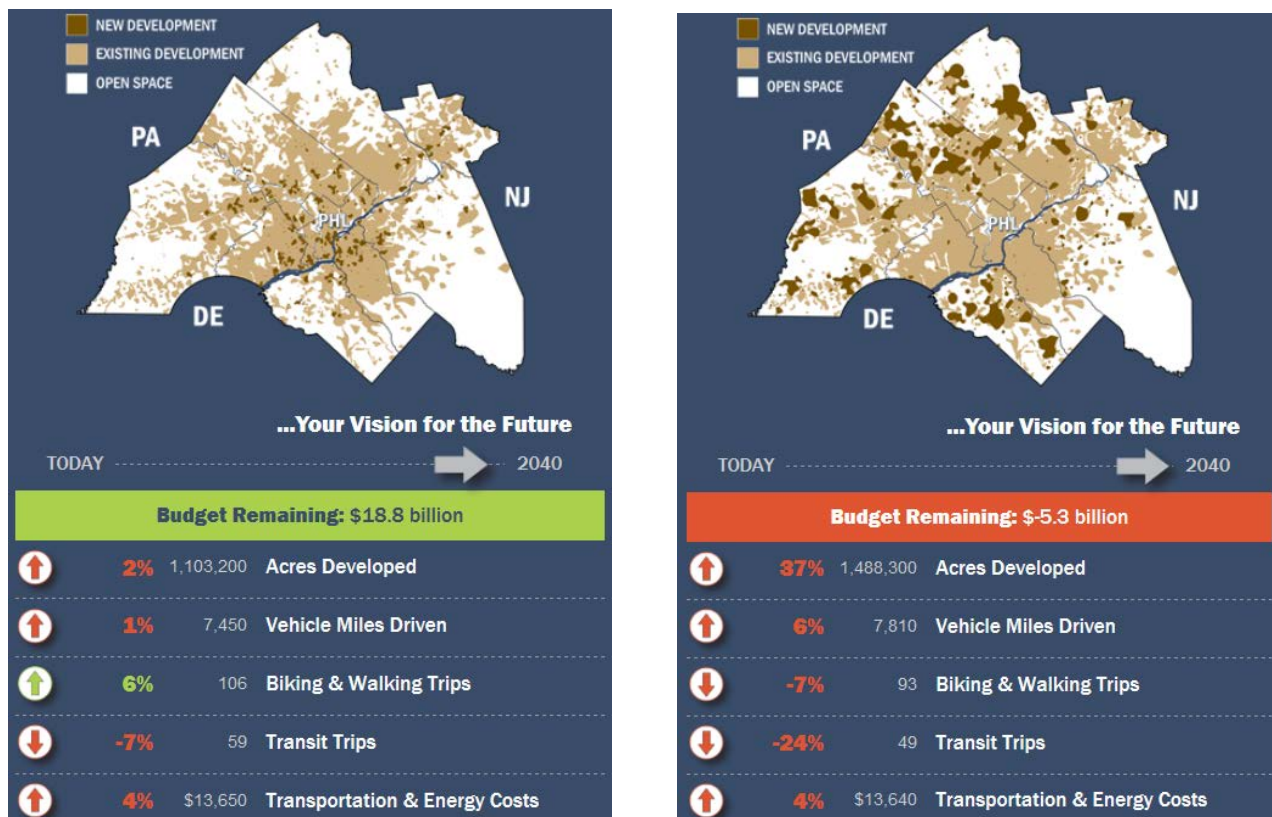
⁴⁵ The Lincoln Institute of Land Policy, *Opening Access to Scenario Planning Tools*, 2012. Available at:

https://www.lincolinst.edu/pubs/dl/2027_1352_Opening%20Access%20to%20Scenario%20Planning%20Tools.pdf.

⁴⁶ 23 USC § 135 (f)(3)(B) and § 134 (i)(6)(C).

transportation projects to be implemented during a 27-year horizon. Individual choice regarding investments and development patterns was then translated into fiscal, environmental, and safety-related outcomes. Below are two example outputs from the Choices and Voices tool.

Figure 3-1. Sample Outcomes from DVRPC Choices and Voices Tool



Source: DVRPC Connections 2040 Choices & Voices website: <http://www.dvrpc.org/asp/ChoicesAndVoices/>.

In the Cleveland area, through a grant from the Partnership for Sustainable Communities, the region has developed an on-line tool to allow the public to “be the planner” for the region and make choices that will affect the area’s Vibrant NEO (Northeast Ohio) 2040 plan. While this effort is broader than an MPO’s transportation plan, the Imagine My NEO tool⁴⁷ lets users provide input on their priorities for making the region a quality place to live. They can also explore the impacts various projects and policies are expected to have on the region. Using a fixed number of tokens, users can make decisions about how to invest the tokens in projects and policies of varying costs – options include cutting taxes, investing in transportation, upgrading parks and recreational

⁴⁷ Information about and access to the tool is available at <http://vibrantneo.org/>.

facilities, and job training for workers. Upon completion, users can choose to submit their final policy and project choices to the agency, as well as post them to a variety of social media outlets.

Considerations in Involving the Public in a Performance-based Plan

It can be difficult to engage the public about long term transportation planning. Many community members will not be familiar with technical terms and concepts and measures of success may be very different so this means that engaging communities involves three critical tasks:

1. Capturing attention in a positive manner by addressing topics that directly impact the community,
2. Engaging in a process that includes techniques such as scenario planning, and
3. Bringing both professional planners and the community into agreement on a set of desired outcomes and performance measures.

While transportation system performance aspects like pavement and bridge conditions are critical to a well-functioning transportation system, for most community members, transportation affects livability. Livability is about tying the quality and location of transportation facilities to broader opportunities such as access to good jobs, affordable housing, quality schools, and safer streets and roads.⁴⁸ This is reflected in measures such as reliability, safety, trip quality, travel time, and trip cost, yet often can be challenging to define in quantitative terms with a limited set of measures. The public has been increasingly involved in a dialogue on how choices about housing locations will impact livability, commute times, and transportation costs. Discussing these tradeoffs – as well as the role that asset condition plays in safety and costs for preserving the transportation system – can be a useful way to engage people in thinking about transportation issues.


The general public is often not familiar with how transportation projects are funded, which can vary significantly between jurisdictions and based on the mode of transportation. Engaging the public in the long range planning process provides an opportunity to provide information to

MICHIGAN LRTP OUTREACH STRATEGIES

In preparing an update to the Michigan Transportation Plan: Moving Michigan Forward (2030 MITP), MDOT employed outreach techniques that both communicated the revision process and gathered stakeholder input by consulting with numerous state, regional, and local agencies. Using household surveys, direct mail, a website, e-mail, webinars and online surveys, MDOT also reached out to thousands of citizens and numerous stakeholder interest groups representing the diverse needs and concerns of Michigan's residents and businesses. Responses reaffirmed the vision, goals, objectives, strategies; a focus on corridors of highest significance, and decision principles established for the 2030 MITP.

Source: www.michigan.gov/slrp

⁴⁸ For more information, see FHWA's Livability web site at: <http://www.fhwa.dot.gov/livability/>.



educate the public about the processes that lead to transportation projects being funded. This can help inform discussions about changes that can be made, for example, to increase funding for specific types of projects the public is particularly concerned about. Because most agencies face significant gaps between needs and revenues to meet those needs, providing this educational component can lead to more productive conversations about solutions and approaches to address this challenge.


One approach for engaging the public is linking the transportation plan with community land use plans, and encouraging adoption of plan goals that link together community outcomes related to land use, transportation and economic considerations.⁴⁹ For instance, the **San Joaquin Council of Governments (SJCOG)** and the **San Joaquin Valley Air Pollution Control District's** Blueprint Planning Process provided a unique opportunity to work together to convey a regional vision of land use and transportation that will be used to guide growth in the San Joaquin Valley over the next 50 years.⁵⁰

Equity is another important consideration for DOT/MPO planners to keep in mind to ensure the process is inclusive. Specifically:

- ▶ Title VI prohibits exclusion from participation in, denial of benefits of, and discrimination under Federally assisted programs on grounds of race, color, or national origin.
- ▶ Americans With Disabilities Act of 1990 states that no qualified individual with a disability shall, by reason of such disability, be excluded from participation in or be denied the benefits of services, programs, or activities of a public entity, or be subjected to discrimination by any such entity.
- ▶ Improving Access to Services for Persons with Limited English Proficiency, Executive Order 13166 requires Federal agencies to identify any needs for services to those with limited English proficiency (LEP), and develop and implement a system to provide those services so LEP persons can have meaningful access to them.
- ▶ Environmental Justice in Minority Populations and Low-Income Populations, Executive Order 12898 instructs Federal agencies to identify and address instances in which adverse human health or environmental effects of their actions disproportionately affect minority and low-income populations.
- ▶ Age Discrimination Act of 1975 prohibits discrimination on the basis of age in programs or activities receiving Federal financial assistance.

⁴⁹ A useful resource of many examples of growing coordination of land use & transportation planning/project implementation can be found here: http://www.fhwa.dot.gov/planning/processes/land_use/toolkit.cfm.

⁵⁰ For more information, see: <http://www.valleyblueprint.org/>.



The public involvement process used in developing the transportation plan must include a process for “seeking out and considering the needs of those traditionally underserved by existing transportation systems, such as low income and minority households, who may face challenges accessing employment and other services.”⁵¹ Agencies have employed a number of strategies to engage traditionally underserved population; for example, **Tennessee DOT** has developed a *Traditionally Underserved Populations Outreach and Analysis Approach*.⁵² For more information, see NCHRP Report 710 “Practical Approaches for Involving Traditionally Underserved Populations in Transportation Decisionmaking.”⁵³

The examples below, from **Metro**, the MPO for Portland, Oregon, and **Minnesota DOT**, illustrate the continuous nature of public involvement throughout the development of a performance-based transportation plan. Providing information about the process schedule and opportunities for the public and stakeholders to be involved is helpful for bringing increased clarity and transparency to the long range planning process.

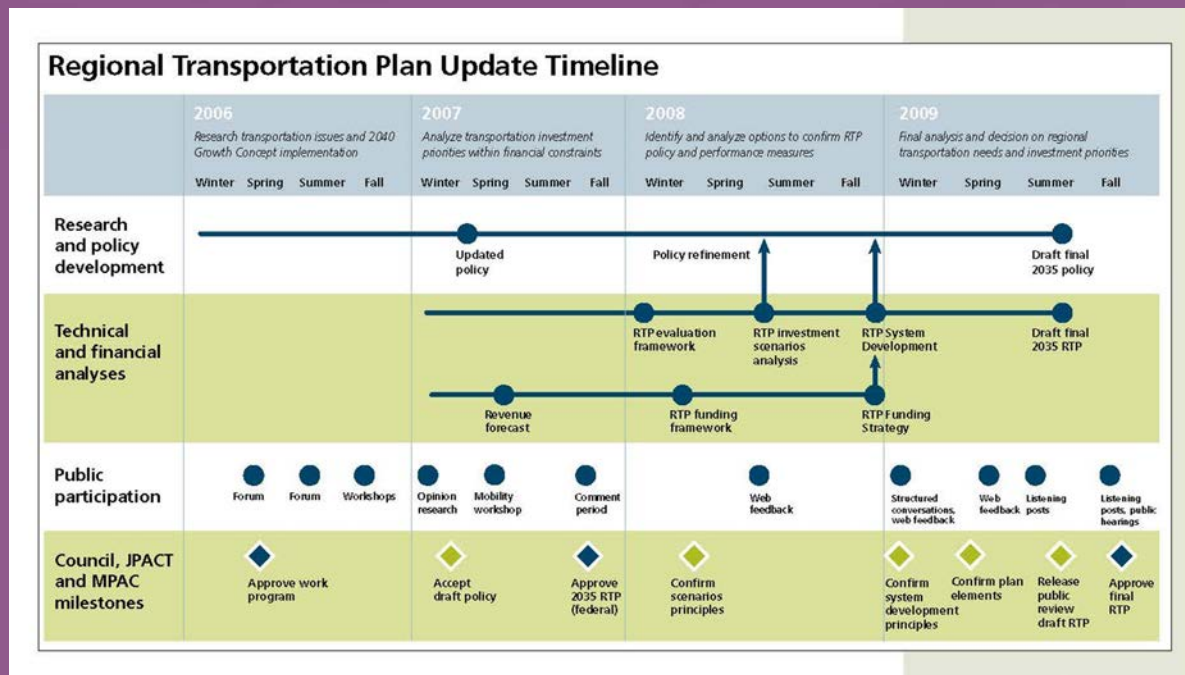
⁵¹ 23 CFR 450 § 210(a)(1)(viii) and 316(a)(1) (vii).

⁵² For more information, see: <http://www.tdot.state.tn.us/plango/pdfs/tup.pdf>.

⁵³ http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_710.pdf

PORTLAND METRO, INVOLVEMENT APPROACHES

Metro, the MPO for the Portland Oregon region, completed an update to its 2035 RTP in 2010. This plan update included performance measures to link transportation investments to reducing the region's carbon footprint, job creation, protecting the urban growth boundary and enhancing travel options. Metro worked closely with stakeholders throughout the plan update process and engaged the public, public agencies, and targeted stakeholders in regional forums; stakeholder task force and advisory committee workshops; public opinion research; meetings with county coordinating committees; and public open houses and hearings; as well as web input. The visual below highlights key milestones in the initial plan update timeline.

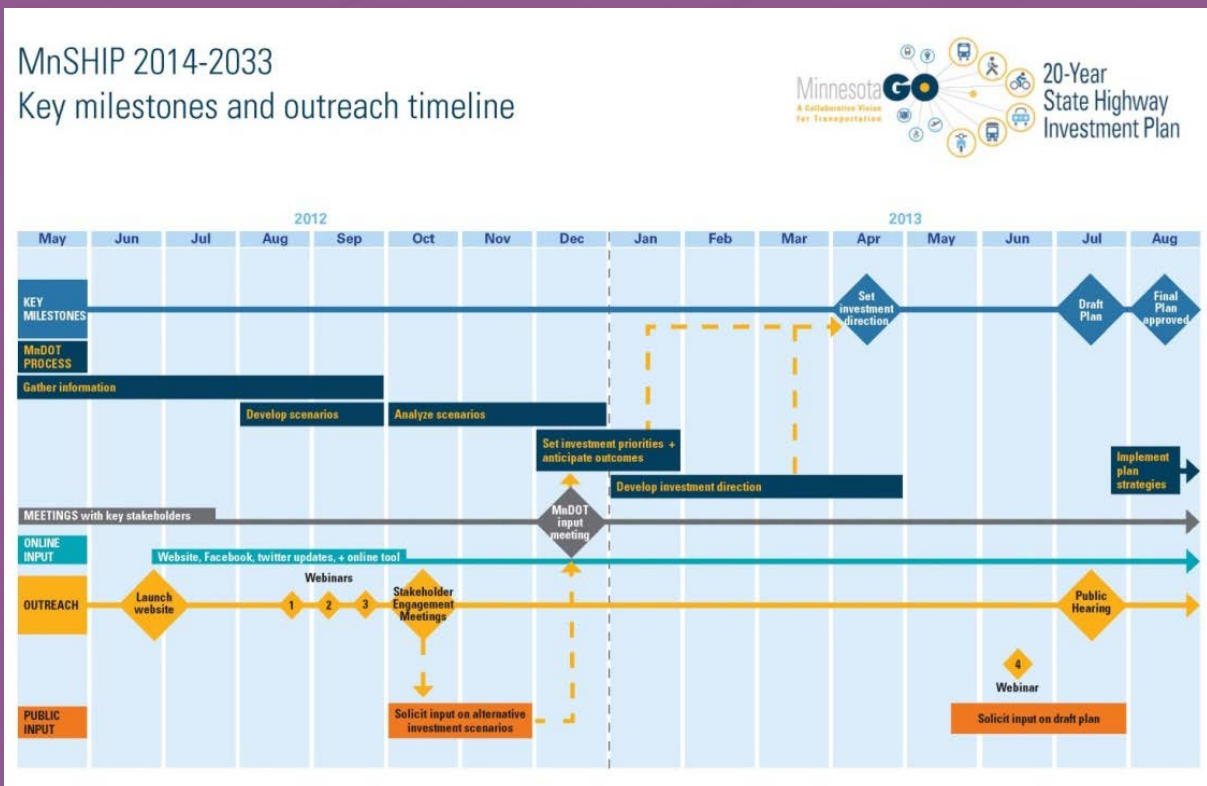


Source: Oregon Metro, 2035 Regional Transportation Plan Executive Summary (2007), Page 17.

For more information, see: http://library.oregonmetro.gov/files//rtp_exec_summary_final.pdf and http://library.oregonmetro.gov/files//2035_rtp_appendix_june2010_web.pdf.

MnSHIP OUTREACH STRATEGIES

The process of developing Minnesota DOT's State Highway Investment Plan (MnSHIP), which is part of MnDOT's Family of Plans, involved extensive public and stakeholder participation. MnSHIP incorporates risk, performance-based planning, and scenario-based planning to establish a fiscally-constrained investment direction for highway projects taking place over a 20-year period. The public involvement plan included a wide range of activities, including stakeholder engagement meetings, press releases, project e-mail distributions, a website, webinars, use of social media platforms, and a public hearing. These were used during the process of gathering information, developing and analyzing scenarios, and developing investment priorities. The diagram below outlines these techniques and their phasing.



Source: Minnesota Department of Transportation *State Highway Investment Plan*, Key Milestones and Outreach Timeline, <http://www.dot.state.mn.us/planning/mnship/pdf/MnSHIPcalendar070113.pdf>.

Interagency Consultation and Coordination

In addition to engaging the public and stakeholder organizations, the development of a transportation plan involves consultation and coordination among agencies. Interagency collaboration in developing a performance-based transportation plan should involve a diverse range of transportation providers including transit agencies, State and local agencies, transportation industry representatives, and agencies responsible for environmental resources. Specifically, the statewide transportation plan is developed in cooperation with MPOs or in cooperation with affected nonmetropolitan officials with responsibility for transportation or, if applicable, through regional transportation planning organizations.⁵⁴

Intergovernmental and agency participation is characterized by the shared influence of participants on final policy solutions and perhaps shared roles in implementation. Partners have a direct involvement in decision making, including the development of alternatives and choice of a preferred solution. Two-way communication is essential and all parties should have clear roles. Communication and collaboration between agencies should begin as early as possible in the plan development process and continue throughout. Facilitating the involvement of a diverse group of professionals with different perspectives can lead to the generation of new ideas and innovative approaches that might not otherwise arise. Having involved interested agencies early in the process can also result in these agencies being more invested in the approval and subsequent implementation of the plan.

Collaboration among agencies is particularly important in a performance-based plan, in which performance measures, data, and targets should be coordinated among agencies. For instance, if a State DOT includes several MPOs, the targets that MPOs set for measures should be developed in coordination with the State to ensure they are consistent with State targets; States should also coordinate with MPOs in their target-setting. Federal statute requires coordination in the development of performance targets in regard to the national performance measures: “Selection of performance targets [in relation to the national measures] by a State shall be coordinated with the relevant metropolitan planning organizations to ensure consistency, to the maximum extent practical...In urbanized areas [not represented by a MPO] selection of [public transportation] performance targets by a State shall be coordinated, to the maximum extent practicable, with providers of public transportation...”⁵⁵ Moreover, “Selection of performance targets by a metropolitan planning organization shall be coordinated with the relevant State to ensure consistency, to the maximum extent practicable,” and “shall be coordinated to the maximum extent practicable, with providers of public transportation.”⁵⁶

⁵⁴ 23 USC § 135 (f)(2).

⁵⁵ 23 USC § 135(d)(2) and 49 USC 5304(d)(2).

⁵⁶ 23 USC § 134(h)(2)(B) and 49 USC 5303(h)(2)(B).

Coordination is especially important for MPOs whose planning areas include jurisdictions in two or more States, particularly when the approaches to transportation planning in those States vary significantly. In this case, an MPO will be coordinating with more than one State in setting targets, acknowledging and addressing where any differences in approach may exist. Some research has been conducted on approaches to coordination and institutional arrangements for multi-state MPOs.⁵⁷ Establishing a pattern of collaboration on issues that benefit both parties, such as data sharing, can foster closer relationships and improved collaboration in other areas, such as target setting.

Even outside of the nationally required measures, State DOTs, MPOs, and transit agencies can benefit from coordination in their consideration of performance measures and targets to ensure consistency in approaches. As an example of this type of coordination, the **Baltimore Metropolitan Council (BMC)** used **Maryland DOT's** annual performance Attainment Report as a key tool and “springboard” in identifying the performance measures it would use in tracking progress toward regional goals and for incorporation in its MTP. The Attainment Report provided critical information about available transportation data as well as State goals for transportation. This strengthened alignment of the MPO’s planning activities and focus with broader State priorities.

It is also good practice for a lead planning agency developing a transportation plan to consult with agencies such as toll road operators and other transportation service providers, as well as local governments and other agencies that have a role in implementing strategies, to ensure that targets are realistic and achievable. These agencies can also be engaged in supporting data collection for tracking progress toward targets. Particularly with respect to freight planning, having a State freight advisory committee with representation from both the State and regional perspective can be particularly useful in considering how transportation can best support the State’s economy, as well as the economies of its various regions.

REGIONAL TRANSPORTATION PLANNING ORGANIZATIONS (RTPOs)

RTPOs have existed for decades, but their role was formalized by MAP-21 (23 USC § 135(m)). RTPOs can be authorized by state DOTs to conduct nonmetropolitan planning and project selection. By doing so, states are fulfilling their coordination requirement by fully delegating the work to the RTPO. RTPOs may be particularly useful in regions that may become an MPO, or have unique characteristics that are better served by local control. Colorado, Iowa, and North Carolina (among others) have RTPOs or MPOs covering the entire state, although state LRTP documents vary considerably in format and scope.

⁵⁷ Multi-State Metropolitan Planning Organizations: Approaches, Cases, and Institutional Arrangements, NCHRP report for AASHTO Standing Committee on Planning, http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/NCHRP08-36%2844%29_FR.pdf.



Carrying Engagement Through to Implementation

The public participation plan that supports development of the performance-based transportation plan provides a strong basis for carrying the engagement from plan development into implementation. By linking performance outcomes during scenario analysis from the plan to the selection of individual projects in the STIP or TIP as well as through on-going reporting on system performance, the public is aware of the goals and measurable progress toward them. Therefore, the transportation plan development process should consider:

- ▶ What needs to be done to track progress over the next 5-10 years or longer?
- ▶ How will the public have access to system performance information: mobile devices, dashboards, websites, push-outs vs. pull-outs, etc.?
- ▶ How will the transportation plan set the stage for continued public and stakeholder engagement that links planning with project development – including the National Environmental Policy Act (NEPA)?
- ▶ What on-going communication to decision-makers and the public will occur?

Engaging with the public and stakeholders in a cooperative manner should be a continuous process both throughout the development of the transportation plan as well as between plan cycles. Performance reporting efforts, for example, can help to convey information about progress and keep stakeholders involved with the latest developments in transportation. This allows participants in outreach activities to draw explicit connections between the input they provided and changes that have been implemented.

4. Scoping and Baseline Information

Development of a performance-based transportation plan begins with baseline information that forms a foundation for the strategic elements of the plan. This baseline information typically includes information on the existing multimodal transportation system, including its condition and performance, as well as factors that are likely to affect the future of the planning area and the future performance of the transportation system, including availability of financial resources. This baseline also captures potential changes in perspective of the region or State's priorities, including policies or principles that have been adopted, as well as data on the difference in growth anticipated in the previous plan to actual changes that have occurred.

Information that impacted the previous transportation plan development is compared to this new data in the plan scoping step. These data represent a broad array of information on land use, population, economic development, employment changes, available revenue, goals and priorities of individual communities, and many other factors that may be specific to that individual area. Within the PBPP framework, this baseline information includes feedback from past plans and the on-going monitoring and evaluation of system performance, and includes:


- ▶ A description of the multimodal transportation system;
- ▶ Information on existing system conditions and performance;
- ▶ Factors and trends that will influence the future;
- ▶ Revenue projections; and
- ▶ Consideration of applicable planning studies, policies, performance-based plans.

Each of these elements is described briefly below.

Description of Multimodal Transportation System

The transportation plan should describe elements of the multimodal transportation system, including not only highways and transit, but also multimodal and intermodal facilities and pedestrian and bicycle networks.⁵⁸ It should also address integrated management and operations of transportation systems and facilities. By including all elements of the integrated multimodal transportation system in decisionmaking, decision-makers, stakeholders, and the public can better understand the system needs and how the investment strategies support the State or region's future. Within a performance-based plan, clearly defining the transportation system as a

⁵⁸ 23 USC 134 (i)(2)(A).



multimodal system can help decision-makers and the public consider goals, objectives, and performance measures that are multimodal in nature.

Many State DOT LRTPs are truly multimodal and describe all modes, including freight and passenger rail and aviation, and include goals and performance measures that relate to all modes. Maryland DOT's statewide plan, for example, is developed in coordination with the State's modal agencies to address all modes of transportation, as well as links between modes. Because many of the State's goals, such as safety and security, system preservation, and economic prosperity are cross-cutting in nature, the statewide plan development provides a unique opportunity to highlight each agency's part in furthering the broad goals for the transportation system.

Information on Existing Conditions and Trends

Before looking to the future, transportation agencies collect a significant amount of information on current conditions as well as established trends to inform transportation plan development.

In addition to gathering baseline data on population, land use, travel, employment, and economic activity, planning staff should collect data related to existing system performance. Traffic counts and travel-time studies routinely support establishing a baseline condition related to congestion. Common metrics related to congestion and travel patterns include: Vehicle Miles Traveled (VMT) – both on the system overall as well as per capita; Vehicle Hours Traveled (VHT) on the system and on specific corridors of interest; levels of traffic congestion and delay; and mode shares in various parts of the region or State.

In recent years, technology has greatly enhanced the ability to collect data on system performance in an ongoing, real-time way, including information on transportation system reliability. In addition, data on performance areas such as safety and the environment are important indicators. Current data provides a baseline for setting targets and comparison with existing targets. In addition, historical information on performance changes (both related to the metrics above as well as other areas such as pavement and bridge condition, accessibility, etc.) in the past and relevant agency actions is also useful. Agencies continue to identify innovative sources of data through partnership development as well. Planners, for example, can build working relationships with traffic management center operators and help them more clearly understand the planning process. This may allow the operators to be more involved in the performance measure conversation by serving as technical experts on data collection and analysis capabilities. Relationships with bicycle and pedestrian groups, or even telecommunications companies, may help facilitate the collection of data that would be difficult to collect otherwise (e.g. use of bicycle and pedestrian facilities).

A performance-based transportation plan is based on comprehensive information about the transportation system, and may include additional information on the operation and condition of the system collected in previous planning cycles or planning activities. Quality data is critical to establishing an accurate baseline of current conditions. A sample of data sources includes the Highway Performance Monitoring System (HPMS); the National Performance Management Research Data Set (NPMRDS); data collected through the Congestion Management Process (CMP) and Highway Safety Improvement Program (HSIP); other management systems addressing bridge, pavement, and transit conditions; as well as data from other State agencies and local governments, among others. The 2013 update of FHWA's Traffic Monitoring Guide includes a chapter on Pedestrian and Bicycle Counting, which can be used when collecting pedestrian and bicycle count data.

Using a performance-based approach may involve new partners and bring new stakeholders into the transportation plan development process in order to assemble this baseline information, since multiple aspects of performance – including safety, environmental condition, asset condition, accessibility, and reliability – should be considered. Moreover, data integration across State and local transportation agencies' data sources is an important consideration to ensure that data are comparable and provide relevant information.

Baseline information can appear in the form of a Transportation System Performance Report (See Chapter 7 for more discussion), and identify how system performance has changed in relation to key performance measures and targets. Development of the System Performance Report also lays the groundwork for understanding how well strategies implemented in the past contributed to changes in performance.

A NOTE ABOUT CHANGES IN DATA SOURCES AND MODELS

Data collection technologies and modeling capabilities continue to evolve. It is important to recognize that the best information on some performance metrics may change over time due to use of newer data sources or models. For example, air pollutant emissions estimates in many regions changed due to the introduction of the MOVES model, which replaced the previous MOBILE model for calculating emissions. In establishing a baseline of performance, therefore, it is important to understand and explain any changes in approach that will affect comparisons of performance results over time.

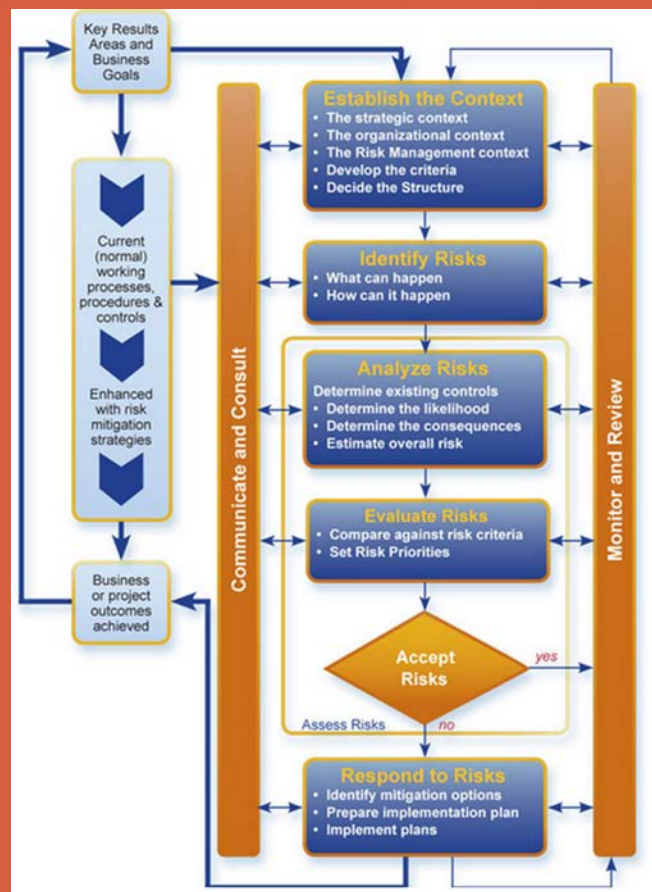
Future Challenges and Risks

In addition to providing information on current and past performance, the transportation plan should consider and discuss current and potential future challenges that are expected to affect the performance of the transportation system. In particular, projected population and employment growth is often a strong indicator of the future demands that will be placed on the transportation system. Below are some examples of challenges commonly identified in this section of the transportation plan:

- ▶ Demographic shifts including future population projections, an aging population, etc.
- ▶ Discrepancies between projected needs and projected revenues
- ▶ Congestion and its consequences (economic, quality of life, etc.)
- ▶ Environmental challenges
 - Air quality
 - Climate change
 - Risk from severe weather events
 - Water quality
- ▶ Safety challenges
- ▶ Changes in technology that will enhance the efficiency of the transportation system
- ▶ Long-term shifts in travel behavior and choices


MINNESOTA DOT ENTERPRISE RISK MANAGEMENT (ERM) FRAMEWORK

The ERM addresses three types of risks to the agency: (1) strategic-level risks, which impede the agency's ability to meet its vision and mission; (2) business-line (or operational) level risks, which affect the agency's ability to deliver products and services and meet performance targets; and (3) project-level risks, which threaten the scope, schedule, cost, or quality of agency projects. The Agency's ERM process is depicted in the figure below.



Source: Minnesota DOT, *Enterprise Risk Management Framework and Guidance*, Page 2.

http://www.dot.state.mn.us/riskmanagement/pdf/erm_framework.pdf



In addition to these common challenges, context-specific challenges can also be raised. Transportation planners to some degree play a role as “futurists,” anticipating future economic, political, environmental, geographic, or demographic changes and determining how they are most likely to impact the transportation system. Some examples of these include:

- ▶ The *2035 State Long-Range Transportation Plan* for **Michigan DOT** includes the long-range demographic forecast of a “dramatic increase in aging and retired populations.” The plan predicts as a result that “transport to health, recreational, and other activities will increase in importance.”⁵⁹
- ▶ The **Pima Association of Governments** in Tucson, Arizona estimates in its RTP 2040 “If we don’t expand alternatives to driving alone while we build new roads and improve existing ones, average traffic speeds during peak hours could slow to 23 miles per hour by the year 2040.”

Part of assessing how future changes are likely to impact the transportation system involves identifying key **risks** that are likely to affect the transportation system, and considering how to incorporate risk considerations into transportation planning.

Risk is the positive or negative effect of uncertainty or variability upon agency objectives. Transportation agencies consider managing risk as part of the strategic and systematic process of operating, maintaining, and improving physical assets and managing their highway network with a focus on the program and agency level. A risk-based approach to managing the transportation system can make the case for the difficult tradeoffs during decisionmaking because of constrained revenue necessary to maintain the entire system.⁶⁰

Since 2003, **Minnesota DOT** has used performance information to guide the development of the family of plans that make up the agency’s statewide LRTP. The State’s business and multimodal objectives, described as Key Results Areas (KRAs), play an important role in the LRTP and measuring progress toward implementation of the plan. In 2013, Minnesota DOT (MnDOT) established an Enterprise Risk Management (ERM) Framework and Guidance, which created a framework for establishing the standards, processes and accountability structure used to identify, assess, prioritize, and manage key risk exposures across the agency. The ERM is used by MnDOT in

⁵⁹ Michigan DOT, *2035 State Long-Range Transportation Plan*, available at:

http://www.michigan.gov/documents/mdot/MDOT_2035MIPlan4approval_398932_7.pdf.

⁶⁰ Additional information can be located in the publication series: Risk-Based Transportation Asset Management; Evaluating Threats, Capitalizing on Opportunities; Examining Risk-based Approaches to Transportation Asset Management; Achieving Policy Objectives by Managing; Managing Risks to Critical Assets; and Managing External Threats through Risk-Based Asset Management. These are located at the FHWA Asset Management Publications and Risk Publications websites: <http://www.fhwa.dot.gov/asset/pubs.cfm?thisarea=risk> and <http://www.fhwa.dot.gov/asset/pubs.cfm>.

the planning process to identify and manage threats to the achievement of the KRAs. Some of the key capital risks that MnDOT has identified include the potential jeopardization of the State’s bond rating, lack of alignment with vision that results in a lack of public trust, deferring bridge investments, lack of responsiveness to respond to local opportunities, and untimely or reduced capital investment leading to unsustainable maintenance costs (see Table 4-1 below for risks). For each risk, MnDOT identified the extent to which it could mitigate the risk through policies and investments. Although MnDOT is not always able to mitigate these risks, their consideration plays a more prominent role in decisionmaking. Thus, the ERM is used as a tool that supports implementation of the LRTP. In developing the Minnesota State Highway Investment Plan (MnSHIP), for instance, MnDOT systematically identified the likelihood and impact of different risks and conducted scenario analysis to assess the trade-offs associated with various investment mixes.

Table 4-1. Key Risks Identified by MnDOT

Key capital investment risks	Mitigated risk by 2023 (of 3 ✓)	Mitigated risk by 2033 (of 3 ✓)
GASB 34: pavement and bridge conditions deteriorate, jeopardizing state bond rating	✓✓	✓
Federal policy: failure to achieve MAP-21 performance targets on NHS reduces funding flexibility	✓✓✓	✓
MnDOT policy: misalignment with Vision & Statewide Multimodal Transportation Plan results in loss of public trust	✓✓	✓
Bridges: deferring bridge investments viewed as an unwise/unsafe strategy	✓✓✓	✓✓
Responsiveness: rigid investment priorities limits ability to support local economic development and quality of life opportunities	✓✓	-
Maintenance budget: untimely or reduced capital investment leads to unsustainable maintenance costs	✓✓	✓
Public input: investment inconsistent with MnSHIP public outreach results in loss of public trust	✓✓	-

Source: Presentation by Ryan Wilson, Minnesota Department of Transportation, Performance-based Planning and Programming Workshop, September 19-20, 2013.



Revenue Projections

Considering potential revenue sources early in the process ensures that performance-based planning activities are based on realistic assumptions about available funding for capital, operating, and maintenance costs associated with the surface transportation system. Providing realistic funding and revenue forecasts from the outset supports decision-maker, stakeholder, and public trust by providing understanding of the limits of funding to support implementation of strategies. Transportation systems are challenged to accommodate many competing needs, and fiscal constraint is needed to set priorities for allocating resources to address those needs. Fiscal constraint also helps clarify what is possible with existing funding sources, and can inform debate about if there is a need for new funding sources.

Consideration of Applicable Planning Studies, Policies, Performance-based Plans

The transportation plan should build upon existing goals, objectives, performance measures, and strategies identified in a wide range of transportation plans, as well as other planning documents. These include required transportation plans, such as the State Strategic Highway Safety Plan, State Asset Management Plan, MPO Congestion Management Process, Transit Asset Management Plan, as well as State Freight Plan. States and MPOs are required to integrate into the statewide and metropolitan transportation planning process, directly or by reference, the goals, objectives, performance measures, and targets described in other State transportation plans and transportation processes, as well as any performance-based plans developed by public transportation providers.⁶¹ In addition, many other regional or State plans, including disaster preparedness plans, conservation plans, pedestrian and bicycle master plans, economic development plans, and others, should be considered in the development of the transportation plan.

⁶¹ 23 USC § 134 (h)(2)(D) and 23 USC § 135(d)(2)(C).

Addressing Challenges Associated with Incomplete Data on Bicycle and Pedestrian Modes of Transportation

Transportation agencies are regularly faced with challenging decisions regarding how to allocate resources between various modes of transportation. These challenges are compounded by gaps in the data available for active transportation modes, such as biking and walking. Whereas VMT data for cars is readily available, data about demand for bicycle and pedestrian facilities is less prevalent. The Transportation Research Board recently published Research Circular E-C183: Monitoring Bicyclist and Pedestrian Travel and Behavior, which provides information about the latest advancements in this area. In addition, a number of jurisdictions and agencies have devised ways to capture the frequency with which bicycle and pedestrian facilities are used, and methods of measuring the impacts of investments in these facilities. Examples include:

- **Colorado DOT formed a bicycle/pedestrian counting program** in 2010 that uses in-pavement bicycle/pedestrian counters. The technology measures quantity of users and records data that provides useful information on travel patterns. The data helps inform decisions and investments related to bicycle and pedestrian infrastructure.
- **Pikes Peak Area Council of Governments and the City of Colorado Springs have sponsored several volunteer-based bicycle and pedestrian count programs** on trails and lanes around the region. The data is used to estimate existing use, potential future use, and to identify project priorities.
- **The Seamless Travel Project is a joint effort between Caltrans, the University of California at Berkeley, and Alta Planning + Design** to create a model for estimating bicycle and pedestrian demand. The project was pilot tested in San Diego over the course of two years, and was designed to not only count quantity of cyclists and pedestrians, but also to identify the factors that influence bicycling and walking. After the pilot test, the team developed a number of approaches for modeling demand.
- **The City of Tucson's ADA Sidewalk Inventory Study Report**, which identifies gaps in the City's sidewalk network in an effort to make the network more accessible for all users. The report includes recommendations for pedestrian improvements based on need and the priority criteria identified at the beginning of the sidewalk inventory study process.

For more information about these programs and studies, see the Resources List.

5. Strategic Vision, Goals and Objectives

A performance-based transportation plan should be based on a clear vision of a desired future, including desired outcomes. Consequently, identifying goals and objectives is critical to providing strategic direction for the plan. Because each step of a performance-based planning process cascades from previous steps, these strategic elements set the stage for performance measures that are incorporated in the plan. The vision, goals, and objectives of the transportation plan should take into account the full range of planning factors, which address transportation system and community outcomes.


Developing a Vision

The first step in a planning process is to develop a vision that provides an overarching statement of desired outcomes, and leads to well defined goals and objectives. Usually a vision statement is concisely worded, but broad in its reach, and is intended to be compelling and inspiring.

As the “hook” that captures the imagination, the vision statement addresses several key issues:

- ▶ **A desired achievement or condition.** More than simply the condition of the transportation system, a performance-based transportation plan focuses on improvements from the perspective of transportation “customers”, and may include a focus on improved (safer, more reliable, more cost effective, less polluting, or more enjoyable) travel conditions, as well as economic and quality of life conditions. A vision statement may meld transportation and broader community outcomes, addressing issues such as land use, housing, and economic opportunities.
- ▶ **Inspiration.** A vision can help inspire the imagination and establish momentum toward new approaches or policies. It is appropriate to set a vision that will take concerted effort among partners, and require transportation investment choices that contribute toward that vision.
- ▶ **A timeline.** By common practice, most transportation plans include a timeline in their title, such as “2040 Long Range Transportation Plan.” Federal regulations specify that LRTPs look out at least 20-years. A general principle to consider in determining whether to look 20, 30, or even 50 years out is that visioning works best if you go far out enough to get beyond present-day problems but not so far out that it becomes too difficult to assess how to get there.

A vision sets the stage for preparing and implementing a performance-based transportation plan. The benefits of a visioning process include high engagement, a big-picture orientation, aligned



actions and outcomes, and *a more focused plan*. Developing the transportation vision for the State or region includes extensive public and stakeholder involvement.


The use of scenario planning in developing a vision, as well as goals and objectives, continues to expand as it helps communities consider a broader range of issues beyond land use and transportation to include economic uncertainty, social equity, housing affordability, water quality, impacts of climate change, accessibility and other concerns. As described in Chapter 3, scenario planning is a useful tool for assisting in imagining alternative futures that organizations can use to help them improve decisions regarding a vision of the future, goals, objectives, and investments. Importantly, scenario planning can be helpful in surfacing underlying values and perspectives that align around a common understanding of how best to move forward in light of the range of controllable (i.e., investment decisions and policies) and uncontrollable (i.e., economy, population growth) factors that influence outcomes. Scenario planning can be the catalyst for bringing individuals, agencies, jurisdictions, and private sector entities together to think creatively and comprehensively about what they want their future to look like and what strategies or solutions result in the most desired outcomes. FHWA has encouraged scenario planning as a beneficial enhancement of the traditional transportation planning process.

Goals and Objectives: Definitions

In preparing the performance-based transportation plan, it is useful to distinguish between *goals* and *objectives*, as well as guiding *principles* and *policies* that are often discussed within a plan.

- ▶ A GOAL is a broad statement that describes a desired end state: “*Foster livable communities that increase transportation choices.*”
- ▶ AN OBJECTIVE is a specific, measurable statement that supports achievement of a goal: “*Increase access to jobs and housing via transit.*”
- ▶ A PRINCIPLE is a statement that reflects values or priorities, but does not directly address an outcome that can be measured. It may involve a fundamental truth or proposition that serves as the foundation for decisionmaking: “*Coordinated land use, transportation, and economic development are the foundation of an equitable, sustainable community.*”
- ▶ A POLICY involves a course of action intended to influence and determine decisions and actions: “*Support coordinated land use and transportation planning.*”

In a performance-based transportation plan, the goals (and associated objectives) are important for identifying desired outcomes and should be used as a basis for selecting performance measures used in the plan. Well-crafted goals and objectives frame and directly influence performance measurement, so this is a critical step. The FHWA *Performance Based Planning and*



Programming Guidebook provides in-depth information on how to develop goals and objectives for a performance-based planning process.⁶²

The integration of other performance-based plans and coordination with other planning processes in the region or State is an important aspect of developing goals and objectives in metropolitan and statewide long-range transportation plans. Other performance-based plans with strategic relevance for the transportation plan may include a State asset management plan, a strategic highway safety plan, a metropolitan congestion management plan, a State freight plan, a transit asset management plan, a transit agency safety plan, a transportation systems management and operations plan, and others. Through the creation of each of these plans, stakeholders with in-depth knowledge of that functional area are typically brought together to shape the goals and objectives of that plan. The goals and objectives within these plans should inform the development of the overarching, long-range goals and objectives of the transportation plan. In turn, subsequent updates of the functional plans should be fit under the “umbrella” of the goals and objectives of the transportation plan. The process of developing the transportation plan enables decision-makers and the public to explore goals and objective from different plans, understand potential conflicts and commonalities, and create a forum for discussing priorities and trade-offs and developing and selecting achievable targets.


Establishing Goals

Transportation plan goals traditionally relate to the planning factors in Federal legislation.⁶³ The goals are often adapted to reflect how each of the factors is unique to the conditions of each State or region. Performance management approaches within transportation agencies have increased the focus on goals that directly relate to transportation system performance: infrastructure condition, safety, congestion, and reliability. However, the inclusion of external partners and stakeholders in the planning process often widens the range of goals considered to include community outcomes such as livability, sustainability, the economy, and equity.

A key value of developing a transportation plan is that it is a process where the community – including stakeholders, partner agencies, and transportation system users – considers all of its goals in the context of its resources, and is forced to make trade-offs among the various competing priorities. Consequently, public involvement, stakeholder engagement, and input from partners are critical to establishing and defining commonly agreed-upon goals. For example, the **Arizona DOT** worked to ensure inclusion of a wide array of perspectives in developing its recent plan, *What Moves You Arizona* (November 2011). Arizona DOT developed a participation plan that

⁶² FHWA, Performance Based Planning and Programming Guidebook, September 2013. Available at: http://www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook/.

⁶³ 23 USC § 134 (h) and § 135 (d).



included: direct coordination with COGs and MPOs; e-newsletters; online comments; 3 videos; emails; a Facebook page; surveys; radio, TV, and newspaper advertising; 8 workshops with special interest groups; and open house presentations.⁶⁴

While a goal itself is generally broad, it is important to consider what kind of data and analysis will be needed to develop measurable objectives to evaluate progress toward attaining the goal as part of transportation investment decisionmaking. Data availability should be considered at this stage to help ensure that the information needed for measuring outcomes is available and not too costly to collect and maintain. By considering data needs early in the process, organizations can help avoid unintended expenditures for data collection and management.

In addition to planning factors, MAP-21 establishes broad national goals in seven performance areas [23 USC § 150(b)]:

- ▶ **Safety** – To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- ▶ **Infrastructure Condition** – To maintain the highway infrastructure asset system in a state of good repair.
- ▶ **Congestion Reduction** – To achieve a significant reduction in congestion on the National Highway System.
- ▶ **System Reliability** – To improve the efficiency of the surface transportation system.
- ▶ **Freight Movement and Economic Vitality** – To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- ▶ **Environmental Sustainability** – To enhance the performance of the transportation system while protecting and enhancing the natural environment.
- ▶ **Reduced Project Delivery Delays** – To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

These are *national* goals and a State or region should have a range of goals that align with these national goals and may have goals that address other transportation-related concerns. For instance, some plans include goals that address quality of life issues, accessibility, public health, or equity. Some goals may also address specific issues or concerns, such as bicycling and walking.

⁶⁴ Arizona DOT <http://www.azdot.gov/docs/default-source/planning/lrtp-2011-1129.pdf?sfvrsn=2>.

However, while objectives address specific geographies, conditions, or partners, goals generally more broad.

There are several resources or relevant plans that States and regions can reference when developing goals in specific areas (e.g., safety, infrastructure condition, congestion) for the transportation plan. Some resources exist as part of national literature whereas others are planning documents and management systems used by a region or State. The section below provides information on pertinent resources for several goal areas to assist in forming transportation plan goals (as well as corresponding objectives and performance measures).

SAFETY

A Strategic Highway Safety Plan (SHSP) is a statewide coordinated safety plan that provides a comprehensive framework for reducing fatalities and serious injuries on all public roads. Through the development and update of the plan, the State department of transportation works collaboratively with Federal, State, local, and private sector safety stakeholders to establish statewide goals, objectives, and key emphasis areas that enable the State to reduce highway fatalities and serious injuries. This involves identification and analysis of highway safety problems in the State. The SHSP is a requirement of the Highway Safety Improvement Program (HSIP)⁶⁵ and the goals, objectives, performance measures, and targets of the SHSP should be integrated into the transportation plan. This is a key resource for selecting safety goals and objectives in the transportation plan.

More information on the SHSP can be found at:

- ▶ FHWA Office of Safety, Strategic Highway Safety Plan (SHSP) Website.⁶⁶
- ▶ NCHRP Report 500: *Guidance for Implementation of the AASHTO Strategic Highway Safety Plan*. This is a series of volumes each focused on addressing a specific type of highway crash or contributing factor.⁶⁷
- ▶ Transportation Safety Planners Desk Reference prepared by the Transportation Safety Planning Working Group with support from FHWA, 2007.⁶⁸
- ▶ NCHRP Report 546: *Incorporating Safety into Long-Range Transportation Planning*, 2006.⁶⁹


⁶⁵ 23 USC § 148.

⁶⁶ FHWA Office of Safety, Strategic Highway Safety Plan (SHSP) Website: <http://safety.fhwa.dot.gov/hsip/shsp/>.

⁶⁷ NCHRP Report 500: Guidance for Implementation of the AASHTO Strategic Highway Safety Plan: <http://safety.transportation.org/guides.aspx>.

⁶⁸ Transportation Safety Planners Desk Reference: http://tsp.trb.org/assets/FR_Safety%20Planner_1_17_07FINAL.pdf.

⁶⁹ NCHRP Report 546, *Incorporating Safety into Long-Range Transportation Planning* (2006): <http://www.trb.org/Main/Blurbs/156716.aspx>.



In addition, Public Transportation Agency Safety Plans must include performance targets based on national safety performance criteria and state of good repair criteria, and identify strategies “to minimize the exposure of the public, personnel, and property to hazards and unsafe conditions.”⁷⁰ These agency safety plans also can be a resource for selecting safety goals and objectives in the transportation plan.

INFRASTRUCTURE CONDITION

Each State is required to develop a risk-based asset management plan for the National Highway System (NHS) to improve or preserve the condition of the assets and the performance of the system.⁷¹ A State asset management plan must include a listing of the pavement and bridge assets on the NHS in the State, including a description of the condition of those assets; asset management objectives and measures; performance gap identification; lifecycle cost and risk management analysis; a financial plan; and investment strategies. States must address pavements and bridges but are encouraged to include all infrastructure assets within the highway right-of-way in their risk-based asset management plan, and may include roads other than on the NHS. In addition, Transit Asset Management Plans include “capital asset inventories and condition assessments, decision support tools, and investment prioritization”, and can be a useful resource for the transportation plan.⁷²

A comprehensive transportation asset management plan (TAMP) will serve as an important resource in developing goals and objectives for infrastructure condition within a State, metropolitan area, or rural area transportation plan. The TAMP serves as a management tool to achieve a common understanding and commitment to improve performance, and acts as a focal point for information about the DOT’s assets, management strategies, long-term expenditure forecasts, and business management processes. More information on the TAMP, transportation asset management, and transit asset management is available on the FHWA Office of Asset Management Website and from the FTA State of Good Repair and Asset Management Website.⁷³

CONGESTION MANAGEMENT

A congestion management process (CMP) is a systematic and regionally-accepted approach for managing congestion that provides accurate, up-to-date information on transportation system

⁷⁰ 49 USC § 5329(d)


⁷¹ 23 USC § 119(e)

⁷² 49 USC § 5326

⁷³ FHWA Office of Asset Management, Transportation Asset Management Plans Website:

<http://www.fhwa.dot.gov/asset/plans.cfm> FTA, State of Good Repair and Asset Management Website:

<http://www.fta.dot.gov/13248.html>



performance and assesses alternative strategies for congestion management that meet State and local needs. The CMP is intended to move these congestion management strategies into the funding and implementation stages. A CMP is required in Transportation Management Areas (TMAs), metropolitan areas with population exceeding 200,000. Beginning with SAFETEA-LU, metropolitan areas were encouraged to integrate the CMP into the development of their metropolitan planning process. The CMP, as defined in Federal regulation, includes several activities that are significant for the development of congestion reduction objectives in both State and metropolitan transportation plans. The CMP includes the development of congestion management objectives, establishment of measures of multimodal transportation system performance, and the collection of data and system performance monitoring to define the extent and duration of congestion and determine the causes of congestion. For more information, see FHWA's Congestion Management Process Guidebook.⁷⁴

SYSTEM RELIABILITY

Transportation system users desire travel time reliability – consistent and predictable travel times. Travel time reliability is a reflection of the variability of travel time. Travelers and shippers like to know what to expect and travel time reliability gives them greater certainty when using the transportation system. Unreliable travel is caused by non-recurring events, such as weather conditions, work zones, special events, and traffic incidents, as well as fluctuations in traffic volumes.


There are several new resources to assist States and MPOs in incorporating reliability into the goals, objectives, and performance measures of their transportation plans. The second Strategic Highway Research Program (SHRP 2) created several products that are helpful to planners. The *SHRP 2 Guide to Incorporating Reliability Performance Measures into the Transportation Planning and Programming Processes*⁷⁵ offers assistance in incorporating reliability throughout the planning process including goals and objectives.

Planning practitioners are increasingly using vehicle probe data to obtain information on travel time reliability. FHWA has acquired a national data set of average travel times for use in performance measurement. This data set is being made available to States and metropolitan planning organizations (MPOs) as a tool for performance measurement. The National Performance Management Research Data Set (NPMRDS) is a vehicle probe-based travel time data set and consists of average travel times reported every 5 minutes on the National Highway System (NHS) as defined in MAP-21 and on the five-mile radius of arterials at border crossings. To obtain more

⁷⁴ FHWA Congestion Management Process Guidebook:

http://www.fhwa.dot.gov/planning/congestion_management_process/cmp_guidebook/.

⁷⁵ Available at: <http://www.trb.org/Main/Blurbs/168855.aspx>.



information on the national performance measurement data, refer to the FHWA NPMRDS Frequently Asked Questions.⁷⁶

FREIGHT MOVEMENT AND ECONOMIC VITALITY

Understanding performance of the freight transportation system and the challenges that come with increasing demand for freight transportation is important to improving mobility and productivity and establishing goods movement goals in the transportation plan.⁷⁷ Travel time data for freight is available through the NPMRDS discussed above. States and regions can create freight plans that establish goals, objectives, and strategies for improving goods movement and economic activity in the area. These plans and any standing working groups or committees focused on freight movement should be considered in the development of transportation plan goals.

ENVIRONMENTAL SUSTAINABILITY

FHWA has created multiple resources that can support State DOTs and MPOs in developing transportation plan goals in the areas of environmental sustainability. Sustainability as a concept may be considered broadly to include consideration of three primary principles: social, environmental, and economic. “The goal of sustainability is the satisfaction of basic social and economic needs, both present and future, and the responsible use of natural resources, all while maintaining or improving the well-being of the environment on which life depends.”⁷⁸ Planners can use the FHWA Sustainable Highways Initiative website to obtain information on how to incorporate sustainability goals in their transportation plans.⁷⁹ From that website, planners can access FHWA’s sustainability self-assessment tool, INVEST, to evaluate, score, and improve the sustainability of their transportation plans. Additionally, FHWA has information useful for setting climate change-related goals and performance measures for the transportation plan on the FHWA Office of Planning, Environment, and Realty’s Climate Change website.^{80,81}

As an example, the **North Central Texas Council of Governments (NCTCOG)** used the INVEST System Planning module to evaluate the sustainability of its *Mobility 2035* metropolitan transportation plan. The INVEST tool results aligned with planning areas that NCTCOG had emphasized in the past, such as social considerations and air quality elements, but also pointed

⁷⁶ Available at: http://www.ops.fhwa.dot.gov/freight/freight_analysis/perform_meas/vpds/npmrdsfaqs.htm.

⁷⁷ http://www.fhwa.dot.gov/planning/freight_planning/index.cfm


⁷⁸ <http://www.sustainablehighways.dot.gov/overview.aspx#quest1>.

⁷⁹ Available at: <http://www.sustainablehighways.dot.gov/default.aspx>.

⁸⁰ Available at: http://www.fhwa.dot.gov/environment/climate_change/adaptation/.

⁸¹ Available at:

http://www.fhwa.dot.gov/environment/climate_change/mitigation/publications_and_tools/ghg_planning/.



out issues that hadn't been considered, like addressing infrastructure resiliency to climate hazards such as increased flooding, and measuring performance on sustainability outcomes. NCTCOG is planning to incorporate advances in these areas into its next transportation plan, *Mobility 2040*.

Crafting Objectives

Objectives are specific, measurable statements that support achievement of a goal. An objective should include or lead to development of a performance measure in order to support decisionmaking. For instance, under a broad goal related to improving travel options, an objective might be to: “increase bicycling and walking.” An ideal objective is often described as SMART (specific, measurable, agreed-upon, realistic, time-bound). In this case, the objective would be crafted more specifically to define a performance measure and target: for instance, “By 2035, achieve 10 percent of work trips made by bicycling and walking.”

A single goal may have many objectives. For example in the Denver Regional Council of Governments’ (DRCOG) 2035 *Metro Vision Regional Transportation Plan*, adopted in 2011, the TDM subchapter includes:

Two important overall Metro Vision [objectives] are directly related to TDM:


- *Reduce the percent of trips to work by SOV to 65 percent by 2035, and*
- *Reduce the regional per capita VMT by 10 percent by 2035.*

The current SOV to work share is about 74 percent. The current per capita VMT is about 26 miles. The goal is to bring that value down to 23 miles per person by 2035.⁸²

Data become more important in moving from broad goals to objectives. Baseline data addressing the issue of concern, such as bridge condition, transit overcrowding, or incident response time, help focus planners on important performance gaps or conditions that need monitoring or improvement. It is also important to consider what data will be needed to support implementation and monitoring.

In general, objectives that guide decisions in a transportation plan should reflect intended outcomes that are experienced by system users or the public. Outcome objectives typically reflect changes noticeable to the public that are influenced by a variety of factors (e.g. reduce hours of incident-based delay), output objectives reflect the activities or results of activities undertaken to affect outcomes (e.g. reduce clearance time for traffic incidents), and activity measures reflect

⁸² DRCOG 2035 Metro Vision Regional Transportation Plan
[http://www.drcog.org/index.cfm?page=regionaltransportationplan\(rtp\)](http://www.drcog.org/index.cfm?page=regionaltransportationplan(rtp)).



actions taken by transportation agencies that relate to strategy implementation (e.g. increase the number of cameras tracking system conditions). More information on objective types can be found in the FHWA *Performance Based Planning and Programming Guidebook*.

An objective may be framed to address a type of travel (e.g., passenger, freight), travel mode (e.g., rail, buses, passenger vehicles), or geography (e.g., urbanized area, nonurbanized area). Thus, one goal area might have several objectives that address different aspects of the issue. For example, there may be separate objectives addressing:

- ▶ Congestion on interstates and non-interstates, or
- ▶ Reliability of various transit modes and highway travel.


An objective may also focus on a specific component of the region or transportation system where an issue is of key importance, such as “Increase access to transit within targeted growth areas.”

When multiple objectives are used, it is important that objectives not contradict or conflict with each other. Any contradiction of objectives should be resolved before inclusion in the final transportation plan.

Linking Transportation Plan Goals and Objectives to Broader Plans

Goals and objectives can support broader community visions, as articulated in State and regional comprehensive planning documents. Goals do not need to be under the control of transportation agencies, but should be able to be affected through transportation investment decisions.

For instance, the Arizona transportation plan, *What Moves You Arizona: 2010-2035*, references the *Building a Quality Arizona 2050 (bqAZ)* vision, in which **Arizona DOT** worked with organizations, stakeholders, and residents across the State to develop a comprehensive vision. The bqAZ framework presented a multimodal transportation system that recognized and strengthened the relationship between land use and transportation by connecting activity and employment centers statewide. Several of the LRTP goals are directly drawn from bqAZ Guiding Principles. The Arizona LRTP also recognizes that many of the goals (e.g., support economic growth, link transportation and land use, improve mobility and accessibility) are the responsibility of many public and private partners, so the plan discusses the role that ADOT expects to play. For instance, under the goal to “support economic growth,” ADOT’s role is to develop and operate a State Transportation System



that provides predictable freight and people movement to create/retain jobs and support a competitive and thriving economy.⁸³

Similarly, recognizing the common issues across agencies, the **Maryland DOT** worked with the Maryland Department of Planning and Maryland Department of Housing and Community Development, which are responsible for land use and housing plans, respectively, in development of the Maryland Transportation Plan. In this way, visions and goals associated with those plans could be considered and incorporated into the Maryland DOT's LRTP development process. The **Pikes Peak Area Council of Governments** collaborated with the US Fish and Wildlife Service, the Environmental Protection Agency, and the US Army Corps of Engineers, as well as State agencies such as the Historic Preservation Office in developing its goals to ensure that they aligned with other key regional and State priorities.

Recognizing that planning is a continuing process, the transportation plan goals and objectives can build upon those found in previous transportation plans, while considering new challenges and factors that may suggest a need to adjust.

⁸³ Arizona DOT, What Moves You Arizona: 2010-2035 Long-Range Transportation Plan (2011). <http://www.azdot.gov/docs/default-source/planning/lrtp-2011-1129.pdf?sfvrsn=2>.

6. Performance Measures and Targets

Performance measures and associated targets are the centerpiece of a performance-based transportation plan. They are used in a performance-based transportation plan to define in specific and measurable terms the desired outcomes of the plan. Performance measures and associated targets provide an objective means to inform decisions about strategies and investments in the transportation plan, and serve as indicators to assess progress toward achieving desired outcomes. Because of this elevated role, the performance measures selected for the transportation plan should meaningfully reflect all of the goals and objectives of the plan, which are based on the region's or State's vision and support the national goals as set forth in MAP-21.

Federal law requires States and MPOs to set targets in relation to the set of national performance measures.⁸⁴ It also requires MPOs⁸⁵ and encourages State DOTs⁸⁶ to include the national performance measures and these performance targets in their transportation plans. In addition,

NATIONAL PERFORMANCE MEASURES

National performance measures address the following issues:


- ▶ For the National Highway Performance Program (NHPP):
 - Pavement conditions on the Interstate system and remainder of the National Highway System,
 - Bridge conditions on the NHS,
 - Performance of the Interstate system and remainder of the NHS
- ▶ For the Highway Safety Improvement Program (HSIP):
 - Number and rate per vehicle mile traveled of fatalities
 - Number and rate per vehicle mile traveled of serious injuries
- ▶ For the Congestion Mitigation and Air Quality Improvement Program (CMAQ):
 - Traffic congestion
 - On-road mobile source emissions
- ▶ Freight movement on the Interstate system
- ▶ Public transportation:
 - State of good repair
 - Safety

Source: 23 USC § 150(c) and 49 USC § 5326(c) and § 5329(d)

⁸⁴ The U.S. DOT is required to promulgate rulemaking within 18 months of October 1, 2012. The conclusion of the rulemaking process will result in the publication of the final rule (including an effective date) in the Federal Register. The States will then set associated performance targets within 12 months of the effective date and MPOs will set targets within 180 days of the establishment of State targets.

⁸⁵ 23 USC § 134 (h)(2)(B).

⁸⁶ 23 USC § 135 (d)(2)(B).



transportation plans also may include a range of additional performance measures beyond the national measures.

Some States document performance measures and targets in documents other than the transportation plan. For example, the Maryland DOT has a limited set of performance measures in its current transportation plan, but its annual attainment report identifies specific targets and tracks progress toward the transportation plan goals and objectives.⁸⁷

Key Roles for Performance Measures in the Transportation Plan

Performance measures serve several key roles in a performance-based transportation plan, as discussed in the PBPP Guidebook:

- ▶ Clarify the definition of goals;
- ▶ Monitor and report toward implementation of plan goals and objectives;
- ▶ Identify location, extent, and intensity of performance needs or deficiencies, which will serve as a reference for target setting; and
- ▶ Evaluate potential impacts of scenarios, programs, or projects.


Clarify the Definition of Goals

As noted earlier, a goal is a broad statement, and a performance measure is an indicator used to assess the progress toward a goal. Performance measures are the specific, measurable attributes of performance that must be changed in order to reach the goal. For example, the performance measures of “average transit travel time to work” and “average travel speeds on highways” could be used as performance measures that translate the overarching goal of “mobility” into specific indicators that should be changed in order to reach the goal.

Performance measures should be clearly defined to ensure that stakeholders and the public understand what is being measured and that they reflect the performance attributes that are of greatest value for the community. For instance, mobility can be defined in many ways and it is important to work with the public and stakeholders to define what is meant by “mobility” and what is the most useful measure or measures of it. Similarly, issues like economic vitality and livability are multi-faceted concepts for an area. By defining specific performance measures,

⁸⁷ Maryland DOT, State Report on Transportation.

http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/Plans_Programs_Reports/Index.html.



attention is focused on key issues of concern that can be influenced by transportation policies and investments.

Some goal areas may compete. For instance, the goals of increasing vehicle travel speeds and improving pedestrian safety may seem to be at odds with each other, since faster travel speeds can lead to a less hospitable pedestrian environment and more crashes. Consequently, it is important to clearly identify priorities and values when selecting and defining performance measures, particularly for those that address broad goals such as mobility.

Monitor and Report on Progress toward Transportation Plan Goals and Objectives

One of the most important roles for performance measures is to allow transportation plan goals and objectives to be tracked over time to inform the public, planners, and decision-makers on the state of the transportation system relative to the characteristics that it values the most. By monitoring and reporting on these measures, all stakeholders can see whether or not the region or State is moving toward the desired goals and objectives of the plan. This enables decision-makers to examine what is happening on the system and make more informed decisions. States and regions use performance measurement tools to evaluate their transportation system and guide investments decisions reflected in the transportation plan. Performance information, together with public and stakeholder input, supports decision-makers in making investment choices and trade-offs within available resources.

Performance measures developed to track goals and objectives in a performance-based transportation plan are included in the plan along with a report on the current and past conditions for those measures (discussed in Chapter 7).

For example, the ***Pikes Peak Area Council of Governments (PPACG)*** in Colorado used an extensive public involvement process to develop a set of 17 goals, associated objectives with targets for years 2015, 2025, and 2035, and between one and twelve performance measures per goal for its *Moving Forward Update 2035* Regional Transportation Plan, adopted in 2012. PPACG hosted five workshops or focus groups among a wide variety of regional stakeholders and a website survey to develop and refine this set of goals, objectives, and performance measures. The region strove to meet three standards for each performance measure developed:⁸⁸

- ▶ Consistent data are likely available or can be obtained to facilitate analysis;
- ▶ The measure can be applied at system, corridor, and project levels; and

⁸⁸ For more information, see PPACG case study and references in Chapter 11.

- ▶ The measure is quantitative in nature.

The table below provides an example of the thorough nature of the PPACG MTP's goals, objectives, and performance measures. For each goal, specific objectives with targets were established for short-, mid-, and long-term timeframes. PPACG has listed as its first objective for each goal the development of a baseline for comparison by 2015. This is a necessary step for any performance-based planning endeavor.

**Figure 6-1. Pike's Peak Area Council of Governments –
2035 Moving Forward Update to the Regional Transportation Plan**

Goal: Improve the operation of transportation systems and services to enhance emergency response, minimize travel times and maximize service quality of all modes of commercial and private travel throughout the region.

Objectives:

By 2015

- Verify baseline for comparison
- Maintain commercial vehicle and auto per capita travel time at 2005 levels
- Increase the # of transit routes with a headway (time between buses) of 60 minutes or less by 15% and implement signal preemption for buses
- Utilize demand management strategies to reduce peak hour travel by 10% from 2005 levels.

By 2025

- Maintain commercial vehicle and automobile per capita travel time at 2005 levels
- Increase the number of transit routes with a headway (time between buses) of 60 minutes or less by 25% and implement signal preemption for buses
- Reduce transit and non-motorized travel time by 20% from 2005 levels
- Utilize demand management strategies to reduce peak hour travel by 20% from 2005 levels

By 2035

- Maintain commercial vehicle and automobile per capita travel time at 2005 levels
- Increase the number of transit routes with a headway (time between buses) of 60 minutes or less by 35% and implement signal preemption for buses
- Reduce transit and non-motorized travel time by 30% from 2005 levels
- Utilize demand management strategies to reduce peak hour travel by 30% from 2005 levels

Performance Measures:

- Average transit travel time to work
- # of routes with headway of 60 minutes or less
- Travel time during peak and off-peak travel hours for auto, trucks, non-motorized travel, and transit

Source: Pike's Peak Area Council of Governments, *2035 Moving Forward Update*.

With a similar emphasis on the use of performance measures to monitor MTP goals, the ***Southern California Association of Governments (SCAG)*** developed a set of nine goals for its *2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS): Towards a Sustainable Future*. With the exception of the security goal, each goal was mapped to one or more “performance outcomes” to enable the region to “quantify regional goals, estimate the impacts of proposed investments, and evaluate progress over time.”⁸⁹ The performance outcomes in the SCAG plan are:

- ▶ Mobility/Accessibility
- ▶ Reliability
- ▶ Location Efficiency
- ▶ Productivity
- ▶ Safety and Health
- ▶ Economic Well-Being
- ▶ Cost Effectiveness
- ▶ System Sustainability
- ▶ Environmental Quality

For each performance outcome, SCAG established performance measures or indicators, definitions, targets (typically directional), and the data source.

⁸⁹ SCAG RTP, <http://rtpscs.scag.ca.gov/Pages/2012-2035-RTP-SCS.aspx>.

Figure 6-2. A Subset of Performance Measures included in the Southern California Association of Governments' 2012-2035 RTP

Performance Measure/ Indicator	Definition
Share of growth in High Quality Transit Areas (HQTAs)	Share of the region's growth in households and employment in HQTAs
Land consumption	Additional land needed for development that has not previously been developed or otherwise impacted, including agricultural land, forest land, desert land, and other virgin sites
Average distance for work or non-work trips	The average distance traveled for work or non-work trips separately
Percent of work trips less than 3 miles	The share of total work trips which are fewer than 3 miles
Work trip length distribution	The statistical distribution of work trip length in the region

Source: Southern California Association of Governments, *Regional Transportation Plan 2012-2035: Sustainable Communities Strategy*, Performance Measures Appendix, Table 2 (April 2012).

Identify Performance Needs and Deficiencies

A key role for performance measures is to identify deficiencies in meeting the performance objectives of the transportation plan (see Chapter 8 for more discussion). To assess the performance needs and deficiencies in the State or region, analysts typically conduct an in-depth assessment through data collection and/or the use of modeling and simulation tools to assess performance and identify the gaps between current conditions and targets.

For example, the **Southwestern Pennsylvania Commission (SPC)**, the MPO for the Pittsburgh, Pennsylvania region, uses the measures of travel time, speed, and delay to identify regional mobility needs. Through its Congestion Management Process (CMP), SPC has a monitoring program that collects data on 100 corridors every 3 years using travel time runs with GPS. The results are aggregated by corridor and reviewed with other agencies and the community to compare and validate the patterns of congestion and identify sources of congestion. This data collection helps transportation practitioners customize strategies for specific corridors based on the unique needs and travel patterns of that area. Findings from the CMP, as well as SPC's Regional Operations Plan, inform the strategies that are considered in the region's long range planning process.⁹⁰

⁹⁰ Southwestern Pennsylvania Commission RTP, http://www.spcregion.org/trans_lrp.shtml.

Evaluate Potential Impacts of Scenarios, Programs, or Projects for Investment

The fourth critical function of performance measures in a performance-based transportation plan is in the evaluation of strategies or solutions to address performance needs or deficiencies. This includes the evaluation of scenarios, programs, projects, strategies, or policies to identify the likely impacts of the solution on the performance characteristics of interest for the region or State.

Examples are described below.

- ▶ Both the **Baltimore Metropolitan Council (BMC)** and the **Wilmington Area Planning Council (WILMAPCO)** use project prioritization to rank projects based on their ability to meet the goals set forth in each MPO's respective long range plan.⁹¹
- ▶ **Pikes Peak Area Council of Governments** in Colorado, in its project selection process, uses a cost-benefit analysis methodology that measures benefits including time savings, vehicle operating cost savings, greenhouse gas and criteria pollutant emission savings, and accident cost savings. The MPO developed a system that integrated a VISUM travel network model with the TREDIS economic benefit model.⁹²
- ▶ The **Mid-America Regional Council** in the Kansas City area also scores projects using

VERMONT AGENCY OF TRANSPORTATION: PEDESTRIAN AND BICYCLE PERFORMANCE MEASURES

Vermont Agency of Transportation (VTrans) has developed a number of bicycle and pedestrian measures to measure its progress toward enhancing these modes of transportation. These measures are currently used to monitor the efficiency and effectiveness of transportation projects and programs throughout the state. The performance measures fall into five of six categories. The measures represent a mix of outcome and output measures. Examples include:

- Number of minutes per day the average Vermont resident spends doing pedestrian and bicycle activity
- Miles of shared-use paths
- Number of schools and students participating in pedestrian or bicycle safety education programs or events
- Percent of all workers who commute to work by walking or bicycling

For more information, see:

http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/Itf/BikePedTechMemo3.pdf

⁹¹ For more information, see: <http://www.baltometro.org/plans/transportation-outlook-2035-prioritization> and <http://www.wilmapco.org/priority/>.

⁹² See Chapter 11 and references list for more information.

a process that relates clearly back to performance measurements chosen to reflect objectives. The MPO's 2040 long range plan includes a series of goals and measures that address livability issues, and its annual progress report contains data that is considered during project prioritization to evaluate program priorities with on-the-ground changes.⁹³

- ▶ The **North Central Pennsylvania Regional Planning and Development Commission** developed a project prioritization process to address the need for the agency to make targeted investments of limited resources in its large region. After an iterative process of developing prioritization criteria using Decision Lens (software provided to the agency by Pennsylvania DOT), all projects in the agency's 2011 TIP were scored against "Overall Transportation Criteria," which include 14 measures related to five key topics with respective weights assigned to them: safety (36 percent), job creation and community benefits (23 percent), transportation planning and project support (14 percent), project location factors (12 percent), and transportation benefits (16 percent). North Central continues to work with other agencies and Pennsylvania DOT to identify indicators to track its investments in preserving the existing system, one of the agency's and State's priorities.⁹⁴

Chapter 9 discusses investment analysis in more detail.

Identifying, Selecting, and Implementing Performance Measures for the Plan

Identifying and selecting a mutually-agreed upon set of common performance measures for use in a State or metropolitan transportation plan may involve public input, coordination among multiple agencies, evaluation by a technical committee, and approval by senior leaders in the region or State. It also involves coordination of performance measures selected for related planning documents and use of national measures. Performance measures have importance in investment decisions and should reflect the values and priorities of a region or State, as well as national goals. Moreover, they should be grounded in the realities of data availability and technical evaluation.

A sample of actions to take in developing a set of performance measures include:

- ▶ Clarifying and confirming the roles of the performance measures in the transportation plan and beyond.
- ▶ Identifying the primary audiences for communicating information through the performance measures.

⁹³ For more information, see: http://www.fhwa.dot.gov/livability/creating_livable_communities/booklet06.cfm.

⁹⁴ For more information, see: http://www.ncentral.com/trans/?page_id=55 or <http://www.ncentral.com/wp-content/uploads/2013/08/Final-Chapter-6-0.pdf>.

- ▶ Agreeing to a list of evaluation criteria for individual measures and the set of measures (see next section: Attributes of Effective Performance Measures in transportation plans).
- ▶ Gathering a list of recommended performance measures based on transportation plan goals, objectives from a broad range of planning partners and stakeholders, and performance measures from related transportation plans for the State or region.
- ▶ Obtaining public input on potential performance measures.
- ▶ Evaluating performance measures for data availability and other chosen evaluation criteria.
- ▶ Reaching consensus on a set of performance measures based on evaluation results.
- ▶ Obtaining approval from senior leadership/governing boards.

The **Michigan DOT** and **Pikes Peak Area Council of Governments** each held four to five workshops or focus groups to obtain input on performance measures and select a minimum set of measures. The **San Diego Association of Governments (SANDAG)** used a technical workshop group made up of staff from local member government agencies to lead the development of a set of measures, conducted general outreach to the public, and involved the SANDAG policy board at key points including the approval of the final list of performance measures.

Performance measures can support a broad range of goal areas such as mobility, safety, security, air quality, infrastructure condition, and livability. Those in the transportation plan should integrate performance measures from:

- ▶ The State’s Strategic Highway Safety Plan, a statewide-coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads.⁹⁵
- ▶ State Transportation Asset Management Plan (TAMP), “a tactical-level document which focuses its analysis, options development, programs, delivery mechanisms, and reporting mechanisms on ensuring that strategic objectives are achieved.”⁹⁶ Each State is required to develop a risk-based asset management plan for the NHS. The TAMP must include asset management objectives and performance measures which should be considered for adoption in the transportation plan. The TAMP is the State’s central framework for asset management including information about its assets, management strategies, and expected long-term costs.

⁹⁵ 23 USC § 148 (c).

⁹⁶ <http://www.fhwa.dot.gov/asset/plans.cfm>.

- ▶ **Transit Asset Management Plan.**⁹⁷ As established by MAP-21, all Federal Transit Administration (FTA) grantees and their subrecipients must develop transit asset management plans that include, at a minimum capital asset inventories and condition assessments; and investment prioritization. In addition, each designated recipient of FTA formula funding will be reporting progress on the performance measures established by the U.S. DOT on transit asset condition. These performance measures along with any others added to the transit asset management plan should be considered in the development of performance measures for the transportation plan.
- ▶ The congestion management process (CMP),⁹⁸ defined previously, establish metropolitan regions' congestion management objectives and performance measures and use those measures to identify mobility needs. The CMP is an important source of mobility-related performance measures for the transportation plan.
- ▶ **Transit Agency Safety Plan,**⁹⁹ a comprehensive agency safety plan that includes methods for identifying and evaluating safety risks throughout the public transportation system of the recipient, strategies to minimize the exposure of the public, personnel, and property to hazards and unsafe conditions. This plan should also be used in developing performance measures in the transportation plan related to transit safety.
- ▶ **State Freight Plan**¹⁰⁰ is a multi-modal (includes air, rail, truck and maritime transport) and intermodal plan to improve freight movement and connections to markets, supporting economic importance of freight movement. It identifies transportation networks important to freight-dependent industries and recommends multimodal strategies to increase strategic freight system efficiency. States and metropolitan areas should consult this plan for any relevant performance measures to include in their transportation plans.
- ▶ Other relevant State or regional plans such as pedestrian and bicycle plans.

While Federal rulemaking will specify the way in which national performance measures are defined for the program areas specified in MAP-21, some useful resources to consider to help in selecting performance measures and associated targets in the transportation plan are listed below:

- ▶ **Safety measures** – Information related to safety can be found in the FHWA publication: *Strategic Highway Safety Plans: A Champion's Guidebook to Saving Lives, Second Edition*, specifically Chapter 3: SHSP Content, which describes performance management and

⁹⁷ 49 USC § 5326(c).

⁹⁸ 23 CFR § 450.320(a),(b).

⁹⁹ 49 USC § 5329(d).

¹⁰⁰ 23 USC § 167.

objective setting, and *A Primer on Safety Performance Measures for the Transportation Planning Process*.¹⁰¹

- ▶ **Operations and congestion measures** – The FHWA publication, *Advancing Metropolitan Planning for Operations: The Building Blocks of a Model Transportation Plan Incorporating Operations - A Desk Reference*, is a helpful resource in setting operations-related objectives and selecting performance measures.¹⁰² The FHWA *Congestion Management Process Guidebook* also provides a useful discussion about a range of performance measures.¹⁰³
- ▶ **Livability measures** - *The Role of FHWA Programs in Livability: State of the Practice Summary* offers information on common livability performance measures and analysis tools that can be used to estimate the impact of strategies on livability-related performance measures.¹⁰⁴
- ▶ **Bridge and pavement condition measures** –The *National Bridge Investment Analysis System* website¹⁰⁵ and resources on the FHWA Office of Asset Management web site¹⁰⁶ provide information on assessing these conditions.
- ▶ **Sustainability measures** – Planners can refer to *A Guidebook for Sustainability Performance Measurement for Transportation Agencies* from NCHRP for information related to sustainability performance measures.¹⁰⁷
- ▶ **Freight measures** – Resources for developing freight measures include NCFRP Report 10 *Performance Measures for Freight Transportation*¹⁰⁸ and the FHWA Office of Freight Management and Operations Performance Measure webpage.¹⁰⁹
- ▶ **Bicycle and pedestrian network and accessibility measures** – For many agencies, completing a network of bicycle and pedestrian trails and other facilities is a key step in making walking and bicycling viable alternative travel modes. FHWA’s Bicycle and Pedestrian Program provides a number of resources that can be helpful in selecting measures for these modes.¹¹⁰

¹⁰¹ Strategic Highway Safety Plans: A Champion’s Guidebook to Saving Lives, Second Edition: <http://safety.fhwa.dot.gov/hsip/shsp/guidebook/index.cfm#toc>. A Primer on Safety Performance Measures for the Transportation Planning Process: <http://safety.fhwa.dot.gov/hsip/tsp/fhwahep09043/>.

¹⁰² Available at: <http://ops.fhwa.dot.gov/publications/fhwahop10027/index.htm>.

¹⁰³ Available at: http://www.fhwa.dot.gov/planning/congestion_management_process/cmp_guidebook/.

¹⁰⁴ Available at: http://www.fhwa.dot.gov/livability/state_of_the_practice_summary/research03.cfm.

¹⁰⁵ Available at: <http://www.fhwa.dot.gov/tpm/resources/nbias/>.

¹⁰⁶ Available at: <https://www.fhwa.dot.gov/asset/>.

¹⁰⁷ Available at: <http://www.trb.org/Main/Blurbs/166313.aspx>.

¹⁰⁸ Available at:

http://www.trb.org/Main/Blurbs/Performance_Measures_for_Freight_Transportation_165398.aspx.

¹⁰⁹ Available at: http://ops.fhwa.dot.gov/FREIGHT/freight_analysis/perform_meas/index.htm.

¹¹⁰ Available at: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/.

With the implementation of MAP-21 performance management requirements, State DOTs, MPOs, and transit agencies will be increasingly coordinating on the implementation of performance measures. Recently, California MPOs, with SANDAG leading the coordination, conducted a collaborative effort to identify a “common, standardized set of up to ten transportation performance monitoring indicators”¹¹¹ that would be used by all MPOs and State agencies dealing with both Federal and State regulations to help support the implementation of Senate Bill 375 (SB 375) and MAP-21. Many California MPOs will continue to track progress on their own unique plan measures, which are often more directly aligned with their regional priorities, but the standardized set will provide continuity, ability for comparison, and possible opportunities for collaboration between MPOs to address technical challenges or other issues. A technical group of representatives from MPOs and State agencies took into consideration the diversity of regions including rural and urban, external factors and available statewide data sources. These results were distributed in 2013, through a final report. The proposed performance monitoring indicators are in the following figure:

Figure 6-3. Proposed California MPO Performance Measures

Table 1: Proposed Performance Monitoring Indicators					
ID	Inventory Ref. (Appendix B)	MAP-21 Category	Statewide Performance Monitoring Observed Data	Performance Measure (Model Based)	Referenced In
Congestion Reduction					
1	A-8/A-1	VMT	✓	✓	SB 375 & MAP-21
		a. VMT per capita* b. Percent of Congested Freeway Highway Vehicle Miles [PeMS]	✓	✓	
2	A-16/A-18	Mode Share (Travel to Work)*	✓	✓	SB 375 & MAP-21
Infrastructure Condition					
3		Sate of Good Repair	✓		MAP-21
		a. Highways			
		b. Local Streets			
		c. Highway Bridges			
		d. Transit Assets			
System Reliability					
4	A-65	Freeway/Highway Buffer Index [PeMS]	✓	✓	MAP-21
Safety					
5	A-39	Fatalities/Serious Injuries	✓	✓	MAP-21
		a. Fatalities/Serious injuries per capita* b. Fatalities/Serious injuries per VMT*			

¹¹¹ SANDAG, Statewide Performance Monitoring Indicators for Transportation Planning, Final Report, June 2013, http://sgc.ca.gov/meetings/20130916/Agenda_Item_4_SANDAG_Indicators_Final_Report.pdf.

Economic Vitality					
6	C-33	Transit Accessibility (Housing and jobs within 0.5 miles of transit stops with frequent transit service)*	✓	✓	SB 375
7	A-84	Travel Time to Jobs	✓	✓	SB 375 & MAP-21
Environmental Sustainability					
8	B-1/B-5	Change in Agricultural Land*	✓	✓	SB 375
9	E-5	CO2 Emissions Reduction per capita (modeled data)*		✓	SB 375 & MAP-21
* Indicator relates to public health			[PeMS] Indicator for MPOs that have access to PeMS data		

Source: SANDAG, *Statewide Performance Monitoring Indicators for Transportation Planning*, Final Report (June 2013).

Attributes of Effective Performance Measures in Transportation Plans

Selecting performance measures for the transportation plan is a challenging but important task. The FHWA *Performance Based Planning and Programming Guidebook* offers six factors that should be considered when selecting performance measures for a performance-based transportation plan.

Does it represent a key concern? Performance measures represent the most important concerns or interests for a region or State.

Is it clear? The performance measure should be understandable.

Are data available? Each measure must be able to be measured effectively through the collection of available, reliable, and accurate data to provide a consistent and trustworthy result for planning and investment decisions.

Can it be forecasted? Consider which measures can be forecasted when evaluating potential solutions.

Is the measure something the agency and its investments can influence? Each measure should depend to at least some extent on the policies and investments chosen for the transportation plan and STIP or TIP.

Is the measure meaningful for the types of services or area? Ensure that the measures are tied to the desired outcomes and values that are described in the vision, goals, and objectives of the transportation plan. Consider if the measure needs to be different for rural and urban areas.

The ultimate purpose of performance measurement is not just reporting the performance of the system, but the development of actions that improve performance.

The criteria used by the **Wilmington Area Planning Council (WILMAPCO)** in Delaware and its planning partners in selecting performance measures for its MTP were reliable, relevant, regional, and easy-to-understand. Three questions were also kept in the forefront as they considered their performance measures:

- ▶ Can we explain this measure and can it be easily understood by the general public?
- ▶ Will data be available for this measurement over time?
- ▶ Is it clearly tied back to the MTP goals and objectives?

Michigan DOT and its planning partners established 11 criteria that had to be met for a performance measure to be adopted. Criteria included “Does the measure indicate causality?”, “Is the measure an early warning indicator?”, and “Does the measure predict outcomes?” To be selected, a measure needed the following characteristics: data to support it, public interest in the measure, control by the State in effected measures, value in reporting on the measure, supported decisionmaking, and enhanced accountability. In the end, nineteen core measures were included in the plan, with seven subordinate measures.¹¹²

Measures that Reflect Diverse Transportation Plan Goals

As a set, the performance measures selected should represent a limited number of measures to meaningfully measure the goals

MEASURES OF LIVABILITY AND SUSTAINABILITY

Mobility, livability and sustainability goals have increasingly become a focus in transportation planning. New evaluation tools and methods have been developed to help MPOs and States evaluate and measure livability related principles impacted by transportation. A number of new resources have been developed to provide guidance to incorporating sustainability into transportation decisionmaking. Some examples include:

FHWA’s sustainability self-assessment tool, *INVEST*. *INVEST* defines actionable criteria that transportation agencies can fulfill in order to be more sustainable. FHWA developed *INVEST* to guide, measure, and recognize “above-and-beyond” performance in the sustainable planning, design, and construction of transportation infrastructure.

NCHRP Report 708: A Guidebook for Sustainability Performance Measurement for Transportation Agencies provides model sustainability-related performance measures, including data sources and examples of use.

EPA’s Guide to Sustainable Transportation Performance Measures, which identifies evaluation methods and data sources associated with 10 key measures. The guide is intended to help transportation agencies use performance measurement to better account for environmental, economic and social impacts of projects and planning.

(continued on next page)

¹¹² http://www.michigan.gov/documents/mdot/MDOT_SLRP_rept_Goals_Objectives_Performance_Report_11-17-06_180916_7.pdf.

in the transportation plan. Agencies with significant experience developing a performance-based plan and tracking progress toward the plan over time have suggested that the ideal number of performance measures to have within a transportation plan is between 10 and 15 measures. This allows the agency and the public to stay focused on the issues that are most important, and keeps the resources that must be spent on tracking performance at a reasonable level.

It is worthwhile to consider measures that reflect plan goals for livability, sustainability, active transportation, growth management, location efficient housing, community service provision, and accessibility. In 2011, EPA completed a *Guide to Sustainable Transportation Performance Measures*.¹¹³ The guidebook identifies 10 performance measures (largely already in use by MPOs) that can readily be developed and applied in transportation decision-making:

- ▶ Transit accessibility
- ▶ Bicycle and pedestrian mode share
- ▶ VMT per capita
- ▶ Carbon intensity
- ▶ Mixed land uses
- ▶ Transportation affordability
- ▶ Distribution of benefits by income group
- ▶ Land consumption
- ▶ Bicycle and pedestrian activity and safety
- ▶ Bicycle and pedestrian level of service

The **Chicago Metropolitan Agency for Planning (CMAP)** used the “H+T Index as a measure in its *Go To 2040* regional plan,¹¹⁴ along with a goal to reduce combined housing and transportation costs for working families to 53 percent of income in 2015 and 45 percent in 2040.”¹¹⁵

(continued from previous page)

The FHWA *Livability in Transportation Guidebook* includes case studies of how MPOs and states have incorporated livability metrics into their transportation decision making process. The guidebook indicates though that existing transportation measures are often not comprehensive enough to effectively evaluate “community development, housing and environmental goals.” As such, additional measures will be needed to help agencies understand how their plans and projects impact livability.

The Center for Neighborhood Technology designed a housing and transportation affordability index, known as *H+T Index*, to better demonstrate the affordability of housing according to the transportation costs associated with its location. Traditional affordability measures disregard transportation costs, which are often significant for many households. The tool can be used by planners to benchmark and set targets for affordability.

¹¹³ http://www.fhwa.dot.gov/livability/state_of_the_practice_summary/research03.cfm;
http://www.epa.gov/smartgrowth/pdf/Sustainable_Transpo_Performance.pdf.

¹¹⁴ CMAP, <http://www.cmap.illinois.gov/about/2040/livable-communities/land-use-housing>.

¹¹⁵ <http://htaindex.cnt.org/applications.php>.

PORTLAND, OREGON REGIONAL ACTIVE TRANSPORTATION PLAN

The Regional Active Transportation Plan (ATP) was developed as an implementation strategy of the 2035 RTP. It outlines a vision, plan, and policy to advance progress towards active transportation goals and targets. It is currently being proposed for adoption as a component of the Regional Transportation Plan. As part of the RTP, targets and performance measures were set to track progress in meeting goals related to safety, active transportation, basic infrastructure and access to daily needs. The plan acknowledges such measures as important tools for “measuring progress and maintaining accountability.” The ATP details specific targets for active transportation mode share and safety. An example of these targets, and comparison to modeled mode shares, is included below:

Active transportation mode	2010 modeled mode share for all trips (4-county area)	2035 modeled mode share for all trips with full build out of 2035 State RTP Network	Active Transportation Target (tripling of 2010 modeled mode share)
Transit	3.8%	4.9%	11.4%
Walking	8.9%	9.6%	26.7%
Bicycling	2.8%	3.1%	8.4%

2011 Oregon Household Activity Survey and modeled data, Metro 2012

As part of the ATP, additional measures were recommended to evaluate and measure progress. Some examples include:

- Bicycle and pedestrian miles traveled
- % increase in bicycle network separated from traffic
- % of regional trails completed

For more information, see: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=39005>

Identifying Desired Trends or Targets

While a performance measure allows comparison, a performance-based transportation plan should identify desired trends (e.g., reduce, increase, maintain) or targets (specific numerical figures) associated with performance measures. A target clarifies the level of performance on a specific measure or a direction that the region or State intends to achieve within a given timeframe in order to make progress toward achieving transportation plan goals and objectives.

They provide transparency, clarity, and accountability to the investment decisionmaking process. Targets allow potential projects or other strategies to be evaluated and compared according to how much they help the region or State in achieving the desired level of performance. Decision-makers can evaluate a decision in relation to a desired end state. Additional information can be found in the FHWA *Performance-Based Planning and Programming Guidebook*.

MAP-21 requires States and MPOs to set targets for each of the national performance measures. MPOs are required to include the performance targets for the national measures in their transportation plans and States should do so (see Table 2-1 earlier in the document).

In the context of the transportation plan, given the 20+ years outlook into the future, MPOs and State DOTs may choose to develop specific numerical targets or to indicate whether they are aiming to increase or decrease measures. Including a specific numerical target puts more focus on the resources required and the tradeoffs that may be necessary to meet these targets, but it can be challenging to agree on an appropriate target. Identifying a desired direction can be helpful when making comparisons among different investment alternatives, and allow more flexibility in making changes to targets. For instance, State DOTs using targets will frequently include them in a separate report and not the transportation plan.

Data-driven target development needs to take into consideration that performance targets will likely compete. An increase toward one target can reduce progress toward another target. For example, improving travel times for motor vehicles could reduce pedestrian safety.

One MPO that is embracing a performance-based planning approach by including specific performance measures and targets in its transportation plan is the ***Lima-Allen County Regional Planning Commission*** (see text box).

COMPETING TARGETS

When targets compete, it will be necessary for the State or region's stakeholders to clearly identify their priorities and values as it relates to the performance targets so that informed trade-offs can be made based on the area's values.

LIMA-ALLEN COUNTY REGIONAL PLANNING COMMISSION'S TARGET-SETTING THROUGH COLLABORATION

The Lima-Allen County Regional Planning Commission (LACRPC) is the MPO for Allen County and adjacent municipalities in northwest Ohio. The 2040 Transportation Plan (released in 2013), embraces MAP-21's performance-based planning approach. The plan identifies four transportation goals for the largely rural area, which focus on supporting economic opportunities, making targeted infrastructure investments, protecting the natural and built environments, and promoting vibrant, livable communities.

There are 3-6 specific objectives, and associated performance measures and targets under each of the four goals. These targets include: achieving a 3.5% increase in annual transit ridership, protecting wetlands at 95% of current acreage, and expanding bike/ped network mileage by 7% each year through 2040. As directed by MAP-21, LACRPC worked with the local transit authority and the Ohio DOT to ensure that their regional goals align with broader state and national objectives.

For more information, see: <http://www.lacrpc.com/transportation.aspx>.

The **Genesee Transportation Council**, the MPO for Rochester, NY, uses directional targets in its transportation plan to show the desired and likely change for each measure relative to a benchmark. The performance measures are multimodal and include performance on transit, roadways, rails, trails, and sidewalks.

Figure 6-4. Genesee Transportation Council – L RTP 2035 Performance Measures

Performance Measure	What it Evaluates	Benchmark	Desired Change	Likely Change
Number of Fatalities	Safety	100	Decrease	Slight Decrease
Federal-Aid Highways with Pavement Fair or Better	System Preservation	90.3 percent	Increase	Slight Decrease
Non-Deficient Bridges	System Preservation	64.8 percent	Increase	Slight Decrease
Average Age of Transit Buses	System Preservation	7.65 years	Decrease	Slight Decrease
Travel Time Index on Major Roadways	Mobility	1.10	Decrease	Slight Increase
Transit On-Time Performance	Mobility	84 percent	Increase	Slight Increase
Passenger Rail On-Time Performance	Mobility	70 percent	Increase	Slight Decrease
Median Incident Clearance Time on Major Roadways	Mobility	52 minutes	Decrease	Slight Decrease
Median Transit Load Factor	Accessibility	0.93	Slight Increase	Slight Increase
Gaps in Core Multi-Use Trails Network	Accessibility	36 miles	Decrease	Slight Decrease
Federal-Aid Highways in TMA with Complete Sidewalks	Accessibility	19.6 percent	Increase	Slight Increase
Emissions of Nitrogen Oxides	Environment	18,914.8 Kg/day	Decrease	Decrease
Emissions of Volatile Organic Compounds	Environment	13,537.8 Kg/day	Decrease	Decrease
Emissions of Carbon Dioxide Equivalent	Environment	11,385 tons/day	Decrease	Slight Decrease
Direct Energy Usage	Environment	146.2 billion BTUs/day	Decrease	Slight Decrease

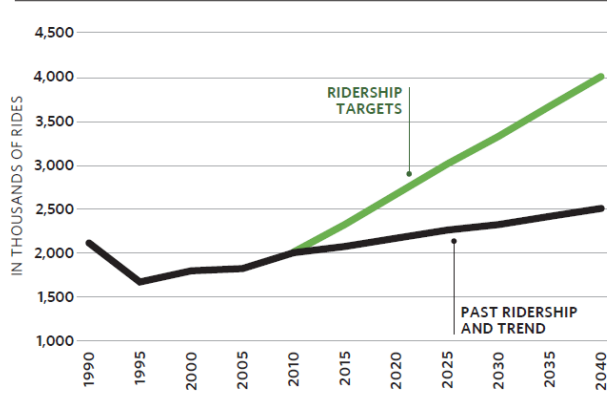
Source: Genesee Transportation Council, *2035 Long Range Transportation Plan*, Page 110.

An important component of a performance target is the timeframe within which the specified level of performance should be achieved. In the context of a transportation plan, the timeframe of the target is often based on the length of the plan (25+ years) to correspond to the expected

outcomes of the strategies, projects, or other investments specified in the plan. MPOs such as the **Denver Regional Council of Governments, Metropolitan Transportation Commission, and Portland Metro** use this method. For example, DRCOG’s *2035 Metro Vision Regional Transportation Plan*, contains the targets: “Reduce the percent of trips to work by SOV to 65 percent by 2035,” and “Reduce the regional per capita VMT by 10 percent by 2035.” There are other variations of timeframes used less often. The **Chicago Metropolitan Agency for Planning (CMAP)** uses a trend line to illustrate its performance targets in transit ridership and transit access in its transportation plan: *Go To 2040*. Text near the graphs specifically calls out targets for 2015 and 2040.

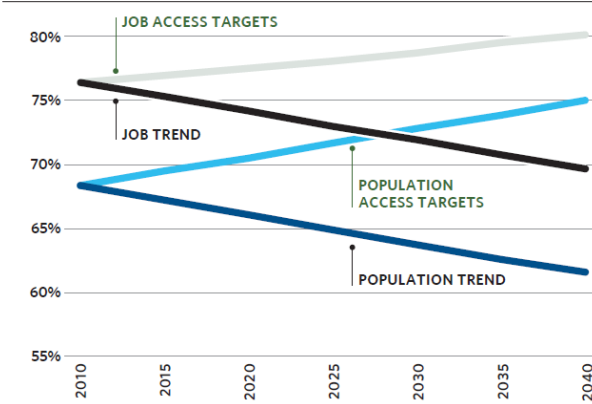
Figure 6-5. CMAP Examples of Targets in Go To 2040 Plan

Figure 62. Transit ridership targets, 1990-2040



Sources: Regional Transportation Asset Management System, Chicago Metropolitan Agency for Planning analysis, 2010

Figure 63. Transit access targets, 2010-2040




Source: Chicago Metropolitan Agency for Planning analysis, 2010

Source: Chicago Metropolitan Agency for Planning, *Go To 2040*, Page 294.

As noted previously, the **Pikes Peak Area Council of Governments’** transportation plan sets performance targets for three timeframes: 2015, 2025, and 2035. The **Ohio-Kentucky-Indiana Regional Council of Governments**, Cincinnati, Ohio, uses the planning cycle (typically 4 years) as the timeframe for the targets in its plan.

As identified in NCHRP Report 666, *Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies*, there are many relevant factors that should be considered when setting a target. These factors include— “political/legislative influence, customer and stakeholder perspective, agency experience in using performance measures and targets, commitment to regular communicating and reporting, span of agency control, financial resources, and timeframe.”¹¹⁶

¹¹⁶ Available at: <http://www.trb.org/Publications/Blurbs/164178.aspx>.




Research from the NCHRP Report 666 found that there was a wide range of approaches used to set targets for performance-based resource allocation by transportation agencies. The commonly used approaches include:

- ▶ **Policy-driven.** Under this approach, targets are established in a “top-down” manner such that senior executive management or an external political body sets the targets. This is typically done in the context of larger transportation goals or policies.
- ▶ **Modeling.** This is used to develop targets based on what is possible given the resource or funding constraints. It is also used to determine what strategies or funding is needed to achieve the target, which in turn may drive an iterative revision of the target.
- ▶ **Consensus-based process.** Targets are established collaboratively with a variety of transportation stakeholders. An analysis of the planning context and constraints on possible investment performance is used in this approach.
- ▶ **Reliance on formal and informal customer feedback.** Transportation system user feedback on system performance and objectives is gathered through a variety of survey and outreach methods to set targets.
- ▶ **Use of benchmarks from peer agencies.** Targets are established based on review of similar investment approaches and results for performance measures of interest as experienced by other transportation agencies.

Setting performance targets for the transportation plan generally involves several steps. First, it relies upon gathering useful baseline information on the region or State’s current conditions or performance. For instance, in developing bridge condition targets, data gathered during bridge inspections provides a valuable source of information.

Next, analysis is typically conducted to assess likely expected future performance, recognizing that population growth, demographic and technological changes, economic conditions, and other factors will affect future performance. Travel demand models are commonly used for analysis of the highway network, and can be used to support forecasts of future performance in relation to some measures of mobility and congestion. These models can also be used in combination with emissions models to assess air pollutant and greenhouse gas emissions or with other tools in order to develop an understanding of anticipated trends. Moreover, travel models can identify segments of the system that are expected to operate below acceptable levels, and can be used to test potential remedies. Other forecasting and analysis tools can be used for safety, asset condition, and other measures.

Setting performance targets requires regions and States to determine anticipated conditions or performance levels that are attainable by implementing improvements within funding constraints. The target level ideally should not be too easy to reach or purely aspirational/unattainable.



Consequently, it is important to ground the target in the existing and anticipated fiscal constraints of the region or State. A tool like the Highway Economic Requirements System – State Version (HERS-ST) software package can be used to help predict the investment required to achieve certain highway system performance levels, particularly in relation to pavement condition.¹¹⁷ FHWA is currently undertaking research to assess ways to possibly adapt HERS-ST to further help support target setting for pavement condition, safety, and travel time-related measures.

In addition to understanding anticipated revenues, consideration should be given to construction cost trends when establishing targets over the time horizon of the plan. Inflation of construction materials or increased fuel prices can impact construction costs and the ability to implement projects. The National Highway Construction Cost Index (NHCCI) is intended as a price index that can be used to track pure price-changes associated with highway construction costs and to convert current-dollar expenditures on highway construction to real- or constant-dollar expenditures¹¹⁸ providing year of expenditure cost estimating. Forecasting future construction cost trends can be challenging but should be considered as a factor in target setting.

Targets in the transportation plan should be developed in a collaborative process between the State and MPO, transit agencies, local transportation departments, and other stakeholder agencies, building on the coordination that will need to occur in setting targets for the national measures under MAP-21. Given the overlapping boundaries between States and MPOs, and the need for a shared vision on expectation for future performance and collective identification of strategies, collaboration in target setting is vital to ensure consistency among targets.

¹¹⁷ Available at: <http://www.fhwa.dot.gov/infrastructure/asstmgmt/hersfact.cfm>.

¹¹⁸ <http://www.fhwa.dot.gov/policyinformation/nhcci/desc.cfm>.

7. Transportation System Performance Report

As noted in the discussion of baseline information, the development of a transportation plan typically starts with baseline information on the State or region, and in a performance-based plan, will also include information about existing system performance. This contextual information includes statistics about the transportation infrastructure condition and performance in relation to performance measures and targets established in previous long-range planning cycles or other transportation plans. In addition, the development of the system report plays a critical role in informing the agency regarding key issues and challenges with the system, which in turn can inform goal- and priority-setting.

Comparing Trends to Targets

A baseline of performance and trends provides information that is needed to contextualize future expected performance, for example, under various investment scenarios, or funding levels. The change in performance trends as a result of specific investments or scenarios enables planners and their partners to compare how outcomes may change depending on investment and select a scenario or investment strategy.

As agencies gather increasing amounts of data and expand their analysis capabilities, many have shifted to providing a wealth of information that would traditionally be in the performance report in a variety of ways, often interactive. Having readily accessible information about performance can not only help drive performance-based planning, but can also strengthen outreach to stakeholders and other agencies. In some cases, the performance reporting and performance-based planning enhance agencies' credibility in the eyes of policymakers and the general public. Having clear graphics is critical to communicating performance information. Moreover, a balance

THE SYSTEM PERFORMANCE REPORT

MPOs are required to include “a system performance report and subsequent updates evaluating the condition and performance of the transportation system with respect to the performance targets” established for the national performance measures.

23 USC § 134(i)(2)(C)

State DOTs are encouraged to include information contained in a system performance report in the LRTP; they may also reference support documents such as separate performance reports, online dashboards, or other products. State DOTs are responsible for coordinating statewide transportation planning across all modes, which can include sea ports, airports, transit, railways, and highways; thus, the system report lays out the system components.

must be struck in making performance information simple and easy-to-understand while also providing enough background information to contextualize performance, such as explaining some of the external factors that may have influenced performance outcomes.

Examples: Within and Outside of the Transportation Plan

Maryland DOT has been publishing its Attainment Report (AR) for over a decade, since 2002. Over time, Maryland DOT has adapted the AR so that it is less text heavy, and uses more graphics, charts, and other visuals to clearly communicate information. Maryland DOT has moved on-line with the AR, to display key indicators. Maryland DOT is developing a “dashboard” that will make it easy to communicate key trends. The figures below, from the 2002 and 2013 Attainment Reports, respectively, provide examples of the agency’s evolution in the use of graphics to both convey and contextualize performance information. The example from 2013 provides clear information about how the year’s performance relates to that of years past, and indicates the performance target for the year 2015.

Figure 7-1. Safety Performance Results from 2002 Maryland DOT Attainment Report

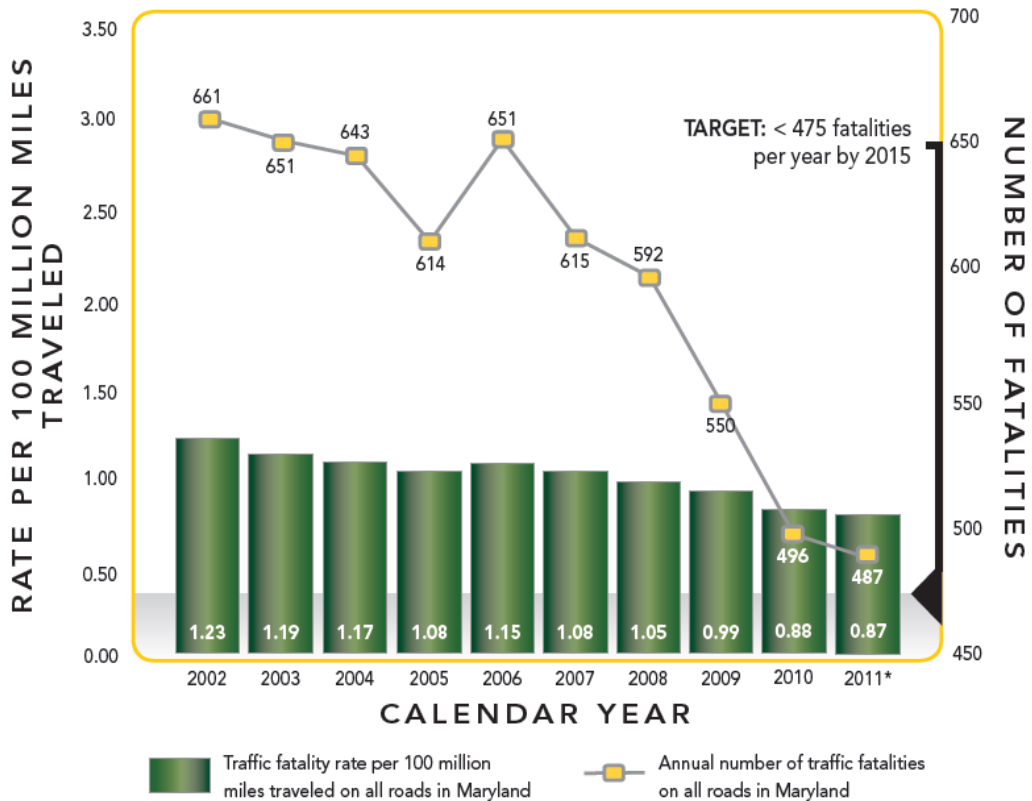
Fatalities and injuries by persons using each mode

Mode	Performance Measure	Data
State Highway Administration	Injuries and fatalities on State and Toll Facilities	Year 2000:
	Overall injury and fatalities – number and rate per 100 million vehicle miles	<u>Overall:</u> Fatalities: 445 Fatality Rate: 1.21 Injuries: 31,468 Injury Rate: 85.4
	Pedestrian injury and fatalities – number and rate per 1 million population	<u>Pedestrian:</u> Fatalities: 69 Fatality Rate: 13.0 Injuries: 578 Injury Rate: 109.1

Source: Maryland DOT, 2002 Attainment Report, Page 14.

Figure 7-2. Safety Performance Results from 2013 Maryland DOT Attainment Report

Annual Number of Traffic Fatalities on All Roads in Maryland



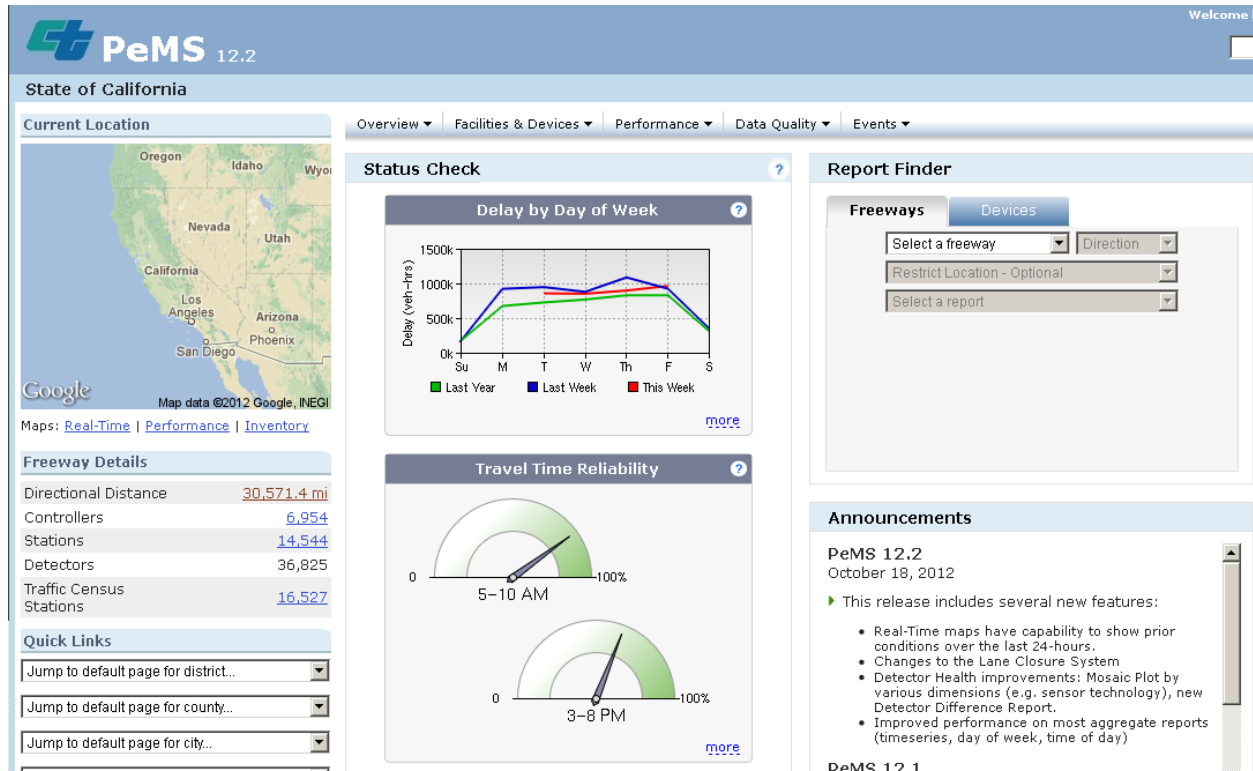
Source: Maryland DOT, 2013 Attainment Report, Page 20.

The **Mid-America Regional Council** of the Kansas City metro area’s *Transportation Outlook 2040* contains a robust analysis of system performance and identification of performance measures. The plan’s annual performance report includes performance measures related to all goals in the long range plan.¹¹⁹

Using the Performance Measurement System (PeMS), **Caltrans** collects system performance data and displays it through its website. PeMS data is used by several California MPOs to conduct performance-based planning and report on system performance in their MTPs. The figure below shows a snapshot of the PeMS homepage. Among many other features, it provides a way to easily view freeway delay and reliability.

¹¹⁹ For more information, see: <http://www.marc.org/Transportation/Metropolitan-Transportation-Plan>.

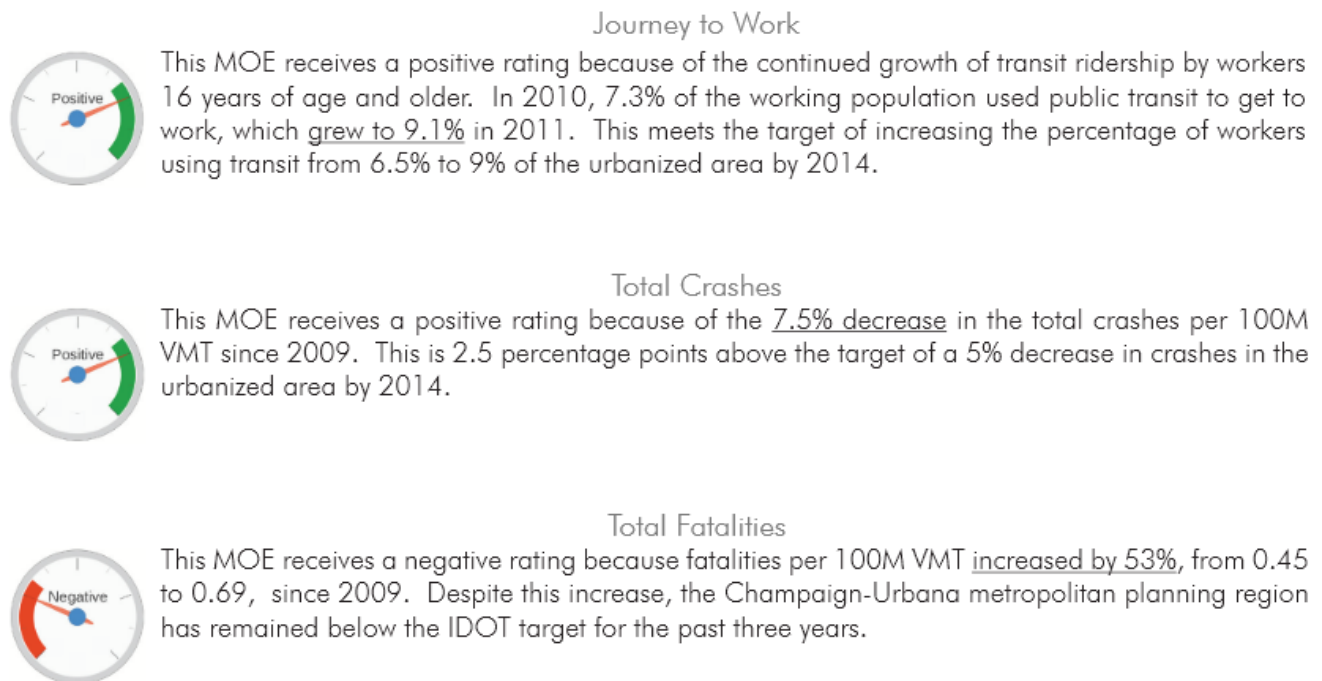
Figure 7-3. PeMS System Report Used by MPOs in California



Source: Caltrans, PeMS website, <http://pems.dot.ca.gov/>.

The **Champaign County Regional Planning Commission** in Illinois uses a variety of graphics to clearly communicate objectives in its transportation plan, as well as to explain performance in its annual performance “report card” (see Figure below for example from the report card). The **Old Colony MPO** in Massachusetts also uses graphics to reinforce its emphasis on performance and the process it undertook to develop outcome-based measures.

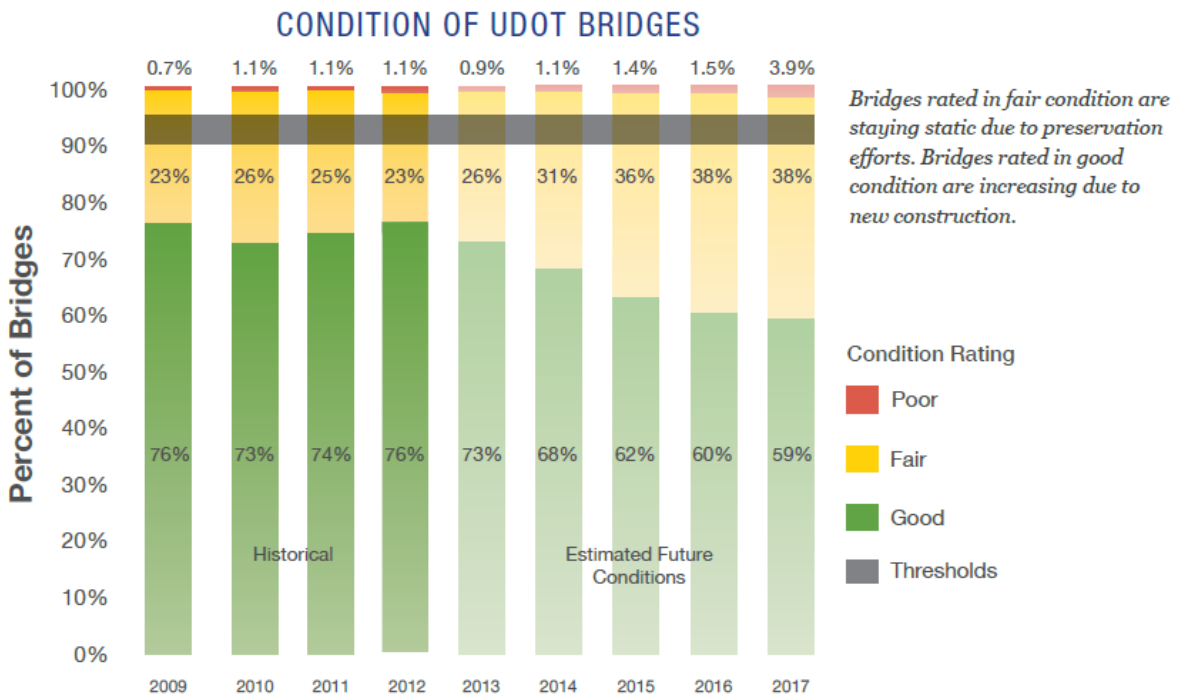
Figure 7-4. Champaign-Urbana Annual Performance Report Card Excerpt



Source: Champaign County Regional Planning Commission (CUUATS), *2012 LRTP Report Card* (April 2013).

The **Utah DOT** publishes a Strategic Direction and Performance Measures Report, which tracks progress toward the agency’s long range plan goals. In this annual report, UDOT provides not only data on historical system performance but also identifies expected future performance, based on the trends established over the previous few years in comparison to targets.

Figure 7-5. Sample Chart from UDOT's *Strategic Direction and Performance Measures Report*



Source: Utah Department of Transportation, *2014 Strategic Direction and Performance Measures*, Page 12.

8. Identification of System Needs, Potential Strategies, and Costs

A fundamental part of any performance-based transportation plan is the estimation of needs and available resources to address those needs. During this phase of plan development, planners are gathering information that will be used to support investment analysis. In order to perform the most effective performance-based investment analysis, four steps are commonly undertaken:


- ▶ Needs assessment;
- ▶ Financial planning;
- ▶ Identification of possible solutions, and their costs; and
- ▶ Solutions screening (based on environmental and social considerations, policies, and other factors).

These steps may be conducted somewhat iteratively or concurrently with one another. In addition, an effective performance-based approach includes public and stakeholder engagement and agency collaboration, and assessment of how the selected alternative contributes to performance outcomes.

Performance Needs Assessment

As noted in Section 7, the system performance report summarizes the system trends in comparison to targets. The transportation plan also typically identifies stakeholder and public needs together with an assessment of key challenges and trends that will impact system performance or needs in the future. Needs assessment builds on that information. It typically involves a financial component, identifying the funding that will be needed to operate, maintain, and serve expected transportation demands. Within a performance-based plan, needs assessment also may involve comparing *expected conditions or performance* with *desired conditions or performance outcomes*, using State or MPO-set targets. This form of needs assessment goes beyond simply adding up needed expenditures. Instead, this step functions as a form of gap analysis to assess where there are areas of expected unsatisfactory performance, and what it would take to achieve desired performance.

In the Maryland Transportation Plan, **Maryland DOT** defines transportation needs as the projects and services required to operate and maintain the current transportation system, as well as the expansion of services and infrastructure necessary to meet the needs of the State's growing population and the associated demand for travel. These costs include system operation,



maintenance, preservation and expansion as provided by MDOT's five modal agencies and Maryland's share of the Washington Metropolitan Area Transit Authority's system. Operating and maintenance needs include the costs of service for transit trips on buses, heavy rail, light rail, commuter rail, and para-transit vehicles; operations and maintenance of roadways; dredging for the Port of Baltimore; and continued funding for many other system necessities.¹²⁰

State DOTs and MPOs use many different methods to identify system needs. One of the most used methods for identifying needs is the travel demand model. Travel demand models have been in use for decades, and are growing increasingly sophisticated and granular. The purpose of these models is to match origins and destinations for trips, and forecast the demand on segments (links) of the system. Although some travel demand models are capable of providing information on multiple modes, they are most useful for analysis of the highway network and for identifying infrastructure project needs. Travel demand models are nearly ubiquitous among MPOs, but are also used for nonmetropolitan planning and forecasting of inter-regional travel.

Using a travel demand model, planners can identify segments of the system that are expected to operate below level of service standards set in the MPO or State DOT targets.¹²¹ Using the model, potential remedies for the project can be tested. Based on knowledge of the extent of deficiency and the best-performing remedy, project concepts can be drafted.


Other types of predictive models and analysis tools can also be used to assess needs. For instance, the Highway Economic Requirements System – State Version (HERS-ST) model, developed by FHWA, can be used to help determine performance-based highway investment needs and outcomes of various funding levels. HERS-ST considers engineering principles, system deficiencies, and economic criteria to determine efficient improvements needed to meet a certain level of system performance or to have a net benefit. The National Bridge Investment Analysis System (NBIAS) similarly is an analysis tool developed by FHWA that estimates bridge maintenance, improvement, and replacement needs.¹²² It produces over 200 performance metrics for investing in bridges and different budget levels.

In its transportation plan, **Arizona DOT** used HERS-ST and NBIAS to estimate investment needs and performance outcomes of various budget levels on the existing system, and then used a variety of sources, including regional long-range transportation plans, to identify system expansion needs. In

¹²⁰ Maryland Department of Transportation, *2035 Maryland Transportation Plan: Moving Maryland Forward*, draft, September 2013.

¹²¹ It may be desirable for certain segments to operate at different levels of service. For example, congestion in a central business district may be recognized as a positive sign of economic activity. A lower level of service on these segments might be laid out in the performance measures/targets, or correction of the level of service may be taken into account in the project selection criteria.

¹²² For more information about how NBIAS has been used, see: <https://www.fhwa.dot.gov/tpm/resources/nbias/>.



total, the analysis estimated needs associated with highway preservation, modernization, and expansion to total \$43.3 billion over the 25 year plan horizon. In addition, ADOT estimated needs for public transportation, including urban “state-of-good repair” needs, urban expansion needs, and rural preservation and expansion needs, as well as needs associated with freight and passenger rail and aviation. In addition to capital needs, ADOT also estimated the operating costs associated with highway and public transportation system operations over the Plan timeline, including non-capital system traffic management operations and routine maintenance. In total, the result suggested a cost of \$88.9 billion to address these needs. ADOT also examined a plan “vision level” needs assessment that quantified the cost associated with the first 25 years of the State’s bqAZ vision, which included more significant highway expansion/maintenance, bus and passenger rail expansion and modernization, bicycle and pedestrian improvements, and aviation improvements. This analysis resulted in an estimate of \$250.1 billion in needs.¹²³

Financial Planning


A key component of a performance-based transportation plan is reviewing and estimating available financial resources. Developing a financial resource estimate typically involves developing an inventory of available funding streams, along with projections of funding that is forecast to be available from each funding stream over the life of the transportation plan. During this process, it is helpful to note the types of investments that are eligible using each funding stream. Financial resource estimation typically culminates in a chapter or other defined section of the transportation plan that discusses available financial resources to devote to transportation projects. This section is sometimes labeled the “Financial Plan.” The financial plan serves as a key input for investment analysis, project selection, and moving projects from the transportation plan to the STIP/TIP.

MPOs are required to create a financial plan that demonstrates how the transportation plan can be implemented; that is, the MPO’s MTP must be cost feasible.¹²⁴ The financial plan is critical to demonstrating fiscal constraint for MPOs. State DOTs can opt to include a financial plan in the statewide transportation plan.¹²⁵ Even if the statewide transportation plan does not include a financial plan, it should be informed by the financial plan and investment strategies from the State asset management plan for the NHS and investment priorities of the public transit asset management plans.

¹²³ Arizona Department of Transportation, *What Moves You Arizona: Long Range Transportation Plan 2010-2035*, November 2011, available at: <https://www.azdot.gov/docs/default-source/planning/lrtp-2011-1129.pdf?sfvrsn=2>.

¹²⁴ 23 USC § 134 (i)(2)(E)

¹²⁵ 23 USC § 135(f)(5)



FHWA provides guidance to transportation agencies on the reasonability of assumptions regarding the agency's available resources.¹²⁶ In long-range planning, agencies sometimes consider implementing pricing mechanisms to finance specific projects or to incentivize certain behaviors that provide benefits such as congestion reduction to the traveling public. According to FHWA, enactment of specific taxes or pricing strategies can be considered reasonable if there is clear evidence of support for the taxes or fees and specific strategies are in place for securing the necessary approvals. As an example, in its Transportation 2040 plan, the **Puget Sound Regional Council**, the MPO for the Seattle metropolitan area, included roadway pricing strategies that would be phased in over the life of the plan.¹²⁷ According to PRSC, these pricing strategies will support a 132 percent peak period increase in local transit service (108 percent increase off-peak), the extension of regional light rail, and investments in walking and biking facilities. Together, they are expected to result in a 9 percent reduction in regional greenhouse gas emissions from the trend.

The financial plan will usually contain information on funding sources at the Federal, State, and local levels. Reasonably expected funds should be estimated and projected over the entire lifespan of the transportation plan. Anticipating the overall level of Federal revenues and local match is a core element of the financial analysis.


Anticipating future levels of funding can be challenging. Educated guesses can inform the estimate's deviation from a flat line projection. Funding streams may fluctuate (e.g., State gas tax revenues in the event of a recession), so planners should build a margin of error in their estimates. Further, the purchasing power of the dollar will deteriorate over time due to inflation. Planners should apply inflation factors to each revenue stream to ensure that investment decisions are being made using common figures.¹²⁸

There may be many sources of funding, including local funding, State funding (revenue from motor fuel taxes, registration fees, etc.), Federal funding, debt financing, toll equity and public-private partnerships. The volume and flexibility of available funding has a profound influence on the investments that are included in the transportation plan's investment package. The total pool of available funds impacts the number and size of projects that the agency can afford to build. Flexible funds allow for money to be directed toward projects that provide the best performance return—regardless of project type, mode or functional class of the roadway.

¹²⁶ For more information, see: http://www.fhwa.dot.gov/planning/guidfinconstr_qa.cfm.

¹²⁷ Puget Sound Regional Council, Transportation 2040, May 2010, available at: <http://www.psrc.org/transportation/t2040>.

¹²⁸ For more information on financial planning, see https://www.fhwa.dot.gov/planning/guidfinconstr_qa.cfm.




In practice, forecasting revenue early in the development of the performance-based transportation plan (in the scoping or baseline phase) will provide information about the financial constraints that must be considered when developing trends and targets. However, more detailed financial planning typically occurs through the plan development process. There will likely be more transportation system performance improvement needs and desired implementation strategies than available funding. To determine how adopted strategies in the transportation plan can be implemented, the transportation plan indicates resources from public and private sources that are reasonably expected to be made available to carry out the plan, and recommends any additional financing strategies for needed projects and programs.

Identification of Possible Solutions and their Costs

Based on system needs assessment and resource availability, planners – working with the public and stakeholders, and relying on existing planning documents, including the SHSP, transportation asset management plan, and other documents – can identify potential solutions to address the needs or performance gaps. While traditionally, the focus of long-range planning has been on capital projects, it is important to consider a wide range of potential strategies. These may include the following:

- ▶ **Infrastructure projects** are capital projects, which include physical improvements, rehabilitations, or replacements to a component of the transportation system. These can include roadway infrastructure, bicycle/pedestrian improvements, Intelligent Transportation Systems technologies, and public transportation rolling stock, among others. Capital needs are sometimes further divided into:
 - **Preservation:** Activities that protect transportation infrastructure by sustaining asset condition or extending asset service life; preservation includes resurfacing of pavements, replacing aged transit vehicles, upgrading rail track, and airport runway rehabilitation.
 - **Modernization:** Improvements that upgrade efficiency, functionality, and safety without adding capacity; examples of modernization activities include access control, hazard elimination, lane reconstruction, and bus system upgrades.
 - **Expansion:** Improvements that add transportation capacity through the addition of new facilities and or services; expansion activities include adding new highway lanes, expanding bus service, construction of new highway facilities, and adding rail passenger service or facilities.
- ▶ **Programs** are non-physical improvements to the transportation system. Transportation system management & operations (TSMO) strategies, such as incident management, traveler



information, and ridesharing programs. They also include traffic safety campaigns and air quality outreach efforts.

- ▶ **Policies** are a course of action, guiding principle, or rule enforced to create an impact on the transportation system. Examples include enhanced law enforcement to support safety, such as strict enforcement of pedestrian right of way or child safety seat use. Other examples include integrated transportation and land use planning, complete streets policies, and parking restrictions.
- ▶ **Pricing and subsidies** create financial incentives either to support or reduce certain behaviors. Congestion pricing, for instance, can encourage travelers to drive less during peak periods and shift to alternative modes. Subsidies are funds that defray the actual cost to the public of using the transportation system. Examples of subsidies are public transit operating assistance, reduced tolls for carpools, and subsidized borrowing of money.

Methods to Identify Potential Solutions

The development of the transportation plan will involve analysis to identify potential solutions to contribute to the gap in performance in comparison to desired trends or targets. There are a number of methods that can be used to identify potential solutions.

Data Analysis – This allows for identification of specific problem or “hot spot” areas, particularly related to traffic accidents and congestion.

Modeling – As noted earlier, the travel demand model can be used to identify specific deficiencies, in particular, related to traffic congestion, and to help identify and analyze potential infrastructure solutions. Modeling can also be used to assess different types of land use patterns and policies.

Other types of predictive models can also be useful to planners. These tools evaluate and forecast the transportation system through the lens of economic development, land use, or greenhouse gas emission, among others. Transportation Asset Management systems predict changes in physical infrastructure condition and the investments needed to achieve performance.

Other Plans – Projects concepts can be imported from the cost feasible plan or needed project list in a previous transportation plan or plan developed by another agency. Strategies may also be identified in documents, such as the Strategic Highway Safety Plan, State Freight Plan, Transportation Asset Management Plan, a corridor study, or a freight analysis.

Public and Stakeholder Input – An important method of identifying or prioritizing potential solutions is through public involvement, and is often tied together with needs assessment. Regular communication with the public helps to identify public concerns about the transportation system, gauge the demand for new services, and understand the community’s priorities for

improvements. Some public involvement is reactionary, in that the public will communicate with the State DOT or MPO due to a severe deficiency or failure of a facility/service. As noted in Chapter 3, there are many tools for effectively gathering public and stakeholder input, including website comment submission forms, surveys, and interactive tools to enable the public to assess the performance impacts of different types of solutions. Other types of public involvement include visioning exercises, staffing a citizens’ advisory committee, and holding regular meeting with community groups.

Intergovernmental Consultation – This is a powerful method of identifying needs for the transportation plan. MPOs are a platform for intergovernmental consultation between member local governments. MPOs can also identify projects with other public agencies in the region, such as the transit provider, port/airport authority, toll authority, or commuter services office. Intergovernmental coordination is an important task for State DOTs, since Federal statute calls for coordination and consultation with a wide variety of stakeholders. Both States and MPOs can include projects on tribal lands. Advisory committees can be useful for quick, broad consultation. A common type of advisory committee is the technical committee, which is composed of career service staff members of local governments.


More formal relationships can be built with public transportation operators, and seaport/airport authorities. Transit operators can provide a list of needed transit improvements. Port and airport authorities can do the same (generally this

PROJECT SCREENING DURING INVESTMENT ANALYSIS

An alternative to early screening is to evaluate policy impacts simultaneously with performance-based selection criteria. Projects that violate a project screen are assigned a very large weighting that, if triggered, ranks the project so low that it will not qualify for selection.

The table below shows a hypothetical analysis of three roadways segments in an MPO area, with a locally-developed screen for whether the project will infringe on park land. If the project infringes on park land, thirty points are subtracted from the project’s score. Route 2 has the highest rating for all performance metrics, including safety. However, because it impacts park land, it has thirty points subtracted from the total. This heavy penalty ensures projects that do not pass the screen cannot score high enough for selection. Under the selection system shown below, Route 3 will receive funding priority, followed by Route 1. Route 2 has been effectively eliminated from consideration by using the system.

Project	Impacts Park Land	Safety	All Other Criteria	Total
Route 1	0	6	67	73
Route 2	-30	10	80	60
Route 3	0	8	71	79



will include only land-side facilities). Operating assistance and maintenance costs can be included as a separate line item.

Through all of these mechanisms, transportation planners will have a “wish list” of projects and policies that could be analyzed as part of the plan. Together with the financial plan, these strategies form the basis for investment analysis and selection of a preferred alternative in the plan. These project concepts or investment priorities also could be incorporated into an investment plan.

Cost Estimation

Using project descriptions, it is possible—and useful—to estimate the costs to implement projects. The cost of each line item can be estimated using industry handbooks, State procurement agencies, or previous agency experience with similar projects. Several handbooks from organizations such as ARTBA, AASHTO, and APTA (as well as others) can provide quick-reference cost estimates. For example, the Pedestrian and Bicycle Information Center (PBIC) recently developed a report to assist with estimation of pedestrian bicycle infrastructure costs.¹²⁹ The agency’s experience with similar projects and an analysis of local commodity and labor markets can yield a more accurate cost estimate. Related investments can be combined together into a grouping of similar projects.¹³⁰ This method can help defray some of the analysis cost later during the planning process. In general, this method is used for lower-cost, non-controversial line items projects typical of system preservation projects. It is also very important, in estimating costs, to consider not only the upfront capital costs of a specific project, but also the long-term costs of maintaining and operating any transportation facilities constructed as part of that project. FHWA offers guidance on using life-cycle cost analysis (LCCA) to select from design alternatives that would yield the same level of performance or benefits.¹³¹

Solutions Screening

Given the wide range of potential strategies and transportation investments that could be implemented, the development of the transportation plan should screen solutions to ensure they meet State, regional, and community goals, and address all Federal requirements.

In a performance-based plan, goals and performance measures function as a key mechanism for narrowing down to the most promising strategies. This process may involve modeling or scenario analysis (described further, with examples, in Chapter 9).

¹²⁹ See <http://www.pedbikeinfo.org/bikecost/>.

¹³⁰ 23 CFR 771(c) and (d) and/or 40 CFR part 93.

¹³¹ See <http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer04.cfm>.

In addition to performance metrics that are explicitly included in the plan, screening of solutions should consider a broad range of factors – quantitative and qualitative – that are important to the community and required by Federal law. Specifically, transportation projects have the potential to impact a broad set of issues, and the transportation plan is required to address certain requirements to avoid or mitigate adverse impacts to the natural or human environment. The planning process therefore should integrate environmental resource plans and other related plans in order to avoid or minimize impacts to protected resources; this integration with various other plans helps to screen possible solutions for compatibility with environmental protection goals and other issues.

Some screening processes are required by Federal law (examples are discussed below). Additional screening procedures may be required by State law. Optional, locally-developed project screens can also be included at the direction of MPO or State DOT senior leadership. These “screens” could be included as performance measures or as other quantitative attributes (e.g. project prioritization or scoring) that are directly addressed as a component of the transportation plan. In other cases, specific analysis may be conducted if a performance metric has not been identified but an issue can be addressed in a qualitative manner.

An example of a project policy screen is the **Capital Region Transportation Planning Agency (CRTPA)** in the Tallahassee, Florida metropolitan area.

PLANNING AND ENVIRONMENT LINKAGES (PEL)


PEL represents an approach to transportation decisionmaking that considers environmental goals early in the planning stage and carries them through project development, design, and construction. This can lead to a seamless decisionmaking process that minimizes duplication of effort, promotes environmental stewardship, and reduces delays in project implementation.

The PEL approach is intended to establish coordination early – starting with transportation problem identification in planning and continuing through the rest of the project delivery process in such a way that environmental, community, and economic issues and concerns are appropriately considered and addressed. PEL lays the foundation for a broad consensus on goals and priorities when developing solutions for the complex issues surrounding the management and construction of the transportation system.

By advancing Integrated planning, PEL involves the connection between transportation planning, resource conservation and management plans (for instance, local watershed and/or habitat conservation plans), and important information regarding sensitive resources (such as the location of wetlands, endangered species, environmental justice populations, etc.). This type of collaborative planning offers opportunities to see and act on broader scale patterns and trends in our communities, regions, and ecosystems that may be missed if only explored at the project level.

For more information, see:

<http://environment.fhwa.dot.gov/integ/index.asp>.



CRTPA developed the Canopy Roads Project Screen to evaluate projects on its roads lined with mature oak trees. The screen identifies projects which may impact the tree cover shade, a valued community asset.¹³²

Below are several common screens that are applied due to Federal requirements:

ASSESSMENTS OF NATURAL AND HUMAN ENVIRONMENTAL RESOURCES


Multiple pieces of Federal policy—most notably the National Environmental Policy Act (NEPA) of 1964—provide the framework for protection of natural resources and sensitive habitats. In addition to including environmental goals and performance measures in a performance-based plan, the transportation plan should consider protected habitats, wetlands, and other protected land areas, as well as noise and water pollution, and human environment considerations, such as historic structures, scenic areas, parks, or cultural landmarks, among others. The development of a transportation plan is required to include consultation with agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation, including comparison of transportation plans with State conservation plans or maps and inventories of natural or historic resources, if available.¹³³ Moreover, transportation plans must include discussion of potential environmental mitigation activities, which will generally address the context and some of the potential impacts associated with proposed transportation improvements identified in a transportation plan.

Consequently, this environmental screening process may include analysis of:

- ▶ Regional development and growth patterns;
- ▶ Local land use, growth management, or development plans and projections of future land use, natural resource conservation areas, and development;
- ▶ Demographic trends and forecasts, including population and employment projections;
- ▶ GIS overlays showing past, current, or predicted future conditions of the natural and built environments;
- ▶ Environmental scans that identify environmental resources and environmentally sensitive areas;
- ▶ Descriptions of airsheds, water resources and watersheds; and

¹³² The 2008 Review of Florida’s MPO Long Range Transportation Plans, <http://www.cutr.usf.edu/programs/pcm/files/2008-11-LRTPReview.pdf>.

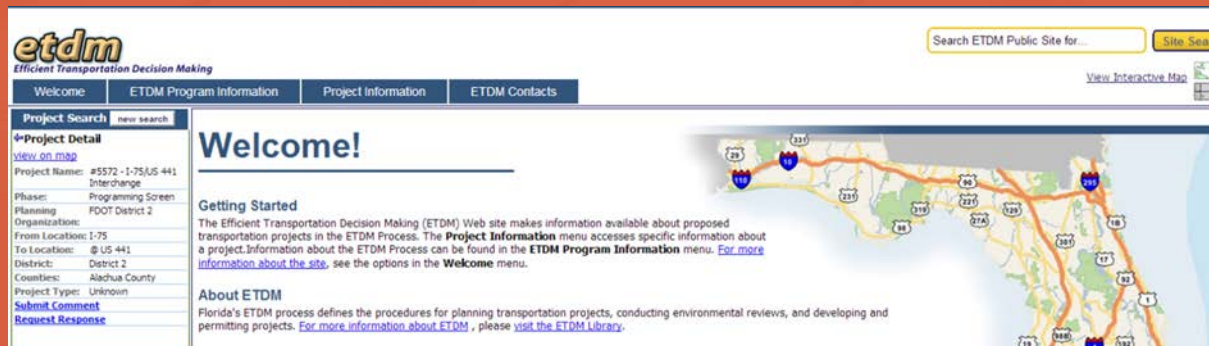
¹³³ 23 USC 134(i)(5) and 23 USC 135(f)(2)(D).

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- ▶ The outputs of natural resource planning efforts, such as wildlife conservation plans, watershed plans, special management areas, and multiple species habitat conservation plans.

When scenario analysis is used in a planning, the resulting model outputs, coupled with GIS layer mapping, can help to inform the investments included in the plan.

FLORIDA EFFICIENT TRANSPORTATION DECISION MAKING


The Florida DOT developed the Efficient Transportation Decision Making (ETDM) program to better assess the sociocultural and environmental impacts of proposed transportation projects. ETDM seeks to improve transportation decision making by facilitating early and ongoing interagency interaction throughout the project development process to better balance meeting mobility needs and protecting community and natural resources. The process integrates screens at various phases of the review process, so that potential issues can be identified and addressed earlier in project development. ETDM uses Environmental Screening Tool (EST), an online, interactive database with mapping capabilities, to support communication between agencies, planners, engineers and the public. EST compiles project data and allows agencies to review, analyze and provide feedback for projects. It also allows the public to access project information and status updates, and send comments directly to the project sponsors. ETDM enhances long range transportation planning by generating better information on the potential impacts of proposed projects, and helping MPOs produce more accurate cost-estimates for projects that require environmental mitigation.



Source: Florida Department of Transportation ETDM website: <https://etdmpub.flas-etat.org>.

AIR QUALITY CONFORMITY

Air quality conformity functions as a form of screening in air quality nonattainment and maintenance areas subject to these requirements. In these areas, the MPO's transportation plan must show that it conforms to the State Implementation Plan for air quality; that is, it ensures that Federal funding and approval goes to those transportation activities that are consistent with air quality goals. Conformity applies to metropolitan areas' transportation plans, transportation improvement programs (TIPs), and projects funded or approved by the FHWA or FTA, for those areas subject to these requirements. In some areas, this process has played a key role in making tough decisions in order to meet both air quality and mobility goals, and has required State and



local transportation officials to find ways to reduce vehicle emissions by developing transportation plans that will reduce single-occupant vehicle (SOV) travel through increased travel options, such as transit, bicycling, and walking, or transportation control measures.

EQUITY ANALYSIS AND ENVIRONMENTAL JUSTICE

As discussed earlier, equity analysis and environmental justice analysis are important to ensure that planned projects do not have a disproportionate or burdensome adverse impact on areas that have a high concentration of minority and low-income households. Agencies must determine whether environmental justice populations would be subjected to disproportionately high and adverse human health or environmental effects as a result of a transportation plan, project, or activity, and to avoid, minimize, or mitigate these effects.


As an example of this type of analysis, in its long range plan, *Metro Vision 2035*, **Denver Regional Council of Governments (DRCOG)** used GIS to identify low-income and minority areas throughout the Denver region and transpose these areas on maps of regional transportation projects. Through this exercise, DRCOG was able to confirm that many large transportation projects are in these areas, while over half of the anticipated regional system expenditures under the fiscally constrained plan are for public transit and non-roadway projects and services, which disproportionately benefit minority and low-income residents. DRCOG has also resolved to ensure that future road projects include elements that benefit non-drivers. In order to determine the most effective uses for its FTA Job Access and Reverse Commute (JARC) program funds, DRCOG conducted an analysis to identify employment areas that are underserved by transit in order to improve accessibility to all employment centers in the region.¹³⁴

Similarly, in the development of *PlanIt 2035*, **Baltimore Metropolitan Council's (BMC)** long range plan, BMC staff conducted GIS analysis to estimate the accessibility of minority and low-income populations with respect to home-based work and home-based non-work trips and ensure that the plan would have no disproportionate adverse impacts on their communities. BMC identified and compared impacts for both existing and committed projects and under the preferred alternative scenario.¹³⁵

As discussed in more detail below, the **Metropolitan Transportation Commission (MTC)** of the San Francisco Bay Area sought to add equity performance measures to its most recent long range plan, Plan Bay Area, due to the region's significant affordability challenges. The purpose of this effort

¹³⁴ For more information, see <http://www.denverregionalequityatlas.org/> and <https://www.drcog.org/index.cfm?page=TransportationFundingEquity>.

¹³⁵ For more information, see: <http://www.baltometro.org/plans/final-plan-it-2035-2> and <http://www.baltometro.org/transportation-equity/access-to-jobs-2>.



was to identify how to measure whether the region’s low-income residents would benefit from proposed transportation projects. As a result, MTC added an equitable access measure, the share of low-income and lower-middle income residents’ household income consumed by transportation and housing, with a target of decreasing this value by 10 percent, from 66 percent to 56 percent (rather than increasing by 3 percent, the projected rise according to trend data). Plan Bay Area policies will aim to stabilize the length and duration (and thereby, cost) of commute trips for lower-income residents (see case study in Chapter 11 for more details).

Conducting project screening requires the MPO or State DOT to obtain or generate information about protected resources. Geographic Information Systems are an invaluable tool during screening. State resource agencies—such as the State Historic Preservation Office—may be able to provide GIS datasets that can be cross-referenced with the List of Needed Projects. Consultation with State agencies and special purpose districts (i.e. - water resources board, council of governments) may yield useful information. Information obtained through public involvement may alert planners to problematic projects. Finally, MPOs and State DOTs should maintain datasets of information on issues of concern. Projects that fail to meet standards set in the project screen will require more detailed analysis before advancing to scenario analysis or project selection phases.

ANALYSIS OF ECONOMIC BENEFITS


Economic benefits associated with transportation projects can be analyzed, and this information can also be used to screen potential solutions and to support project prioritization and selection. Economic analysis is an approach that can be used to assess the overall benefits of projects by monetizing the benefits that stem from transportation investments (e.g., travel time savings, fuel savings, lives saved, etc.). The identification of net benefits or benefit cost ratio (monetized benefits divided by costs) can be used to help support project selection.

An economic analysis allows project performance outcomes from various performance areas to be directly compared. It represents the return-on-investment analysis used by public agencies and is an important process. NCHRP 08-36 Task 101, *Understanding How to Develop and Apply Economic Analyses: Guidance for Transportation Planners* is a good resource for planners interested in additional information.¹³⁶ FHWA provides guidance on values to use in the monetization process in its TIGER Benefit-Cost Analysis (BCA) Resource Guide.¹³⁷

Transportation investments also can lead to wider economic benefits and regional or localized economic development impacts. Business productivity occurs as transportation investments

¹³⁶ [http://onlinepubs.trb.org/onlinepubs/nchrp/docs/nchrp08-36\(101\)_FR.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/nchrp08-36(101)_FR.pdf).

¹³⁷ <http://www.dot.gov/policy-initiatives/tiger/tiger-bca-resource-guide-2014>.



enable businesses to gain efficiency by reorganizing their operations or changing the mix of inputs used to generate products and services. There are at least three classes of transportation system impacts that can directly lead to wider benefits for business organization and operation—reliability, connectivity and accessibility. The Transportation Project Impact Case Studies (T-PICS) tool includes relative project examples to assist transportation agencies in gauging the wider economic benefits they can expect from their transportation projects.¹³⁸

¹³⁸SHRP2 Project C11,
http://www.fhwa.dot.gov/goshrp2/Solutions/Capacity/C03_C11/TPICSEconomic_Analysis_Tools.

9. Investment Analysis and Selection

Building on identification of needs and financial resources, a performance-based transportation plan will involve analysis of alternative investment choices in order to develop a preferred investment strategy. Scenario analysis is often a key analytical and public involvement technique during this phase of plan development. The consequences of alternative investment choices on transportation system performance are analyzed by applying the performance measures that link directly to the Plan's goals and objectives, and making comparisons. This is typically followed by selection of a preferred alternative, which may include the identification of individual projects or funding for different categories of investments.

Scenario Analysis to Compare Alternative Investment Strategies

In development of the transportation plan, scenario analysis allows agencies to test possible approaches to meeting future needs and identify the most effective package of policies or investments. Scenario development and analysis may address:

- ▶ Different packages of investments, addressing investments across different modes (e.g., transit, highways) or types of strategies (e.g., demand management, system preservation, system expansion) within a fiscally constrained budget;
- ▶ Different land use patterns (distribution of population and employment); and/or
- ▶ Different levels of transportation funding and/or performance expectations.

Scenario planning is often an inclusive and interactive process, involving considerable public participation. Using performance measures to compare alternatives helps in selecting the strategies that will most ably support attainment of objectives, and in making informed tradeoffs among different investment options. In some cases, scenario planning may also consider expected future changes in technology, policy, or the economy that could significantly impact transportation.

In order to be able to evaluate key differences between scenarios, it is important to establish a baseline that serves as a hypothetical point of comparison for projected performance in light of changes in strategies, focus, or funding in the future. Generally, the “business as usual” or current trend scenario – what would occur absent any significant changes in agency focus or action – serves as the baseline for comparing scenarios.

Analyzing Alternative Investment Packages within a Fiscally Constrained Budget

For example, **Arizona DOT’s** transportation plan examined what it calls “alternative investment choices” or AICs, which allocated baseline revenues across three investment types: preservation, modernization, and expansion. The AICs in the Arizona transportation plan address alternative ADOT capital programming priorities, and do not address specific projects.¹³⁹ Specifically, two AICs were designed to assess two starkly different investment choices and their implications on performance outcomes: 1) a “highway focus” alternative (AIC A), reflecting a preservation-oriented investment approach with limited system expansion; and 2) an “expanded travel choices” alternative (AIC B), shifting funding from preservation to expansion, including to non-highway investments such as transit, rail, aviation, and other modes. The outcomes of the alternatives were analyzed in terms of performance measures that directly reflect the transportation plans goals and objectives. In addition, AIC A and B were assessed with respect to the 25-year needs, ADOT priorities, and stakeholder input. The analysis resulted in the Recommended Investment Choice (RIC) that is a combination of the two alternatives enabling preservation of the current system and expanded travel choices. Each investment option was given a qualitative “grade” in relation to each plan goal area. The grades reflect the impact of reduced revenues compared to ADOT’s most recent investments, which reflected a relatively well-funded capital program.

Figure 9-1. Arizona 2035 Long Range Transportation Alternative Investment Choices (AIC) “Grades”

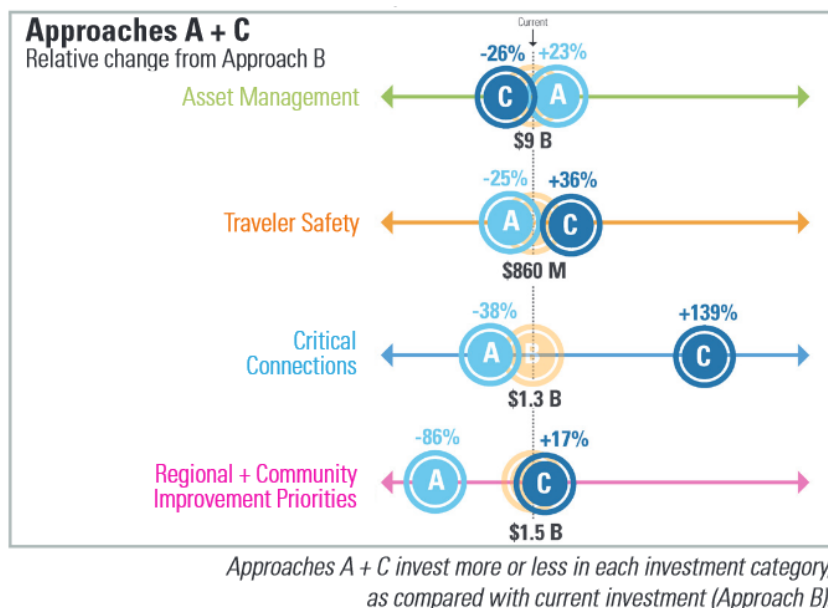
Goal Area	ADOT Existing Investment Strategy	AIC A	AIC B	RIC
Improve Mobility/Accessibility	B	D	C+	C-
Preserve and Maintain System	B+	A	D	A-
Support Economic Development	C+	D	B-	C-
Link Transportation and Land Use	C-	C-	B	C+
Consider the Environment and Natural Resources	B-	B-	B+	B+
Enhance Safety and Security	C+	C-	B-	B-
Investment in Non-Highway Modes	D	D	C+	C

Source: Arizona DOT, *What Moves You Arizona: Long-Range Transportation Plan, 2010-2035*, Table 6-3.

¹³⁹ Arizona Department of Transportation, *What Moves You Arizona, Long-Range Transportation Plan 2010 – 2035*. Available at: <http://www.azdot.gov/docs/default-source/planning/lrtp-2011-1129.pdf?sfvrsn=2>.

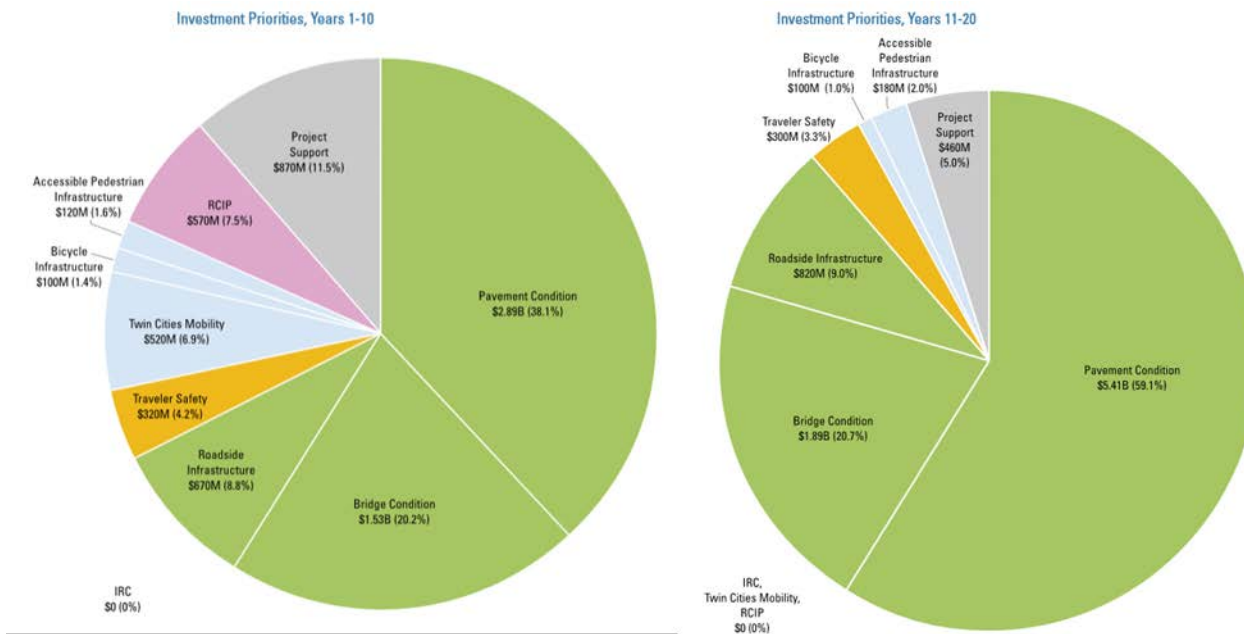
Similarly, **Minnesota DOT (MnDOT)** used a performance-based approach to compare alternative investment options in developing its State Highway Investment Plan: 2014-2033 (MnSHIP). MnDOT developed three alternative approaches to dividing funding between its investment categories: asset management, traveler safety, critical connections, regional and community improvement priorities, and project support. The three approaches to investment are illustrated in a graphical folio or brochure to support stakeholder review and understanding of the fairly different investment directions that the State could take in the long term. The three approaches are Approach A – Focus on maintaining existing infrastructure on the entire system, Approach B – Current investment direction, and Approach C – meet interstate infrastructure needs, and investment in mobility, local priorities, and non-motorized options. The folio illustrating the approaches contains highlights of the approach, a hypothetical driving scenario, strengths and drawbacks, a table comparing this approach to current funding levels, and major outcomes of the approach – this information effectively translated the expected impacts of each scenario to residents and decision-makers. Each approach assumes constant revenue, constant system size, fiscal constraint, and acknowledgement of the difficult trade-offs, without a preference for one solution over another. The figure below compares expected performance of Approaches A and C relative to the “business as usual” Approach B. As a result of this exercise, MnDOT identified its investment priorities for the first and second ten-year periods (see Figure 9-2 below).

**Figure 9-2. Minnesota Department of Transportation:
Using Scenarios to Link Management Systems to the LRTP**



Source: Minnesota Department of Transportation, “Scenario Planning: Background – MnSHIP Investment Approaches,” <http://www.dot.state.mn.us/planning/mnship/pdf/approaches.pdf>.

Figure 9-3. Minnesota Department of Transportation: Final MnSHIP Investment Priorities



Source: Minnesota Department of Transportation, *Minnesota State Highway Investment Plan: 2014-2033*, Page ES-4.

For more information on MnSHIP, see the Plan and the investment categories.¹⁴⁰

As another example, the **Southeast Michigan Council of Governments (SEMCOG)**, the MPO for the Detroit metropolitan area, conducted a scenario analysis of alternative funding between types of projects (pavement repair versus capital). SEMCOG used five funding scenarios: continuing current allocation, public opinion, preservation first, transit first, and maximum performance (a blended scenario). Ultimately, a modified preservation first scenario was selected due to findings about expected performance under that scenario.¹⁴¹

FHWA has developed a set of resources that are helpful in preparing the financial elements of the transportation plan as well as STIPs and TIPs.¹⁴² This set of tools includes spreadsheets that are intended to be used to develop and compare funding scenarios. It also addresses the use of financial data in performance-based planning.

¹⁴⁰ Minnesota State Highway Investment Plan: 2014-2033:

<http://www.dot.state.mn.us/planning/mnship/investment.html> and

<http://www.dot.state.mn.us/planning/mnship/index.html> (investment categories).

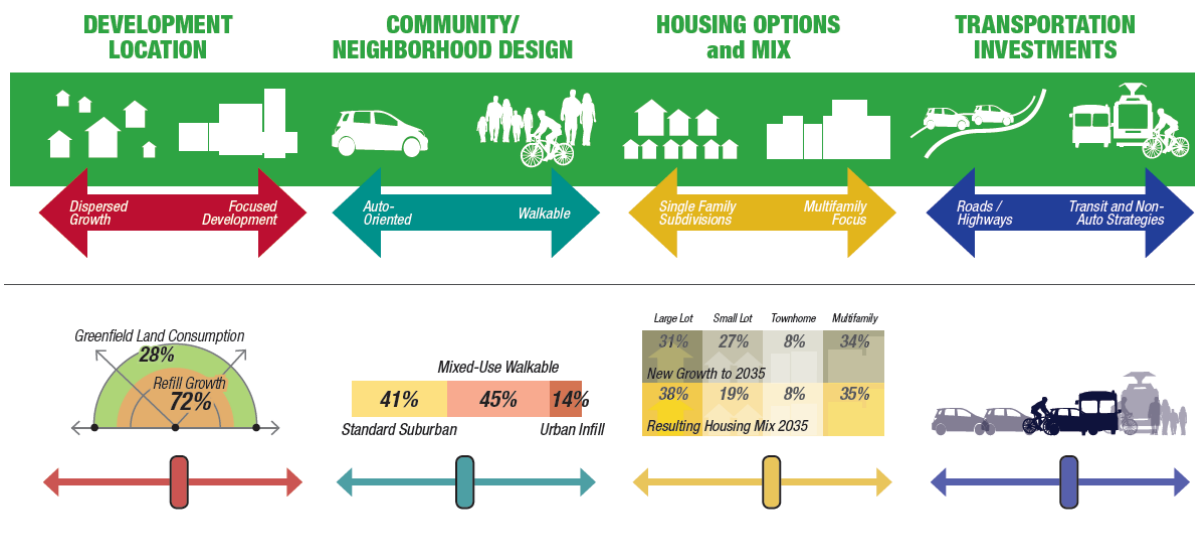
¹⁴¹ For more information, see: <http://www.semco.org/Long-RangeTransportationPlans.aspx>.

¹⁴² FHWA, Transportation Planning Capacity Building, Financial Planning and Constraint Planning Tools for Transportation. Available at: http://www.planning.dot.gov/financial_tools.asp.

Alternative Land Use and Transportation Investment Scenarios

Scenario planning can be used to test alternative land use scenarios, in addition to transportation investments. MPOs and RTPAs in California commonly use scenario planning to develop their preferred scenario for transportation plan development, relying on extensive public participation and scenario planning software tools and transportation models to identify trends and develop targets for the preferred scenario. For example, in the development of its most recently adopted 2035 transportation plan and Sustainable Communities Strategy, the **Southern California Association of Governments (SCAG)** used scenario analysis as a tool in the public outreach workshops that took place during plan development.¹⁴³ Scenario 1, depicted in the figure below, represents the region’s trend line or baseline, which was estimated using (1) past performance data and (2) an analysis of the land use and transportation plans currently in place in various jurisdictions throughout SCAG’s planning area. The scenario analysis relied heavily on the baseline and trend information, as each additional scenario was compared to Scenario 1 in terms of development location, community and neighborhood design, housing options and mix, and transportation investments. The identification of scenarios through numbers rather than terms (such as “transit-focused” or “compact development”) forced participants to think about the merits of each scenario before jumping to conclusions about scenarios based on their titles.

Figure 9-4. Graphical depiction of Scenario 1 from SCAG’s Transportation Plan Development Process



Source: Southern California Association of Governments, 2012-2035 Regional Transportation Plan / Sustainable Communities Strategy. Adopted April 2012.

¹⁴³ Southern California Association of Governments, 2012-2035 Regional Transportation Plan/ Sustainable Communities Strategy. Available at: <http://rtpscs.scag.ca.gov/Pages/default.aspx>.



Alternative Funding Level Scenarios

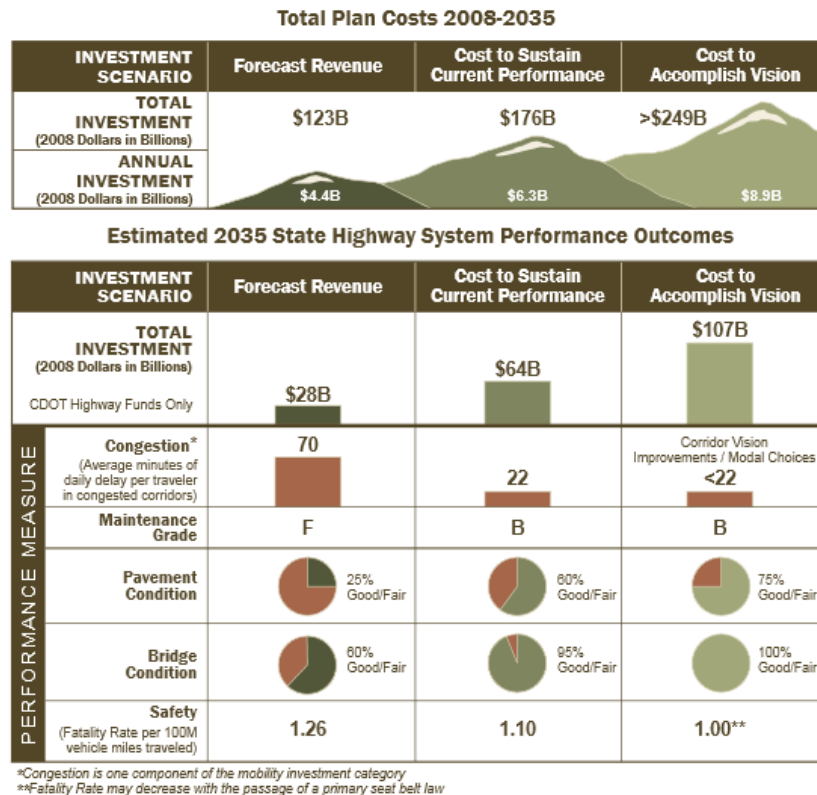
State and MPO transportation plans may explore alternative levels of funding availability, and impacts on performance outcomes. This differs from analyzing alternative investment packages, as discussed above, in that funding level is the leading difference between scenarios as opposed to types of transportation investments.

For example, **Michigan DOT** performed scenario analysis of alternative funding strategies taking into consideration pavement, bridge, safety and congestion. Michigan DOT developed scenarios for various investment strategies with different funding levels. The Transportation Commission approved the preferred scenario. The State conducted a limited scenario analysis, using three economic scenarios: high oil prices, agrarian-focused economy, and modernization of the system. These were modeled for economic impacts on the State.¹⁴⁴

Colorado DOT's LRTP identifies the level of performance that could be expected from three different funding scenarios, showing that the cost to maintain current performance levels exceeds projected revenues and discussing potential funding mechanisms to close the gap (see Figure 9-5).

¹⁴⁴ For more information on how Michigan conducts its long range planning efforts, visit the State's long range planning website at http://www.michigan.gov/mdot/1,1607,7-151-9621_14807_14809---,00.html.

Figure 9-5. Colorado L RTP Presentation of Alternative Investment Scenarios




Source: Colorado Department of Transportation, 2035 Statewide Transportation Plan, Page 37.

The result of scenario analysis is the creation of a preferred planning scenario or selected alternative.

Using Performance Information to Support Project Prioritization and Selection of a Preferred Alternative

Some transportation agencies make explicit linkages between anticipated performance results and selection of a preferred investment alternative or projects in the transportation plan. This is more common at the MPO level, where the MTP identifies specific projects or project concepts. The MPO's MTP contains a financially constrained list of transportation projects for the MPO study area. In a performance-based transportation plan, projects are selected and ranked based on their ability to achieve the plan's desired performance targets in a cost-effective way. Performance measures and targets provide information to support the project prioritization and selection process. Project prioritization may involve ranking projects in order of their ability to help the



State or metropolitan area cost-effectively reach each goal or performance targets and assigning weights to each goal or target.

For instance, the ***Pikes Peak Area Council of Governments*** in Colorado used projected performance on 17 SMART (specific, measurable, agreed-upon, realistic, time-bound) objectives to select projects for its cost feasible plan. PPACG requested that member governments seeking State and Federal monies for transportation projects submit their list of projects for consideration to be included in the MTP. PPACG staff then scored the submitted projects using three planning scenarios (Trend, Infill, and Conservation) in order to determine the uncertainty associated with different land-use futures on transportation projects. After the PPACG Board of Directors adopted the preferred planning scenario, staff then scored projects against the preferred scenario. The reasoning behind this effort was to provide the Board with additional information under the assumption that projects that score well in all cases have less risk of being “bad” investments. The scoring was conducted using evaluation criteria for weighting objectives based on input from a Transportation Advisory Committee, Community Advisory Committee, and public input.

Similarly, both the ***Baltimore Metropolitan Council (BMC)*** and the ***Wilmington Area Planning Council (WILMAPCO)*** use project prioritization processes within the MTP development process to rank projects based on their ability to meet the goals set forth in each MPO’s respective long range plan. The ***Mid-America Regional Council (MARC)*** in the Kansas City area also scores projects using a process that relates clearly back to performance measurements chosen to reflect objectives. The agency uses a 100-point scoring system, which includes inputs relating to all LRTP policy goals, to evaluate projects for inclusion in the regionally-significant project list. The scoring system was developed in coordination with the agency’s transportation committee. After the scoring analysis, the agency conducts more detailed follow-up technical analysis from committees, the public, and stakeholders.¹⁴⁵

In the development of its most recent long-range plan, Plan Bay Area, the ***Metropolitan Transportation Commission (MTC)*** found that conducting project-level assessments helped to advance a more performance-based approach to decisionmaking beyond what could be analyzed under broad packages of strategies within scenario analysis. MTC conducted assessments of expected project performance by project type in terms of benefit-cost assessment and an assessment of the impact on regional targets in order to help prioritize investments in the MTP. MTC analyzed all 1000 uncommitted projects in its targets assessment and approximately 100 “significant projects” in its benefit-cost assessment. Through this analysis, the MPO began to strengthen a requirement of making a “compelling case” for project funding. The analysis generally found that transit and regional programs were most supportive of regional targets. Road

¹⁴⁵ For more information, see: http://www.fhwa.dot.gov/livability/case_studies/kansas/index.cfm.

efficiency projects (e.g., congestion pricing, freeway operational improvements) had some of the highest benefit-cost ratios, while highway capacity projects often were less supporting of targets and less cost-effective. As a result of this analysis, thirty-four projects were considered “low-performing”; of those, 12 projects were withdrawn by sponsors, 13 projects were re-scoped, and one project slated for rejection was settled through arbitration; eight projects were approved due to their impact on communities of concern, air quality, or recreational trips.

Figure 9-6. Metropolitan Transportation Commission: Project Performance Assessment

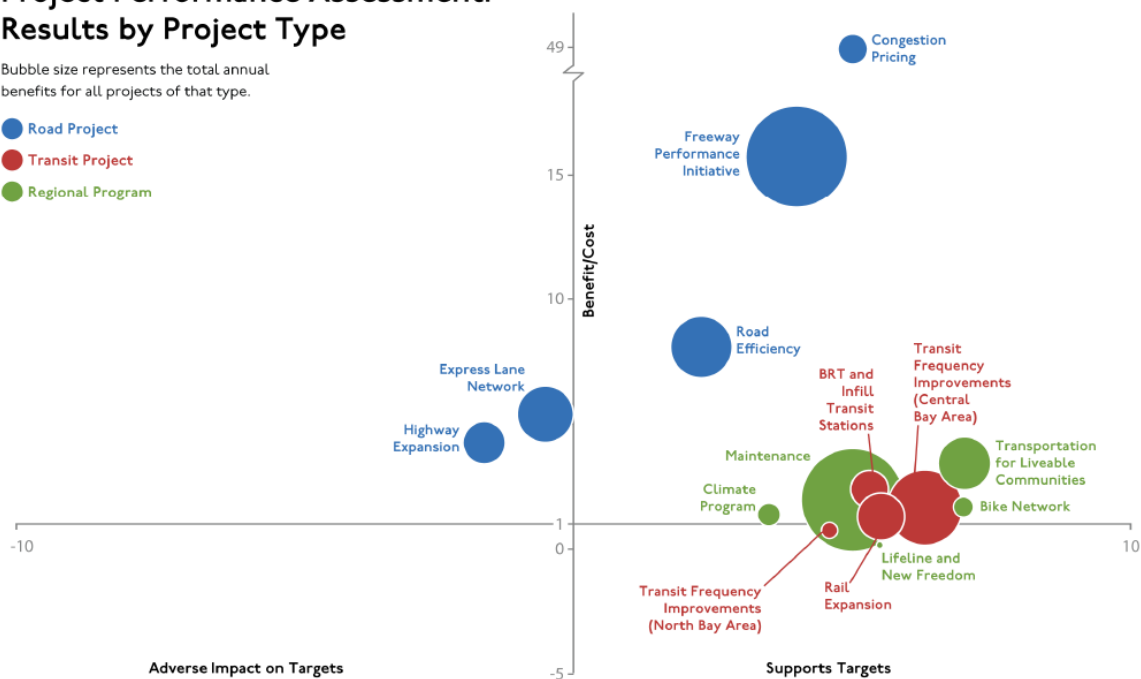
Project Performance Assessment: Results by Project Type

Bubble size represents the total annual benefits for all projects of that type.

● Road Project

● Transit Project

● Regional Program



Source: Metropolitan Transportation Commission, Plan Bay Area Performance Assessment, Page 53.

It is important to recognize that not all MPOs and State DOTs score individual projects as part of the transportation plan development process. This may be to allow flexibility to jurisdictions or the agency in selecting projects. However, a performance-based plan should analyze the overall performance of the plan. For instance, the Transportation Planning Board of the **Metropolitan Washington Council of Governments (MWCOCG)** does not score individual projects, which generally are identified by Maryland, Virginia, and the District of Columbia. However, it does present the anticipated performance of the plan across different performance metrics. By laying out a framework of regional goals and identifying performance measures, the MPO builds consensus on common principles and priorities.

10. Connecting the Transportation Plan and Programming

The transportation plan is a central, unifying document in the transportation planning process. It summarizes goals and performance targets, assesses current system performance, inventories future challenges and needs, and analyses and proposes an investment strategy to be funded over the next twenty years or more to improve performance toward those targets. To be effective, however, the transportation plan must connect to other planning and programming documents in a multi-year cycle of planning.

Connection with the TIP and STIP and Project Prioritization

The documents most directly connected to the transportation plan are the MPO Transportation Improvement Program (TIP) and Statewide Transportation Improvement Program (STIP). The TIP and STIP are critical documents in a PBPP process, as they commit transportation dollars to funding for specific projects, and reflect short-term priorities.

Given that the State transportation plan is not required to have a financial plan, some State DOTs use the LRTP as a policy document to set a strategic direction for investment decisionmaking. In a performance-based plan, this would occur through the identification of goals, objectives, and performance measures, as well as desired trends or targets. Using a performance-based approach, the State DOT may then develop an *investment plan or plans*, which often are associated with an individual mode of transportation, and identify specific investments or categories of investments and associated funding plans. Investment plans may have a mid-range time horizon, such as 10 years. Together with the LRTP, investment plans can form a “family of plans” that is more flexible than a project-based LRTP because the entire document does not need to be updated as frequently. The projects identified are moved to the STIP when they are ready to advance.

A performance-based transportation plan will provide direction to how the TIP and STIP will be developed. The transportation plan may have a chapter or section of narrative discussion that explains how components of the plan will translate into the program. The narrative discussion illustrates to the reader how the information used and generated by the planning process will influence the development of purpose and need, project development, design, and eventual implementation of projects. It also provides transparency, accountability, and predictability to the process.

The transportation plan can support development of a performance-based TIP and STIP by:

- ▶ Identifying goals, objectives, and targets that can be used in the TIP or STIP development process to assess consistency with the transportation plan;
- ▶ Identifying project selection criteria and weighting that are used to prioritize projects to be included in the TIP or STIP; or
- ▶ Identifying performance targets that are used as a basis for assessing the anticipated effects of the TIP or STIP.


Consistency of Projects with Plan Goals and Targets

A performance-based TIP and STIP will, as practicable, include a discussion of the anticipated effect of the program of projects toward achieving performance targets identified in the transportation plan. Moreover, the projects included in the TIP and STIP should be consistent with investment priorities to achieve targets presented in the transportation plan and other performance management plans, such as highway and transit asset management plans, the SHSP, the public transportation agency safety plan, the CMAQ performance plan, and State freight plan.

Maryland DOT provides an example of connections between the State's transportation plan and projects in its STIP. The Maryland Transportation Plan (the MTP) lays out a strategic direction for the State's transportation investments, and identifies key goals and strategies. In recent years, MDOT has made an explicit connection between the projects in the agency's Consolidated Transportation Program (CTP) and the goals in the MTP. For each project in the CTP, each of the modal agencies of Maryland DOT must identify which of the MTP's goals (one or more) the project supports. As of 2010, Maryland DOT requires all localities submitting their requested list of projects to provide information on which MTP goals the project would support. By placing more responsibility on local governments to consider how their priorities support State goals, Maryland DOT intends for agencies throughout the State to consider the MTP as a plan that guides investment strategies and supports project selection.

Project Prioritization / Selection Criteria and Weighting

Performance measures and targets from the transportation plan can be used to support STIP or TIP project prioritization and selection processes. The process developed for projects can include multiple steps: 1) application process and preliminary screening; 2) project evaluation; and 3) project prioritization and selection. Similar to the process that may be used in developing the transportation plan, project prioritization for the STIP or TIP may involve ranking projects in order of their ability to help the State or metropolitan area cost-effectively reach each goal or performance targets and assigning weights to each goal or target.




As an example, the **Genesee Transportation Council** in Rochester, New York, used the goals and performance measures in its *Long Range Transportation Plan 2035* to develop TIP project evaluation criteria. Recognizing their high levels of cost-effectiveness, GTC dedicates funding directly to two priority projects: Implementation of the Highway Emergency Local Patrol (HELP) Program, which provides emergency roadside service to disabled vehicles; and funding for the Regional Transportation Operations Center. For the remainder of funding, GTC collaborated with NYSDOT Region 4 to solicit project proposals for the TIP from counties, municipalities and other eligible entities, and used a structured, performance-based process to evaluate project submissions. A Rater's Guide was developed to provide a consistent rating scale for TIP projects, using specific criteria to score how well a proposed project supports the region's goals and objectives. Funding is not divided up by mode or major category initially. Rather, all projects are ranked using a set of common criteria and mode-specific criteria to select the most beneficial projects for funding. Common criteria used for evaluating projects tie directly to the goals and performance measures in the LRTP and include: safety, mobility, community and economic development, system continuity and optimization, environment, and fiscal responsibility. Mode-specific project evaluation criteria are unique to the following types of projects: highway and bridge, public transportation, bicycle and pedestrian, system management and operations, and goods movement.¹⁴⁶

The **North Central Pennsylvania Regional Planning and Development Commission** developed a project prioritization process for its TIP, which used performance measures to score and rank projects (See case study in Section 11 for more information).

Assessing Anticipated Impact of the TIP or STIP

As discussed above, TIPs and STIPs provide an opportunity to link specific projects to long range plan goals, including those that may be more difficult to quantify, such as livability or economic development. The TIP or STIP can provide information, for example, about whether a specific project is expected to have a significant, moderate, or minimal impact on enhancing economic vitality of the region, as defined by the agency. Linking projects to a goal such as economic vitality provides the agency with the opportunity to track the level of investment it is making in projects that further economic vitality outcomes. In addition to using performance information to rank projects, the TIP or STIP could include an overall assessment of the program of projects in helping to achieve performance targets. As an example, several MPOs in New York State have conducted an assessment of energy and greenhouse gas implications of projects in their TIPs, based on

¹⁴⁶ Genesee Transportation Council, *Long Range Transportation Plan 2035* website (2011), <http://www.gtcmpto.org/docs/LRTP.htm> and *Transportation Improvement Program 2014-2017* (2013), <http://www.gtcmpto.org/Docs/TIP.htm>



guidance from New York State DOT. These calculations address both direct energy and emissions from motor vehicles, as well as the energy and emissions associated with construction of projects.¹⁴⁷

Support for Project Development

Beyond the TIP and STIP documents, identified performance outcomes in the transportation plan can also be used to support project development. Similar to the concept of linking planning-environment linkages, where environmental information from the planning process is used to help support decisionmaking in project development, the performance information in a transportation plan can be used to support project-level information about project purpose and need.


Moreover, it is important to recognize the significant role of system preservation in transportation decisionmaking. In many States and MPOs, 50 to 90 percent of funding is allocated to preservation and maintenance; therefore, new project selection makes up a relevantly limited portion of total funding. That means, however, that how that limited funding is spent is especially critical and emphasizes the importance of good business practice of coordinating improvements in relation to preservation (e.g. when road is resurfaced, add bike lane then). In many cases, agencies can support plan goals by integrating capacity, safety, or livability enhancements into preservation projects.

Planning Studies

Planning studies can provide important information to complex implementation strategies. Corridor or subarea plans are conceptual level planning studies¹⁴⁸, which focus on a particular corridor or sub-area where there is a transportation need. For projects or needs that have been identified in the transportation plan, a corridor or subarea study can be used to better refine the project or need. The results can then feed back into the transportation plan or more provide a more detailed design, concept and scope before the project is programmed into the STIP/TIP. A planning study can also be useful to help define problems or identify potential solutions to carry forward into the NEPA and project development process. A study can assist when funding is limited and decisions are needed as to what improvements can be made in a timely and cost-effective manner. A study is advised if the project is complex: for example, if the project is regionally significant, has environmental constraints, incorporates analysis of housing and

¹⁴⁷ FHWA, *A Performance-Based Approach to Addressing Greenhouse Gas Emissions through Transportation Planning* (2014).

¹⁴⁸ http://environment.fhwa.dot.gov/integ/corridor_nepa_guidance.pdf.



community development options, is costly or controversial, or has the potential for many alternatives that could be indistinct and confusing.

Future Directions and Planning Cycles

Transportation planning is an ongoing cyclical process. Performance-focused organizations will view each cycle as an opportunity to evaluate progress, refine analysis methods, and make changes to the planning process. As an example, in 2013, the ***San Diego Association of Governments (SANDAG)*** was in the process of establishing goals for its next MTP. The agency took a statistically significant survey of the public on the agency's existing goals, which provided the board with much better information about the public's priorities. SANDAG had 38 performance measures in the last plan, but wanted to reduce this figure by the next plan. By streamlining its current set of performance measures to a more manageable number, SANDAG was able to build on priorities identified in previous planning efforts while making necessary changes to enhance its performance-based planning process.

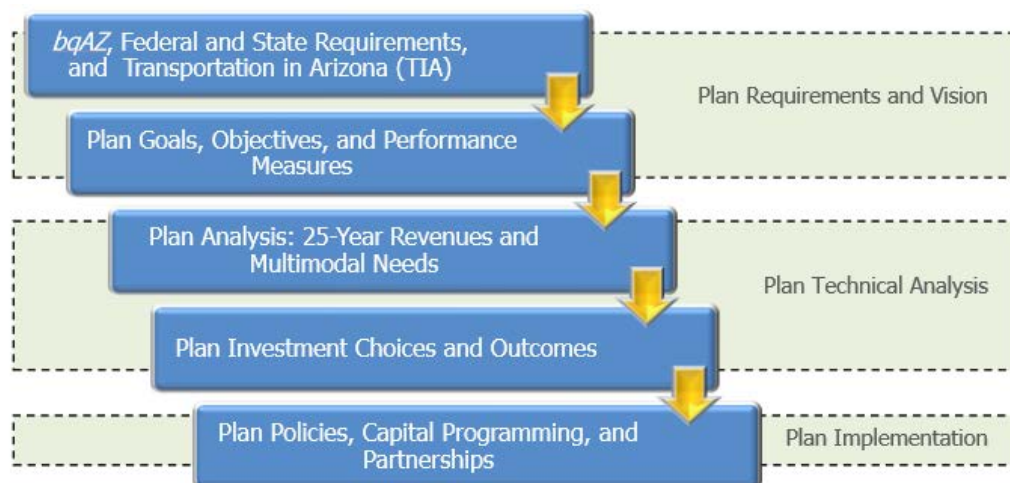
Planners should also avail themselves of information generated during previous plan cycles and information generated during the development of other performance-based documents. Over multiple planning cycles, more reliable information is generated and more accurate analysis methods are developed.

11. Case Studies

Case Study: Arizona Department of Transportation - What Moves You Arizona: 2010-2035 Long-Range Transportation Plan

In 2011, the Arizona Department of Transportation (ADOT) completed its statewide long-range plan, *What Moves You Arizona*, with a horizon year of 2035. The LRP provides strategic direction to guide future investments; it does not examine or recommend specific projects. The plan takes a performance-based approach by documenting existing conditions and future trends that could influence system performance and investment needs; defining State transportation system goals, objectives, and performance measures that reflect input from stakeholders and partner agencies; assessing future needs and anticipated revenues; considering programmatic investment choices to illustrate likely future system performance under different investment mixes; and establishing a preferred investment option that is based on a realistic revenue forecast (fiscally-constrained). The plan builds on the comprehensive 2050 land use and multimodal transportation vision developed through the *Building a Quality Arizona (bqAZ)* long-range planning effort. *Building a Quality Arizona* is a statewide planning effort to integrate transportation, land use, community, and economic development planning and identify long-term needs and potential funding sources.¹⁴⁹

What Moves You Arizona was developed based on the following “Building Blocks,” with public and stakeholder involvement at each key step of its process:



Source: Arizona DOT, *What Moves You Arizona: 2010-2035 Long-Range Transportation Plan* (2011), Page 14.

¹⁴⁹ Pima Association of Governments, 2040 Mobility Matters fact sheet, *Building a Quality Arizona*.

Overview of Plan

What Moves You Arizona provides an in-depth review of Arizona’s transportation planning decisions and how they were reached. The organization of the plan generally follows a standard transportation planning process. The plan’s chapters are:

1. Executive Summary
2. Plan Development
3. Goals, Objectives, and Performance Measures
4. Multimodal Needs
5. Transportation Revenues
6. Investment Alternatives and Outcomes
7. Considerations for Plan Implementation

Outreach


Arizona DOT worked to ensure that a wide array of perspectives were considered in developing *What Moves You Arizona*. Arizona DOT conducted extensive public outreach to engage participation in determining goal plans. A formal public participation plan was developed in 2009 to guide the outreach process. The Councils of Government and metropolitan planning organizations in the State helped to design the plan, which was also open to public comment.

The plan focused on public involvement during two key phases: Goals and Objectives and Alternative Investment Choices. Facebook, surveys, videos and radio, TV, and newspaper advertisements were all used to engage and inform the public about participating in the process. A survey was distributed to collect community input in the goals and objectives for the LRP and workshops with interest groups were conducted to review and discuss goals and objectives.¹⁵⁰

Visioning

“In Phase One of ADOT’s planning process — the transportation vision — we take the approach of the sky is the limit. If money was no object, what would Arizona’s transportation future look like? No fiscal restraint means everything is on the table. In 2008 and 2009, ADOT worked with community members and organizations throughout the State to develop the transportation vision by reviewing the needs for the next 40 years. This vision was called the Building a Quality Arizona (bqAZ) Statewide Transportation Planning Framework and was established with no fiscal

¹⁵⁰Arizona DOT, *What Moves You Arizona: 2010-2035 Long-Range Transportation Plan* (2011).



constraints. The transportation vision for the State sets the comprehensive foundation for other plans that are fiscally constrained.”¹⁵¹

Goals, Objectives, and Performance Measures

According to *What Moves You Arizona*, the goals, objectives, and performance measures of ADOT’s plan form a performance-based framework that is “the foundation for ADOT’s accountability to its partners, stakeholders, and the public.”¹⁵² ADOT and its partners developed eight plan goals through a process that began with *bqAZ*’s Vision and Guiding Principles. The *bqAZ* framework presented a multimodal transportation system that recognized and strengthened the relationship between land use and transportation by connecting activity and employment centers. Several of the goals are directly drawn from *bqAZ* Guiding Principles. ADOT’s staff worked with LRP development teams, the public, stakeholders, and its policy committee to review, revise, and vet the plan’s goals and objectives.

The Arizona LRP also recognizes that many of the goals (e.g., support economic growth, link transportation and land use, improve mobility and accessibility) are the responsibility of many public and private partners, so the plan discusses the role that ADOT itself expects to play. For instance, under the goal to “support economic growth,” ADOT’s role is to develop and operate a State Transportation System that provides predictable freight and people movement to create/retain jobs and support a competitive and thriving economy.

For each goal, a high-level objective was developed. For example, the objective “Be a good steward of Arizona’s natural, cultural, and environmental resources while improving and maintaining the transportation system” was developed to support the plan goal “Consider natural, cultural, and environmental resources.”¹⁵³

Performance measures for the LRP were built from existing ADOT measures and through collaboration and coordination with a number of committees. In selecting the performance measures, ADOT and its partners considered the following:

- “State statutory requirements for specific measurement categories;
- Experiences and approaches used in other States;
- An emphasis on measuring system performance changes that are influenced by plan-level resource allocation decisions (as opposed to program and project-level decisions);
- The need to use “indirect” or “proxy” measures in some areas due to the inability to conduct or support direct measurement of outcomes and impacts; and

¹⁵¹ Arizona DOT, Planning to Programming website.

¹⁵² Arizona DOT, *What Moves You Arizona: 2010-2035 Long-Range Transportation Plan* (2011).

¹⁵³ Arizona DOT, *What Moves You Arizona: 2010-2035 Long-Range Transportation Plan* (2011).

- A focus on system results where ADOT can have a direct impact or influence.”¹⁵⁴

The performance measures developed for ADOT’s LRP were intended to be used as the basis for lower-level performance measures for programs and projects that connect the transportation plan’s performance-based planning framework to capital investments. The measures were also to be used for performance monitoring to track progress toward the plan’s goals and objectives. Targets were not established for the objectives or performance measures in the LRP; rather, the plan explains that performance trends will be helpful in gauging the effectiveness of investments. The first six goal areas are outcome-oriented in nature and are associated with outcome-based performance measures. The LRP explains that the last two goal areas will have process-oriented performance measures developed during plan implementation. The first two goal areas and their associated measures are shown in the figure below.


Improve Mobility and Accessibility
- Percentage of roadway miles at acceptable congestion levels – Applies volume to capacity ratios (V/C) to different road functional classes to assess how well the overall highway system will accommodate current and future travel demand - an unacceptable congestion level may be one where mobility has been degraded to the point where the user no longer feels comfortable, safe, and satisfied with the transportation service provided
- Average speed during peak periods in urban areas – Assesses of the quality of travel in urban areas
- Total annual (or average daily) hours of delay – Provides an indication of how well the system is being operated (particularly in urban areas)
- Amount of rural highways “improved” – Provides a means to compare how different investment strategies will lead to improved transportation system access
System Preservation and Maintenance
- Percentage of State System lane miles with “fair” or better pavement conditions – describes anticipated pavement conditions for the overall systems based on widely accepted engineering standards
- Number of structurally deficient bridges – Identifies how many bridges on the State Highway System cannot be maintained above a specified federal condition standard
- Percent of required maintenance spending – Assesses the degree to which current maintenance levels will be sustained under different system expansion assumptions
- Percent of rural transit preservation needs met – Provides an output-based assessment of how future spending will meet estimated needs

Source: Arizona DOT, *What Moves You Arizona: 2010-2035 Long-Range Transportation Plan* (2011), Page 31.

Identifying System Needs

Arizona DOT used HERS-ST and NBIAS to estimate investment needs on the existing system, and then used sources including regional long-range plans to identify system expansion needs. In total, the analysis estimated needs associated with highway preservation, modernization, and expansion to total \$43.3 billion over the 25-year plan horizon. In addition, ADOT estimated needs for public transportation, including urban “state-of-good repair” needs, urban expansion needs, and rural

¹⁵⁴ Arizona DOT, *What Moves You Arizona: 2010-2035 Long-Range Transportation Plan* (2011).



preservation and expansion needs, as well as needs associated with freight and passenger rail and aviation. In addition to capital needs, ADOT also estimated the operating costs associated with highway and public transportation system operations over the Plan timeline, including non-capital system traffic management operations and routine maintenance. In total, the result suggested a cost of \$88.9 billion to address these needs. ADOT also examined a plan “vision level” needs assessment that quantified the cost associated with the first 25 years of the State’s *bqAZ* vision, which included more significant highway expansion/maintenance, bus and passenger rail expansion and modernization, bicycle and pedestrian improvements, and aviation improvements. This analysis resulted in an estimate of \$250.1 billion in needs.

Investment Decisions

The Arizona transportation plan examined what it calls “alternative investment choices” or AICs, which allocated baseline revenues across three investment types: preservation, modernization, and expansion. The AICs in the Arizona transportation plan address alternative ADOT capital programming priorities, and do not address specific projects.¹⁵⁵ Specifically, two AICs were designed to assess two starkly different investment choices and their implications on performance outcomes: 1) a “highway focus” alternative (AIC A), reflecting a preservation-oriented investment approach with limited system expansion; and 2) an “expanded travel choices” alternative (AIC B), shifting funding from preservation to expansion, including to non-highway investments such as transit, rail, aviation, and other modes. The outcomes of the alternatives were analyzed in terms of performance measures that directly reflect the transportation plan’s goals and objectives. AIC A and B were assessed with respect to the 25-year needs, ADOT priorities, and stakeholder input. The analysis resulted in the Recommended Investment Choice that is a combination of the two alternatives enabling preservation of the current system and expanded travel choices.

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¹⁵⁵ Arizona DOT, What Moves You Arizona: 2010-2035 Long-Range Transportation Plan (2011).

Case Study: Metropolitan Transportation Commission (MTC), San Francisco Bay Area – Plan Bay Area

Background

The Metropolitan Transportation Commission (MTC) is the MPO for the nine-county San Francisco region. The organization is responsible for planning, coordinating, and financing for transportation in the counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma.

In 2010, MTC, together with the Association of Bay Area Governments (ABAG), the Bay Area Air Quality Management District (BAAQMD), and the Bay Conservation and Development Commission (BCDC), formed a joint initiative to foster a more sustainable future. This initiative, termed OneBayArea, creates a forum for coordinating efforts to protect and preserve the natural environment and human health among the region's nine counties.




Source: MTC.

Plan Bay Area, the region's most recent long range plan, passed in 2013. Plan Bay Area is the first plan to be developed jointly and approved by both ABAG and MTC. It is also the first plan to integrate long range transportation planning with housing and land use strategies through the year 2040. Developing an integrated long range plan ensures that Plan Bay Area meets both the region's priorities and the requirements included in California's 2008 Senate Bill 375 (SB 375), which sets regional reduction targets for greenhouse gas emissions from cars and light trucks. SB 375 also requires each of the State's metropolitan areas to develop a Sustainable Communities Strategy (SCS) that lays out a plan for achieving the regional GHG reduction targets, accommodates population growth, and promotes compact development.

A History of Performance-Based Planning

Plan Bay Area is the latest in a series of four regional long range plans that incorporate performance measures to track the progress toward achievement of key objectives not only for greenhouse gas reductions, but also for other quality of life benefits.

- ▶ **2001 Regional Transportation Plan (for year 2025).** As part of the Regional Transportation Plan (RTP) for 2025, MTC developed 11 performance measures under the Plan's six goal



areas. The development of appropriate performance measures was the result of a lengthy process that involved a regional research institution, a stakeholder working group with representatives from the environmental community, business community, and other relevant transportation partners, and internal MTC committees. In the 2001 Performance Assessment that accompanied the RTP, the agency used measures to assess the potential performance of the system under the five alternatives developed as part of the Draft Environmental Impact Review and included in the 2025 RTP.

- ▶ **Transportation 2030 (2005 Regional Transportation Plan).** As part of the 2030 RTP, MTC expanded on its performance evaluation of investment alternatives by utilizing performance measures to evaluate the performance of more than 400 individual projects. To conduct such a large and detailed analysis, MTC developed performance measures that mapped to a new set of corridor objectives that were, in turn, closely tied to the Plan's goals. The plan's six broad goals were largely carried over from the previous RTP. To develop the objectives and measures, MTC established a committee comprised of partner transportation agencies, members of the MTC Advisory Council, and other interested stakeholders. The committee adopted 28 performance measures that could be grouped into two categories: those that address future needs for individual improvements relative to corridor objectives; and those that assess the impacts of groups of projects on travel within a corridor. Each of the 400 projects included in the evaluation underwent a project needs assessment, a corridor benefits analysis, a cost assessment, and one additional evaluation if the project was related to freight. Ultimately, the evaluation informed which projects were selected for inclusion in Transportation 2030.
- ▶ **Transportation 2035 (2009 Regional Transportation Plan).** In the 2009 Plan, MTC built off the lessons learned during the development of Transportation 2030 and underwent a 3-step performance assessment process. During the first step, a "What If?" visioning conducted early in the long range planning process, MTC determined that, based on expected future trends and varying investment scenarios, the region would adopt a series of highly specific and ambitious performance objectives that were intended to serve as benchmarks to measure the region's progress. For the first time, MTC contextualized seven goal areas for the RTP within the "three E's" of sustainability: economy, environment, and equity. The 11 specific performance objectives that were included in the plan were each adapted from State plans and legislation. They were used in the second phase of the performance assessment to conduct quantitative evaluations of projects (comparing costs and benefits), and qualitative assessments that evaluated how the projects addressed Transportation 2035's goals. In the final phase of the assessment, MTC evaluated how well the plan met the adopted performance objectives.

Performance-Based Planning in Plan Bay Area

Building off the legacy of Transportation 2035 and the two preceding long range plans, Plan Bay Area establishes seven broad integrated goals and ten associated performance targets. A clear evolution from the preceding plans, the performance targets established in Plan Bay Area were used to evaluate both investment scenarios and projects, and were utilized to assess projects both quantitatively and qualitatively. The Plan Bay Area performance targets, which were also contextualized within the “three E’s,” were selected over a 5-month process driven by MTC’s Ad Hoc Committee on Performance Measures. The first two targets are required under SB 375, while the remaining eight targets were developed through a collaborative process that relied on the input of local stakeholders, equity, environment and business advocates, and members of the public. Each of the targets aims to achieve the sustainability mission of OneBayArea and the requirements in SB 375.

Table 11-1. Adopted Plan Bay Area Performance Targets

Goal/Outcome	Performance Target
Required by SB 375	
Climate Protection	Reduce per-capita CO ₂ emissions from cars and light-duty trucks by 15% by 2035. <i>Source: CARB, as required by SB 375</i>
Adequate Housing	House 100% of the region’s projected growth by income level without displacing current low-income residents. <i>Source: ABAG, as required by SB 375</i>
Voluntary	
Healthy and Safe Communities	Reduce premature deaths from exposure to particulate emissions: <ul style="list-style-type: none"> • Reduce premature deaths from exposure to PM_{2.5} by 10%. • Reduce PM₁₀ emission by 30%. • Achieve greater reductions in highly impacted areas. <i>Source: Adapted from Federal & State air quality standards by BAAQMD</i>
	Reduce by 50% the number of injuries and fatalities from all collisions (include bike and pedestrian). <i>Source: Adapted from California State Highway Strategic Safety Plan</i>
	Increase the average daily walking or biking per person for transportation by 70% (for an avg. of 15 min/person/day).

	<i>Source: Adapted from U.S. Surgeon General's guidelines</i>
Open Space and Agricultural Preservation	Direct all non-agricultural development within the urban footprint (existing urban development and urban growth boundaries). <i>Source: Adapted from SB 375</i>
Equitable Access	Decrease by 10% the share of low-income and lower-middle income residents' household income consumed by transportation and housing. <i>Source: Adapted from Center for Housing Policy</i>
Economic Vitality	Increase gross regional product by an average annual growth rate of approximately 2% (in current dollars). <i>Source: Bay Area Business Community</i>
Transportation System Effectiveness	Increase non-auto mode share by 10% and decrease automobile VMT per capita by 10%. <i>Source: Adapted from Caltrans Smart Mobility 2010</i>
	Maintain the transportation system in a state of good repair: <ul style="list-style-type: none"> • Increase local road pavement condition index to 75 or better. • Decrease distressed lane-miles of state highways to less than 10% of total lane-miles. • Reduce share of transit assets past their useful life to 0%. <i>Source: Regional and state plans</i>

Source: Plan Bay Area.

Developing Targets

As in the previous performance-based plans, the performance targets were designed to align with the regional long range goals. An evolution of the goals developed in each of the four performance-based long range plans is presented in the table below (goals are listed in the order in which they are presented in each plan).

Table 11-2. Evolution of Regional Transportation Plan Goals

2001 Plan Goals	Transportation 2030	Transportation 2035	Plan Bay Area
1. Mobility of People & Freight	1. A Safe & Well Maintained System	1. Maintenance & Safety	1. Climate Protection
2. Safety	2. A Reliable Commute	2. Reliability	2. Adequate Housing
3. Economic Vitality	3. Access to Mobility	3. Freight	3. Healthy & Safe Communities
4. Community Vitality	4. Livable Communities	4. Clean Air	4. Open Space & Agricultural Preservation
5. The Environment	5. Clean Air	5. Climate Protection	5. Equitable Access
6. Equity	6. Efficient Freight Travel	6. Access	6. Economic Vitality
		7. Livable Communities	7. Transportation System Effectiveness

MTC’s performance measure selection and target setting processes are conducted in tandem. Many of the measures and targets in the plan were adapted from stakeholders’ plans (such as Caltrans’ SHSP) following a process in which MTC ensured that measures (a) align with plan goals and (b) correspond with targets that can be forecasted and validated using the agency’s models. Below are the five criteria MTC developed to select individual measures and their corresponding performance targets. The first four criteria apply most directly to the selection of performance measures, while the final criterion reflects the agency’s process of setting targets based on reasonable assumptions and data.

- Targets should be able to be forecasted well using the agency’s models
(Expected performance can be predicted with reasonable accuracy)
- Targets should be able to be influenced by regional agencies in cooperation with local agencies
- Targets should be easy for the general public to understand
- Targets should address multiple areas of interest
(The target should address more than one of the “three E’s” of sustainability)
- Targets should have some existing basis for the long-term numeric goal
(Targets have a basis in literature and analysis and are not arbitrarily determined)

Three additional criteria were established to identify the set of measures and targets:

- The total number of targets selected should be relatively small
- Each of the targets should measure distinct criteria
- The set of targets should provide some quantifiable metric for each of the identified goals

MTC's Ad Hoc Committee on Performance Measures considered more than 90 potential performance targets for inclusion in Plan Bay Area, and ultimately settled on ten that capture the needs of a broad set of stakeholders and, unlike in years past, focus on societal benefits that can be achieved through a combination of transportation and land use policies. As a result of this interdisciplinary, outcome-driven effort, while previous plans were generally structured around traditional transportation measures, Plan Bay Area includes many targets that aim to improve affordable housing, public health, and economic vitality.

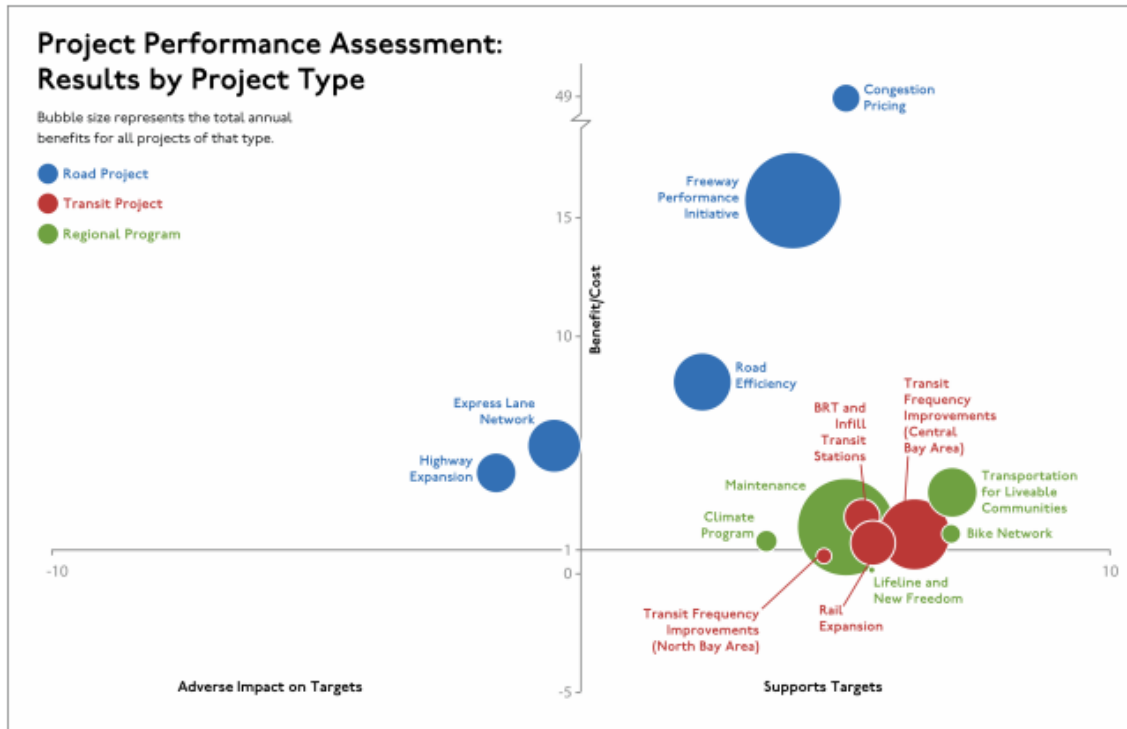
Assessing Performance as Part of Plan Development

As performance-based planning has evolved in the San Francisco region, the utility of the performance measures has expanded. In 2001, performance measures were basic and were only used to assess the various alternative scenarios proposed in the Draft Environmental Impact Review. Over time, the performance measures have taken on a more important role in determining not only preferred scenarios, but also specific investments in individual transportation projects.

The performance-based planning process conducted as part of Plan Bay Area was done in seven key steps:


- 1. Transportation Project Performance Assessment (June-November 2011).** In this phase of the performance assessment, MTC and ABAG first had to develop and adopt performance targets. The setting of targets was based on the region's broad sustainability objectives. Once targets were set, MTC was able to conduct a project level assessment to determine the extent to which individual projects support the regional objectives (qualitative assessment), and to compare projects for cost-effectiveness (quantitative assessment). Once a complete review of projects was complete, MTC developed charts to depict the performance of various projects (and project types), and to select projects for inclusion in the Plan. The figure below shows the benefit/cost and target support findings by project type.

Figure 11-1: Project Performance Assessment Results, incorporating Support for Targets and Benefit/Cost



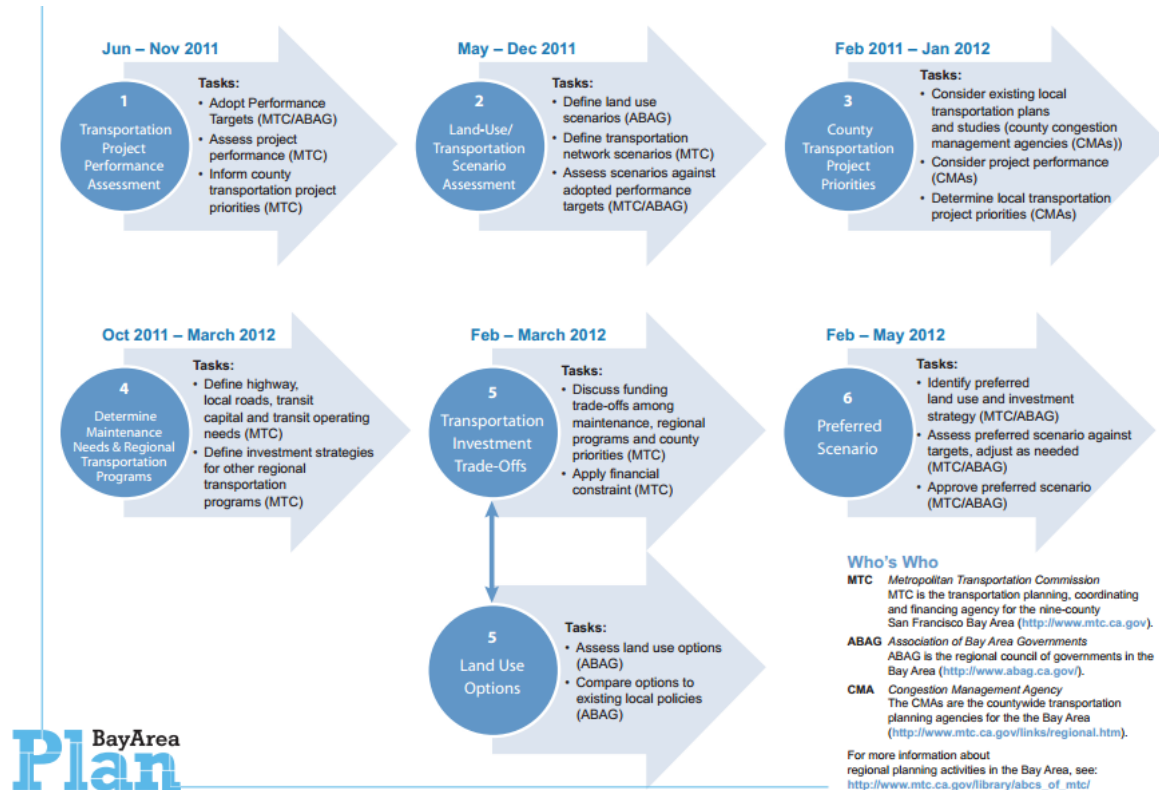
Source: Plan Bay Area Performance Assessment Report, Page 53.

- 2. Land-Use/Transportation Scenario Investment (May-December 2011).** As the project performance assessment was underway, MTC and ABAG developed scenarios to compare varying combinations of investments and land use patterns. The land-use scenarios (developed by ABAG), and the transportation network scenarios (developed by MTC) were assessed against the performance targets to identify where action would need to be taken to meet the adopted targets.
- 3. County Transportation Project Priorities (February 2011-January 2012).** During this phase of assessment, MTC worked with the Congestion Management Agencies (countywide transportation planning agencies) to consider local plans, studies, and project performance, and to determine local project priorities.
- 4. Determine Maintenance Needs & Regional Transportation Programs (October 2011-March 2012).** In determining maintenance needs and regional programs, MTC defined the needs of the highway system, local roads, and transit operating and capital needs. Simultaneously, investment strategies were defined for other regional transportation programs.

- 
- 5. Transportation Investment Trade-Offs & Land Use Options (February-March 2012).** In phase five, MTC discussed transportation funding trade-offs, and applied financial constraints. The performance assessment was used to identify high- and low-performing projects. Because of fiscal constraints, “low performing” projects were subject to a “compelling case process” in which a compelling argument had to be made for why they should be included in the plan. A handful of “low-performing” projects were included in the plan because they were found to provide significant benefits to disadvantaged communities, which supported the region’s equity goals. Also during this phase, ABAG assessed the varying land use options and compared them to existing local policies.
 - 6. Preferred Scenario (February-May 2012).** In the final phase of the assessment, MTC and ABAG together identified a preferred land use and investment strategy, assessed it against targets, and approved a final preferred scenario to align with the targets.
 - 7. Environmental Review and Final Approval (June 2012-July 2013).** After the preferred scenario was selected, it went through a California Environmental Quality Act (CEQA) review to ensure the consideration of reasonable alternatives to the plan. Upon completion of that review, MTC’s board approved the plan.

The figure below presents a flow chart of the first six steps in MTC’s process (prior to the CEQA review).

Figure 11-2: Plan Bay Area Process and Timeline



Source: One Bay Area.

Planning for the Next Long Range Plan

In considering the development of future long range plans, MTC is focused on improving its analysis capabilities and process in three areas.

- ▶ **State of Good Repair (SGR) analysis** – MTC is identifying and pursuing opportunities to do more in-depth analysis related to the condition of its key transportation assets. Because a large percentage (nearly 90 percent) of the MPO’s current budget is spent on maintaining existing systems, having the ability to do greater SGR analysis will allow MTC to better understand the benefits of maintaining existing infrastructure.
- ▶ **Integration of MAP-21 targets** – Like most transportation agencies, MTC is already considering the actions it can take to integrate the targets it sets per MAP-21 requirements into its next RTP. Because the MAP-21 targets will most likely go into effect in 2015-2016, MTC must identify opportunities to align that target-setting process with its RTP process.

- ▶ **Travel model upgrades** – MTC is in the process of upgrading its activity-based travel demand model to better capture information about travel patterns in the Bay Area region. These upgrades will likely include: using smaller travel zones to capture more bicycle and pedestrian trips; incorporating additional information on the road and transit network, which will allow for more detailed analysis of the impacts of suburban growth; and improved benefit-cost analysis to allow for a benefits-cost assessment that spans multiple years throughout the life of the plan.

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What is Notable?

Plan Bay Area's inclusion of performance-based goals and targets make it a model for regional performance-based long range planning.

Effective interagency collaboration in identify performance goals, objectives, and targets. MTC, ABAG, and their partners collaborated to conduct extensive research on the future needs for the region, based on trends related to changing demographics (as baby boomers continue to age, and racial and ethnic diversity increases), a growing population, and an increased demand for transit oriented development. The adopted targets reflect the broad base of stakeholders consulted to select performance measures in Plan Bay Area. Each of the targets included in table 1 includes a source that shows the varying interests reflected in the final set.

Effective integration of regional land use, housing, and equity goals. The seven goals and 10 associated performance targets established in Plan Bay Area are unique because they not only aim to comply with requirements included in SB 375, but they also address the region's broader long-range sustainability objectives (the 3E's: economy, environment, equity). While there is widespread recognition of the overlapping influences transportation, land use, housing, and equity have on each other in shaping regional dynamics and transportation patterns, many agencies have not yet developed regional plans that effectively integrate policies for all of these areas.

Aspirational and realistic targets. Plan Bay Area uses both aspirational and realistic performance targets to express both the magnitude of desired changes as well as likely outcomes based on fiscal constraints. Both types of targets are informative for the general public and decision-makers. As an example, MTC coordinated with the State in establishing the requirement that the Bay Area reduce per-capita CO₂ emissions from cars and light-duty trucks by 15% by 2035 to ensure that struck a balance between being ambitious and realistic.

Attainable scale. One of the most challenging components of developing a performance-based plan is identify and including the right number of performance targets to be achieved. The first criteria that MTC identified for their set of targets was that the "total number of targets selected should be relatively small." Given its extensive analytical capabilities, MTC could have adopted additional performance targets. However, the agency prioritized the need to focus both its and the public's attention on the most important issues.



Case Study: Michigan Department of Transportation – 2035 Long Range Transportation Plan

Background

The Michigan Department of Transportation (MDOT) is responsible for nearly 10,000 miles of highway, over 4,500 bridges, railroad tracks, nonmotorized trails, and four airports.¹⁵⁶ It administers several State and Federal transportation programs and conducts transportation planning for the entire State, including all modes of transportation. MDOT is overseen by the State Transportation Commission, a six-member body appointed by the Governor with responsibility for creating policy for all State transportation programs. The State Transportation Commission is ultimately responsible for the development and implementation of the Michigan’s transportation plan.¹⁵⁷

The MDOT mission is “Providing the highest quality integrated transportation services for economic benefit and improved quality of life.”¹⁵⁸ This is woven into MDOT’s performance-based approach to planning.

A History of Performance-Based Planning

Michigan DOT (MDOT) has a 17-year history of using performance-based approaches to develop programs and manage its investments. MDOT has advanced and expanded its performance-based methods over that period. MDOT’s performance-based planning evolution reflects a focus on accountability to the public, transparency, and strategic investment decisionmaking, especially as transportation needs far outstrip available funds. Performance-based planning at MDOT began in 1997 when the State Transportation Commission set pavement and bridge condition goals with targets for the State’s trunkline highway system. The first system performance measures tracked by MDOT were related to roadway pavement condition, bridge condition, and safety.¹⁵⁹


The next major step in performance-based planning for MDOT was the development of its first performance-based plan in 2005. The *MI Transportation Plan Moving Michigan Forward 2005 – 2030 Long-Range Transportation Plan* (2030 LRP) established goals, objectives, and 19 related core performance measures and seven subordinate measures to allow MDOT to track the State’s progress toward desired plan outcomes. MDOT followed the 2030 LRP with its initial

¹⁵⁶ A Citizen’s Guide to MDOT (2013).

¹⁵⁷ About the State Transportation Commission Webpage (2014).

¹⁵⁸ MDOT Strategic Plan Overview (2010).

¹⁵⁹ 2035 State Long-Range Transportation Plan (2012).



Transportation System Condition Report in 2007 which reports on measures associated with the goal areas of the long-range plan. The report offers a snapshot of progress toward the plan’s goals and is updated semi-annually.¹⁶⁰ In 2010, the Governor of Michigan began the *Mi Dashboard* online feature to provide the public with an easy way to view the performance of the State in several key areas such as economic strength.¹⁶¹ Mi Dashboard includes an Infrastructure Dashboard, which displays performance measure values and a “thumbs up” or “thumbs down” evaluation of progress on each measure. The Infrastructure Dashboard displays transportation-related measures in the areas of safety, mobility, accountability, infrastructure conditions, and economic growth. MDOT began to offer its *Michigan Transportation Scorecard* in 2011 to provide the public with a simple way of understanding performance trends. This scorecard also identified performance targets or desired trends for all of the performance measures. Many of the measures and targets in the scorecard are also in the in-depth, updated *Transportation System Condition Report*. In 2012, the Michigan developed the *2035 State Long-Range Transportation Plan (2035 LRP)* as an update to the 2030 plan. The 2035 plan reaffirmed much of the 2030 plan, and provided a few necessary updates. It retained the performance-based essence of the 2030 plan and incorporated by reference the *Transportation System Condition Report* and the *Michigan Transportation Scorecard*.

Performance-Based Planning at Michigan DOT

Michigan DOT uses performance-based planning and programming as a tool to make the most efficient and effective use of available funds to meet the State’s most critical transportation needs.¹⁶² MDOT recognizes that it needs the public’s confidence in its activities to maintain or increase funding for its programs, and uses performance-based planning to help build that confidence. MDOT has monitored the public’s priorities and needs through regular surveys, referred to as “Attitudes and Perceptions of Transportation.” This helps MDOT ensure that its goals, activities, and investments are aligned with the priorities of the public. Additionally, MDOT provides multiple performance measure dashboards aimed at a public increasingly concerned about government efficiency.


OVERVIEW OF PLAN

MDOT’s focus on communicating with the public extends to its 2035 LRP. The plan is brief (approximately 20-pages long), and provides highlights of MDOT’s transportation planning process

¹⁶⁰ Transportation System Condition Report Webpage (2014).

¹⁶¹ Mi Dashboard Webpage (2014).

¹⁶² FHWA, Performance Based Planning and Programming Newsletter, *Performance Based Planning and Programming in Michigan: Cooperation, Coordination, and Collaboration*.



and its overarching strategic direction and priorities. The plan is presented in a way that is easy for the public to understand, and it contains links to reports and white papers for those readers interested in a more in-depth understanding. Individual modal plans are associated with the LRP, including aviation, freight, and rail.

The brief plan is presented as a revision to the 2030 LRP. It includes the following main sections:

- MI Transportation Plan 2035 Introduction/Overview
- Michigan’s Transportation Challenges
- Continued Support for Components of the Long Range Plan
- Michigan’s Transportation Goals
- Strategies to Achieve the Goals
- Conclusion

The brief 2035 LRP document, in conjunction with the 2030 Transportation Plan: *Moving Michigan Forward*, is considered to be the State’s current long-range plan. When combined with the 2030 LRP and the supporting reports referenced in the 2035 plan, Michigan’s total plan is performance-based. The LRTP is a policy document that provides the overall direction for transportation planning and programming decisions at all levels.


Michigan DOT’s 2035 LRP is supported by more than 30 additional resources. The supporting documents include studies that feed into the LRP, as well as analyses of how the plan will impact Michigan. The supporting resources include white papers on specific modes or issues, such as aviation, regional transportation planning, and intercity bus; relevant planning documents, such as the *Corridor and Borders Report*, a study on transit use in Michigan, and a study of intercity rail; and several studies on the LRP’s impacts on security, environment, and land use.¹⁶³

The supporting materials that are most crucial for the performance-based aspects of the plan are the *Goals, Objectives, and Performance Measures* reports for the 2030 LRP and the 2035 LRP. The white paper for the 2030 LRP defines the plan’s objectives, as well as the 19 core and seven subordinate performance measures. The process and decision criteria for selecting the performance measures are thoroughly documented in the report. The measures are related to the *Transportation System Condition Report* and *Michigan Transportation Scorecard*, both of which provide information on how well the State is performing.

OUTREACH

There was a strong emphasis on public involvement during the development of the 2035 LRP, although less comprehensive than the outreach conducted in the development of the 2030 plan.

¹⁶³ 2035 MI Transportation Plan Technical Report White Papers webpage.



The public participation plan adopted prior to the 2035 LRP process contained fourteen elements, including environmental justice (EJ) outreach and tribal coordination. Meeting locations were arranged based on population centers with EJ groups. Interpreters for Spanish and Arabic were made available. Webinars played an important role during the development process. The stakeholder groups involved in the development of the 2035 plan included committees related to economic development, asset management, Complete Streets, engineering operations, a funding task force, and the Michigan Transportation Research Board. Overall, MDOT conducted interviews with over 2,000 individual households, held three webinars, and executed 15 public meetings for comments on the plan revisions. MDOT strives to ensure that all stakeholders know that MDOT wants to hear from them.

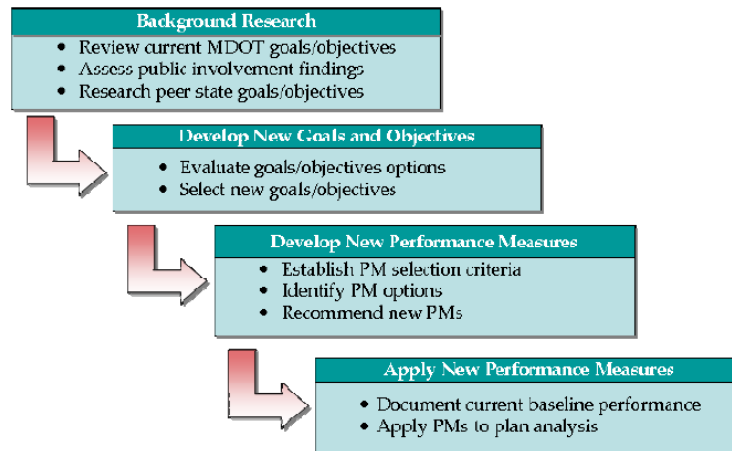
VISIONING

MDOT undertook a visioning process to inform development of the 2030 plan. This visioning process included working with a futurist, EJ outreach, tribal coordination, and other activities. The futurist was brought in to help convey what the region will look like over the next 50 years. The visioning process included the use of scenario planning where scenarios were developed around different potential futures. Three potential future scenarios were built based on a theme: high oil prices, agrarian-focused economy, and system modernization. Stakeholders examined which transportation strategies would be used in each of these cases and found that maintaining the transportation assets or infrastructure was a common strategy that would be necessary in each of the imagined futures. This helped the planners to identify asset management as priority investment area.

GOALS AND PERFORMANCE MEASURES

The process for developing goals, objectives, and performance measures for 2030 LRP followed four basic steps. The four steps are illustrated in the diagram below from the 2030 LRP *Goals, Objectives, and Performance Measures Report*. The goals, objectives, and performance measures of the 2030 LRP were included by reference into the 2035 LRP, an update of the previous plan. The figure below shows the process that MDOT used to develop goals, objectives, and performance measures in the 2030 LRP.

Figure 11-3: Michigan DOT Performance Measure Development Process



Source: Michigan DOT, 2005-2030 Goals, Objectives, and Performance Measures Report (2006).

Michigan's 2035 LRP has four goal areas that were retained from the 2030 LRTP:

- System Improvement
- Efficient and Effective Operations
- Safety and Security
- Stewardship (includes system preservation, environmental protection, and fiscal responsibility)

Each goal has at least one objective for each element of the MDOT mission statement: integration, economic benefit, and quality of life. These three categories were intentionally chosen to provide a tight link between the State's long-range plan and the agency's mission statement.

The goals in the LRP were developed with the help of a Customers and Providers Committee working with MDOT staff to review and reassess the goals of the previous State transportation plan. In addition, current and emerging agency priorities, MDOT's mission, Federal planning factors, and the preferred public vision were taken into account. The MDOT Performance Measures Sub Team, a subset of the larger Michigan Transportation Plan Team, led the drafting of objectives for each goal. The team developed a simple strategic framework of goals and objectives that had the minimum number of goals and objectives that could still capture the State's direction for transportation improvements. As an example, the objectives for the goal of system improvement (as shown in the 2030 *Goals, Objectives, and Performance Measures Report*) are listed below:


Table 11-3. Recommended objectives for the 2030 LRP for reaching the plan’s goal of system improvement

Objective Category	Objectives
Integration	3.1 Expand intermodal connectivity and the number of modal options for freight and passengers.
	3.2 Address system bottlenecks and weaknesses to reduce congestion, enhance continuity, and improve modal connections.
Economic Benefit	3.3 Improve travel time reliability and predictability for passengers and freight.
	3.4 Modernize facilities to accommodate the efficient movement of people, goods, and services.
	3.5 Address congestion to reduce its cost to businesses and the state’s economy.
	3.6 Respond to the unique transportation needs of economic development opportunities.
Quality of Life	3.7 Expand transportation system access.
	3.8 Reduce delay.
	3.9 Employ context sensitive solutions to respond to the values that the public places on aesthetics, cultural resources, and natural landscapes.

Source: Michigan DOT, 2005-2030 Goals, Objectives, and Performance Measures Report (2006).

The MDOT Performance Measures Sub Team established 11 criteria to evaluate potential performance measures. These criteria were used to develop a “short list” of 36 potential performance measures. As outlined in the *2030 Goals, Objectives, and Performance Measures Report*, the criteria for short-listing a performance measure were:

- Current measure used by MDOT
- Data availability
- Analytic capability – MDOT’s capacity to conduct the data analysis necessary for the measure
- Clarity
- Public interest
- Control/causality – MDOT’s ability to impact the measured aspect of performance
- Value of measure in communicating something of importance to the public, stakeholders, and staff
- Ability of measure to support decisionmaking
- Use as an accountability tool
- System-wide or Statewide applicability
- Corridor level applicability



To narrow the pool of performance measures, the MDOT team developed a list of the top seven criteria:¹⁶⁴

1. Is the measure currently used by MDOT?
2. Is the measure in the current state long-range plan?
3. Does the measure indicate the level of achievement toward *MI Transportation Plan* goals?
4. Does the measure focus on one or more of the plan's emphasis areas – integration, economic benefit, and quality of life?
5. Do the measures adequately address a cross section of modes?
6. Is high quality data readily available to support the measure?

To be selected, a measure needed the following characteristics: data to support it, public interest in the measure, control by the State in affecting the measure, value in reporting on the measure, supported decisionmaking, and enhanced accountability. In the end, 19 core measures were included in the plan, with seven subordinate measures. The measures did not correspond one-to-one with the plan objectives and were instead organized as “overarching” or by mode. Baseline values were provided in the *Goals, Objectives and Performance Measures report* for as many measures as possible.

Since the development of the performance measures for the 2030 LRP, MDOT has developed a revised set of performance measures to broaden its view of the transportation system to include level of service, airport condition, transit fleet condition, and passenger rail service levels. These measures are documented in the 2010 Transportation System Condition Report that is updated on a semi-annual basis and is now titled the *Transportation System Measures Report*. In the report, the measures are directly associated with the LRP goal areas. The measures were developed internally to MDOT and focused on those measures that could be evaluated with existing sources of data. MDOT anticipates that the measures will change over the years, but will continue to ensure that the performance measures are aspects of performance that are supportive of the LRP goals.

TARGETS

During MDOT's evolution of performance-based planning, it established targets or “aims” for each of its measures as part of the *Transportation System Measures Report* referenced in the 2035 LRP. As an example, one aim in the report is to “Sustain 85% of all non-freeway bridges on the trunkline system in good or fair condition.”¹⁶⁵ The measures report includes safety performance targets from Michigan's Strategic Highway Safety Plan, such as “Reduce fatalities and serious injuries from

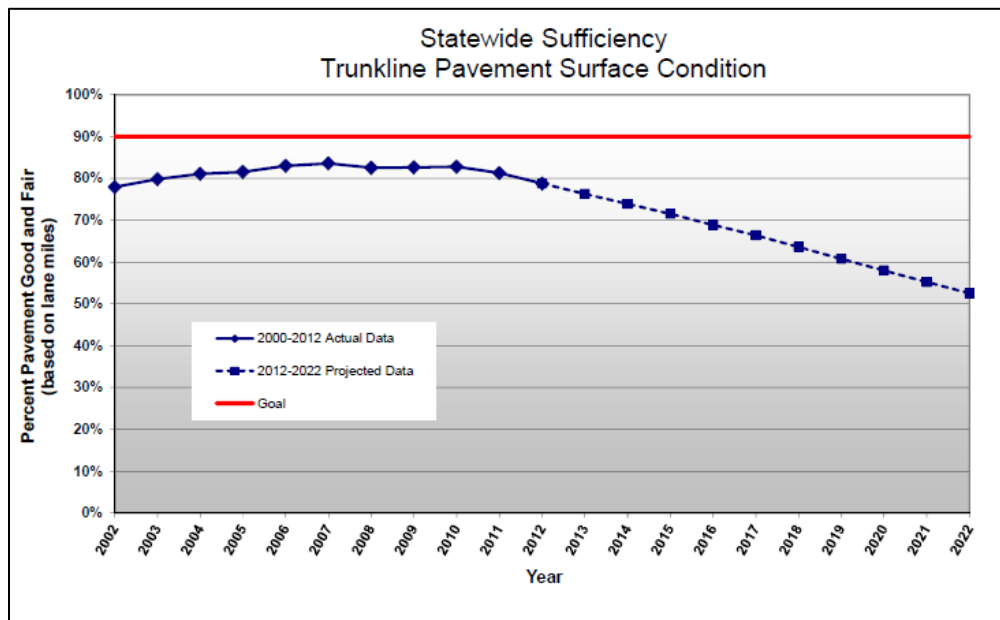
¹⁶⁴ MDOT, 2005-2030 Goals, Objectives, and Performance Measures Report (2006).

¹⁶⁵ MDOT, 2013 System Performance Measures Report (2014).

889 and 5,706 in 2011 to no more than 750 and 4,800 in 2016. This equates to a 3.4% reduction per year.”¹⁶⁶

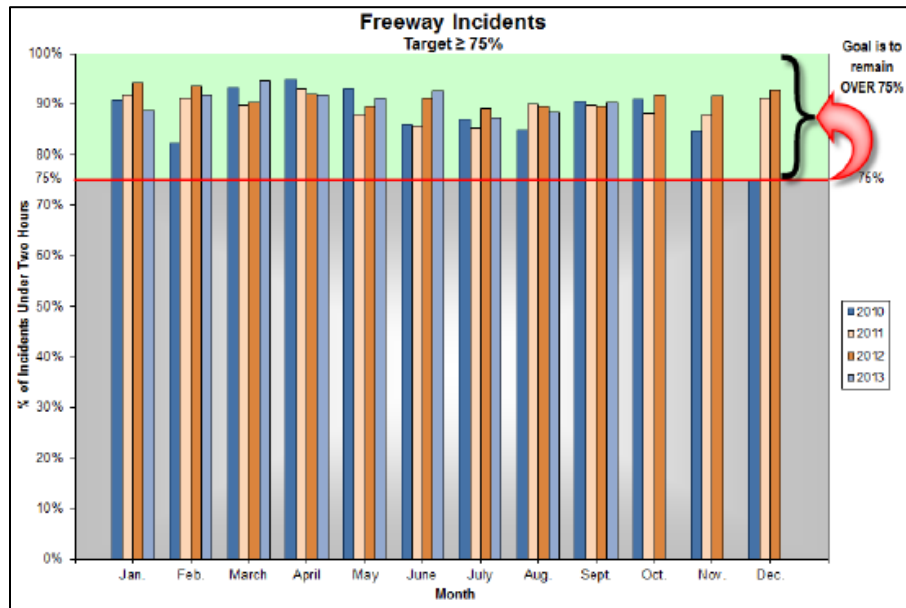
MDOT also graphically displays performance trends for most performance measures in comparison to the target performance levels. Two example graphs are shown below from the 2013 *Transportation System Measures Report*. The line graph illustrates the past, current, and projected future levels of pavement surface condition against the 90% target for that measure. The bar chart shows the percent of freeway closures due to incidents that were under 2 hours. The chart clearly indicates how well the State is performing against the 75% goal.

Figure 11-4. Sample Displays of Performance Trends in Relation to Targets from Michigan DOT



Source: Michigan DOT, 2013 System Performance Measures Report (2014).

¹⁶⁶ MDOT, 2013 System Performance Measures Report (2014).



Source: Michigan DOT, 2013 System Performance Measures Report (2014).

INVESTMENT DECISIONS

During the 2030 LRP development, MDOT performed an investment scenario analysis to identify the level of funding that would be needed to achieve the plan's visions. The four scenarios established in the 2005-2030 State Long-Range Plan were:

- ▶ "Business as Usual" - Funding levels remain as anticipated and relative allocations across program areas stay the same.
- ▶ "Change the Mix"- Assumes the same funding levels as anticipated, but shifts funding from preservation to multi-modal and modernization programs.
- ▶ "Move Ahead"- Provides for 16% additional revenue which is allocated to multi-modal preservation and highway modernization programs.
- ▶ "Flexible New Revenue"- Increases State transportation revenues by 42% over 25 years.

MDOT examined the economic and performance impacts of four investment scenarios and identified the investment levels needed to achieve the plan's vision.

In the 1990s, MDOT was able to successfully make the case to the public for a gas tax increase by illustrating how the State would not be able to meet targeted performance levels for bridge and pavement conditions in the future given the existing level of revenue.¹⁶⁷

PERFORMANCE MONITORING

There are several opportunities for the public, stakeholders, and MDOT staff to obtain up-to-date performance information on a wide range of performance measures. One such example is the already-mentioned *Transportation System Measures Report*.

The *MiScorecard Performance Summary* is updated regularly and reports on the status of 32 performance measures that provide a thorough picture of both MDOT's organizational performance as well as transportation outcome measures including those in the areas of safety, asset condition, and mobility. The scorecard provides directional or numeric targets for each measure, a color code to indicate how close they are to meeting the target, and whether progress was made toward the target since the last reported measurement.

The Infrastructure Dashboard contains an overlapping set of performance measures using same indicator format as *MiScorecard*. It is focused on the performance areas of safety, condition, mobility, economic growth, and accountability for a wide variety of infrastructure elements: highways, bridges, transit, dams, rail, waterways, and borders.

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¹⁶⁷ Interview, Susan A. Gorski, Section Manager, Statewide & Urban Travel Analysis Section, Michigan Department of Transportation, March 18, 2014.

What is Notable?

As documented in the 2012 *Corridors and International Borders White Paper*, Michigan DOT's Corridors and Borders program provides for detailed performance measurement along 17 corridors around the state. These are important corridors for commuting, trade, and interstate travel. A corridor is considered to be a 20-mile wide area around a major highway in metropolitan and nonmetropolitan areas. The focus on Corridors of Highest Significance help provide an integrated network of major routes important to the State's economic recovery goals.

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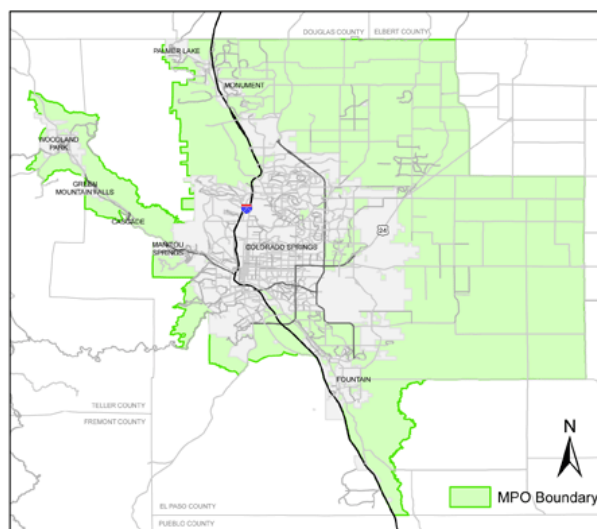
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Case Study: Pikes Peak Area Council of Governments – Moving Forward Update 2035

Background

The Pikes Peak Area Council of Governments (PPACG), the MPO for the greater Colorado Springs, CO region, has 16 member governments representing 3 counties and 13 municipalities. As a regional planning agency PPACG helps coordinate local planning efforts between cities, towns, and counties in the region. PPACG’s regional transportation plan developed in cooperation with two counties and seven municipalities. The most recent plan, the *Moving Forward Update 2035* Regional Transportation Plan, is an update of the previous plan, *Moving Forward*, and was approved by the MPO Board in 2012. The *Moving Forward Update* is the region’s first RTP to incorporate performance-based elements. In its planning process, PPACG solicited input from a much broader variety of stakeholders and the public than previous plans.




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Developing the Plan

To solicit input for the plan, PPACG drew from the expertise of a Technical Advisory Committee and a Community Advisory Committee, as well as agencies and other plans to ensure the alignment of regional goals. The *Moving Forward Update* was developed through 10 key steps:

1. Establish the Foundation for Decision Making: Development of a Vision, Mission and Principles
 - Each of the advisory committees reviewed PPACG’s vision, mission, and principles and made some minor changes from the last update in 2008.
2. Develop Transportation Goals and Performance Measures
 - Through workshops, stakeholders identified their key issues and expressed desired goals and measures. This resulted in 17 goals, of which 8 were not overtly transportation goals and came primarily from new participating agencies. PPACG then used additional public involvement techniques, such as focus groups and attendance



at numerous community events such as 4th of July Parades, and farmers markets to increase input on the goals and measures.

3. Gather Baseline Conditions

- The PPACG transportation team obtained data assembled from local, State and Federal agencies, along with many feasibility and environmental studies conducted in the region. The team then identified data needs for evolving the agency's knowledge of investment types, locations, and impacts.

4. Define Evaluation Criteria and Assign Weighting

- PPACG developed criteria to evaluate projects relative to each Goal. PPACG then created a customized Multi-Criteria Analysis (MCA) process to assist the decision-makers in evaluating the relative importance of each goal in relation to the other goals. Input for this process was obtained from the Technical Advisory Committee, including State and Federal resource and regulatory agencies, the Community Advisory Committee, and a random dial telephone survey. The results of this effort were every goal was ranked as most important and every goal was ranked as least important (even safety). The final Board-approved weighting reflected the average views of the approximately 8 paradigms of citizens in the region. Limitations to the approach were identified to be addressed in future planning cycles.

5. Develop Regional Modeling System

- PPACG located, populated, and adapted tools to evaluate the impact of growth and investments in the region. The list of these and their use are:
 - TELUM: A free tool that develops a neutral, quantitative, forecast of socio-economic growth in the future.
 - CommunityViz: An inexpensive GIS extension that develops additional socio-economic growth scenarios to bracket future growth possibilities and minimize the risk of making inefficient investments due to changed growth patterns.
 - HERS-ST: A free tool that forecasts and prioritizes individual and regional roadway maintenance needs and outcomes at different levels of investment.
 - PPACG TDM: A 4-step travel demand model that can quickly forecast changed conditions due to individual and grouped transportation project implementation.
 - PPACG CMP: A traffic corridor analysis tool used to examine existing and forecast future intersection congestion levels as part of the Congestion Management Process.
 - Vista: A free GIS extension that conducts advanced spatial analysis of habitat and conservation analysis and can support adaptive management of sites and alternatives.

- N-SPECT: A free tool that forecasts changes in water quality and runoff quantity conditions based on changes in climate, land use, and land cover.
- MOVES: A free tool that estimates air pollution emissions from on-road mobile sources.
- TNM: A free tool that is used for predicting noise impacts in the vicinity of roadways.

6. Create Preferred Planning Scenario

- Using a facilitated process, three (trend, in-fill, and conservation) alternative future socio-economic scenarios were developed. These scenarios were then evaluated using the PPACG modeling tools against the adopted goals and by staff from participating agencies to identify issues with their goals and plans. An interesting outcome was that the conservation scenario was also the “sprawliest” scenario due to leap frog development. A second workshop was held to work through minimizing serious conflicts and maximizing synergistic positive impacts. A “preferred” land use scenario that best aligned all participating agency priority goals and accomplished some secondary goals was developed.

7. Evaluate and Score Projects


- Project scoring was discussed with project applicants and potential scoring process and criteria adjustments were considered. The board-approved goal weightings were used to show the relative importance of each goal. Staff scored each submitted project using the modeling tools for three scenarios (preferred, in-fill, conservation/sprawl) and found that 75 percent of the top-scoring projects were top-scoring regardless of which scenario was employed.

8. Create a Fiscally Constrained Project List

- The PPACG plan participants used the scores and financial plan to create a fiscally constrained project list – although some changes in priority were made to take into account allowable uses of funding. The agency also considered how to enhance flexibility and target known problem areas. This list was approved with some modifications by the Board of Directors.

9. Identify Methods to Minimize and Mitigate Undesirable Impacts

- PPACG utilized a Green Infrastructure approach to meet the requirement of identifying strategies to mitigate negative impacts from transportation investments. This effort was made easier due to having tools that can to some degree analyze the magnitude of both negative impacts and mitigation efforts. PPACG contracted with the Conservation Fund to hold a three-day workshop that examined the economic, ecologic, and social benefits of making green infrastructure type investments through the watersheds in the MPO area. PPACG also involved the adjacent, downstream, Pueblo MPO staff for development of this Green Infrastructure plan because they



share the watersheds that the plan is based in. Staff emphasized that further refinement of this plan to ensure context sensitive solutions is necessary in future planning cycles.

10. Ongoing Monitoring of the Moving Forward Update 2035 RTP

- PPACG evaluated monitoring techniques and sought public input on them. The agency has identified monitoring techniques as an area with high potential for future improvement. The monitoring effort led to consolidation/removal of some goals that cannot reliably be evaluated or were exceptionally controversial. For the 2040 Moving Forward Update PPACG has reduced the number of goals from 17 to 13.

Interagency Collaboration

PPACG put considerable effort into recruiting non-transportation agency stakeholders. This recruitment included writing formal invitation letters to the agencies to help support and justify their participation within their agency. In order to create a more collaborative environment, PPACG contracted with the US Institute for Environmental Conflict Resolution to teach a course to participants on methods for effective collaboration. In addition, PPACG contracted with a professional facilitator to improve workshop productivity. This was especially useful as conflicting goals and desires were identified from the participating agencies. These participating agencies included State and Federal resource and regulatory agencies (Environmental Protection Agency, US Army Corps of Engineers, US Fish and Wildlife Service, US Forest Service, Bureau of Land Management, State Historic Preservation Office, Colorado Department of Wildlife, Colorado Department of Public Health and Environment) along with local and private agencies that make investments or decisions that impact or are impacted by transportation investments, such as municipal planning departments, the Area Agency on Aging, the County Health Department, the regional Chamber of Commerce, school districts, local housing authorities, etc. A valuable tertiary outcome of this process was a much more informed set of stakeholders regarding other agency goals and trade-offs between alternative investments.

Adopting a Planning Framework

In developing the *Moving Forward Update*, PPACG used the TCAPP (now PlanWorks) planning framework to identify what needed to be achieved through the regional plan and how those objectives would be reached. The framework includes the following items:

- ▶ Vision, Mission, and Principles
- ▶ Goals and Performance Measures
- ▶ Project Evaluation Criteria

▶ Weighting of Evaluation Criteria

GOALS AND PERFORMANCE MEASURES

The goals and performance measures were developed to outline and guide the desired outcome of investment decisions, and also to evaluate various systemic options. The formulation of the goals drew from existing plans (transportation and other participating agency) and the performance measures were designed to meet the following three criteria:

- ▶ Consistent data is likely available or can be obtained to facilitate analysis
- ▶ The measure can be applied at system, corridor, and project levels
- ▶ The measure is quantitative in nature

To come to a consensus on a final consolidated list of goals and corresponding objectives and performance measures, PPACG held four workshops/focus groups with regional stakeholders to develop an initial list. Once the Board reviewed the initial set of goals and performance measures, it was released for public comment in 2010. After receiving approximately 70 comments on the draft list, PPACG held a fifth workshop to refine and finalize the list. The MPO Board approved a final set of 17 goals, each of which has a number of corresponding performance measures and SMART (specific, measurable, agreed-upon, realistic, time-bound) objectives. Because the objectives are SMART, they contain performance targets, which are broken down by different time periods (by 2015, by 2025, and by 2035). The first three goals, corresponding objectives for 2015, 2025, and 2035, and performance measures are presented in the following table.

Table 11-4. Selection of goals, objectives, and performance measures from the *Moving Forward Update*

Goal 1: Maintain or improve current transportation system infrastructure
<p>Objectives</p> <p><u>By 2015</u></p> <ul style="list-style-type: none"> • Verify baseline for comparison • Maintain current condition w/ 0 degradation from a 2007 baseline <p><u>By 2025</u></p> <ul style="list-style-type: none"> • Improve conditions by 5% from 2007 baseline <p><u>By 2035</u></p> <ul style="list-style-type: none"> • Improve conditions by 10% from 2007 baseline
<p>Performance Measures</p> <ul style="list-style-type: none"> • % of surface condition lane miles for roads and non-motorized facilities in good/fair condition • % of person miles and freight miles traveled on roads in good/fair conditions • # of bridges w/ an index/sufficiency rater of 50 or higher • Age and/or mileage of transit vehicles • Traffic control operations
Goal 2: Improve the operation of transportation systems & services to enhance emergency response, minimize travel times & maximize service quality of all modes of commercial & private travel throughout the region

Objectives

By 2015

- Establish baseline for comparison
- Maintain commercial vehicle and auto per capita travel time at 2005 levels
- Increase the # of transit routes with a headway (time between buses) of 60 minutes or less by 15% and implement signal preemption for buses
- Utilize demand management strategies to reduce peak hour travel by 10% from 2005 levels

By 2025

- Maintain commercial vehicle and automobile per capita travel time at 2005 levels
- Increase the number of transit routes with a headway (time between buses) of 60 minutes or less by 25% and implement signal preemption for buses
- Reduce transit and non-motorized travel time by 20% from 2005 levels
- Utilize demand management strategies to reduce peak hour travel by 20% from 2005 levels

By 2035

- Maintain commercial vehicle and automobile per capita travel time at 2005 levels
- Increase the number of transit routes with a headway (time between buses) of 60 minutes or less by 35% and implement signal preemption for buses
- Reduce transit and non-motorized travel time by 30% from 2005 levels

Performance Measures

- Average transit travel time to work
- # of routes with headway of 60 minutes or less
- Travel times during peak travel hours for autos, trucks, non-motorized travel, & transit
- Travel times during off-peak travel hours for autos, trucks, non-motorized travel, & transit

PROJECT EVALUATION CRITERIA & WEIGHTING

Using the goals and SMART objectives containing performance targets, PPACG, with input from the participants, established a set of evaluation criteria for inclusion in the plan to structure the assessment of all projects under consideration. One evaluation criterion was established per goal.

With such a large number of criteria, PPACG needed a weighting system to reflect and emphasize the relative importance of each criterion for the region's transportation system. Both the Transportation and the Community Advisory Committees engaged in a ranking exercise, as did the public (via a phone survey), and the result was an average ranking for each criterion that was adopted by the MPO Board. A table showing the plan's goals, associated evaluation criteria, and adopted criteria weight values is presented below.

Table 11-5. *Moving Forward Update* Goals, Evaluation Criteria, and Evaluation Criteria Weight Values

Goal	Evaluation Criteria	E.C. Weight Value (Rank)
1. Maintain or improve current transportation system infrastructure	Transportation System Condition Preservation and Rehabilitation	9.5 (1)

2. Improve the operation of transportation systems & services to enhance emergency response, minimize travel times & maximize service quality of all modes of commercial & private travel throughout the region	Regional Mobility Improvement or Regional Congestion Reduction	7.8 (3)
3. Invest transportation funding within categories towards those projects/programs that have the highest life-cycle cost-effectiveness	Cost Effectiveness	7.2 (5)
4. Improve system connectivity and accessibility by completing connections within and/or between modes	System Connectivity	8.1 (2)
5. Improve safety for all travelers	Safety	7.6 (4)
6. Increase security of the transportation system by implementing secure transportation improvements and securing existing transportation facilities	Security	4.3 (16)
7. Increase opportunity for all travelers, including special needs and protected-class travelers, to choose methods of travel other than single occupant motor vehicles	Multimodal Use	6.2 (6)
8. Decrease the gap between funding needed to achieve the transportation plan goals, and funding currently available to invest in the transportation system	Private Partnership	5.0 (11)
9. Ensure transportation system investment benefits are equally distributed to citizens with disabilities, low incomes, and other special needs residents in the region	Environmental Justice	5.1 (10)
10. Reduce transportation-related adverse impacts to communities, neighborhoods, and rural areas identified for cultural, environmental, and/or historical preservation	Adverse Transportation Impact Reduction	4.6 (14)
11. Improve economic competitiveness of the region by enhancing the transportation system	Economic Vitality	5.7 (8)
12. Use transportation investments to incentivize infill in, and redevelopment of, existing communities	Infill/Redevelopment	4.4 (15)
13. Improve, protect and mitigate impacts of critical habitat and connecting corridors suitable for threatened, endangered, and imperiled species	Protect Wildlife Habitat	4.9 (12)
14. Minimize the amount of stormwater runoff and transportation-associated pollutants that enter the region's streams	Protect Streams and Reduce Stormwater Runoff	5.2 (9)
15. Reduce absolute regional transportation-related GHG emissions	GHG Emissions	3.5 (17)
16. Attain existing and future national air quality health standards	CO Reduction	4.9 (13)
17. Communicate and collaborate within and between interests and jurisdictions during development of plans and programs in order to improve the efficiency and effectiveness of decision-making in the Pikes Peak Region	Regional Collaboration	6.0 (7)

What's Next?

PPACG is currently in the process of developing its 2040 Regional Transportation Plan. Similar to the 2035 plan, the 2040 RTP will include a set of broad goals for the region's transportation system, and the goals will be accompanied by performance measures and SMART objectives. In early 2014, PPACG adopted the 13 goals with one to three performance measures per goal. These 13 goals align almost exactly with goals 1-6 and 9-14 in the table above. While there is some variation in the performance measures associated with each goal, the broad objectives of each are similar to those from the 2035 plan.

Three significant differences between the goals and performance measures included in the 2035 plan, and those that have been released in draft form on PPACG's website, are an absence in the 2040 materials of job and housing-related measures, metrics that target the prevalence of bike/ped infrastructure, and measures that assess transportation funding gaps. Under the 2035 RTP's goal seven, performance measures targeted transit-oriented development, mode share, VMT, bicycle and pedestrian level of service and infrastructure, and vehicle occupancy. Goal eight's measures assessed funding opportunities and public-private partnerships (PPPs). Under goal 11, which still exists in the most recent 2040 draft goals, there is no longer a performance measures that addresses job growth in the region.

There has also been an emergence of new performance measures in the 2040 draft, including the use of the Planning Time Index to measure improved system operation; a non-motorized System Connectivity and Accessibility Index as well as a measure of transit ridership increase to measure improved system connectivity and accessibility; and injury and fatality metrics (rather than crash rates) to assess safety.

What is Notable?

Short-, mid-, and long-term objectives. Although setting targets for 15-20 years in the future is important, setting interim targets ensures that the region is on track to meet its goals, and allows for an agency to rethink long-term objectives.

Developing a baseline. PPACG has listed as its first objective for each goal the development of a baseline for comparison by 2015. This is a necessary step for any performance-based planning because it enables the agency to track progress through time.

Broad collaboration. PPACG undertook a significant amount of collaboration, in addition to the inclusion of the public's input. One particularly notable example of collaboration was PPACG's efforts to gather public input on the assignment of relative weights to the evaluation criteria. As noted above, PPACG conducted a weighting exercise with both Advisory Committees, and then conducted a statistically-valid random phone survey to query the public on how they would rank the importance of each evaluation criteria. The final weights were an average of the responses from all three groups.



Pikes Peak Area Council of Governments

Pikes Peak Area Council of Governments, Moving Forward Update.

<http://www.ppacg.org/programs/transportation>.

Pikes Peak Area Council of Governments, Regional Bicycle/Pedestrian Traffic Count Program.

<http://ppacg.org/transportation/bike-ped-counts>.

Pikes Peak Area Council of Governments, 2013 Annual Report.

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North Central Pennsylvania Planning and Development Commission: Case Study on Connecting Planning and Project Prioritization

PROJECT PRIORITIZATION PROCESS

The following is an excerpt from the North Central Pennsylvania Planning and Development Commission's (North Central) project prioritization process showing the use of performance data in project selection by a rural planning organization.

IDENTIFYING PROJECT SELECTION CRITERIA AND WEIGHTING

North Central facilitated an interactive process with its partners in developing project selection criteria for both its transportation planning program (under the auspices of the LRTP), and economic/community development.

Methodology

Members of the Project Prioritization Committee began meeting in December 2008 and continued throughout 2009 in developing selection criteria and elements of the regional core system. Samples from existing transportation and economic/community development projects were used in determining and evaluating the merits of various selection criteria. Beyond the identification and weighting of criteria, the Project Prioritization Committee serves as a steward of the Regional Action Strategy (RAS), monitoring implementation and involved in the evaluation of candidate projects of regional significance. Guiding principles throughout the project included creating a new process that would be intuitive and easy to use.

Recognizing that not all criteria necessarily convey the same level of importance, the next step in the process was to identify a preferred weighting for each project selection criterion. As part of identifying recommended weighting, PennDOT offered North Central the use of a dynamic, group-enabled software called Decision Lens. The software has been developed to improve capital resource planning and decisionmaking. PennDOT in fact has already begun using the tool as part of the most recent update of its Interstate Maintenance (IM) Program. The Decision Lens software subjected each proposed criterion to rigorous pairwise comparisons, or "judgments," which yielded more meaningful and candid results. Members of the Project Prioritization committee were able to vote anonymously on the criteria before discussing the initial results. The results of the committee's deliberations with regard to both criteria development and their subsequent weighting are described in the tables that follow.

A Microsoft Access database was developed to track projects and to apply a recommended weighting to candidate projects as they are data entered and “scored” as part of their evaluation.

Transportation

There are various types of transportation projects that compete for discrete transportation funding “buckets”. These range from highway capacity-adding projects to more non-traditional projects such as Transportation Enhancements. Recognizing the nature of these funding silos, North Central sought to identify selection criteria for each transportation project type against six major categories, as shown in Table 11-6 below. A summary of each project type, including their associated criteria and recommended weighting, follows.

Table 11-6. Transportation Project Type Descriptions (North Central PA)

Project Type	Description
Highway Restoration	This includes projects such as repairs or rehabilitation to extend the life of the existing roadway, which could include resurfacing, concrete rehabilitation, base repair, drainage improvements, and shoulder stabilization. Depending on the condition of the pavement, drainage and sub-base, it could involve complete reconstruction. (It does not include any addition of highway lanes.)
Highway/New Capacity	This includes projects such as the construction of roadways, interchanges or bridges on new alignment, or widening to existing roadways resulting in the addition of lanes.
State Bridges > 8 feet	This includes projects such as the rehabilitation or replacement of an existing state-owned bridge to remove a deficiency, or systematic preventive maintenance activities to maintain a bridge in good condition.
Local Bridges > 20 feet	This includes projects such as the rehabilitation or replacement of an existing local bridge to remove a deficiency, or systematic preventive maintenance activities to maintain a locally-owned bridge in good condition.
Safety	These are stand-alone projects to address specific safety issues. This may include projects to eliminate sight distance problems at intersections, correction of hazardous curves, projects that improve pedestrian safety and other projects that address areas with high accident rates or crash clusters.

Project Type	Description
Transportation Enhancements	These projects include bicycle lanes, sidewalks, and trails and shared use pathways that improve accessibility and mobility for bicycles and pedestrians; scenic beautification, wayfinding signage, welcome centers, transportation museums, historic preservation, streetscapes, and other related projects.

Source: Gannett Fleming, Inc.

Highway Restoration Criteria and Weighting

This is the most common project type that North Central administers as part of its rural transportation planning program. In developing selection criteria, North Central decided to weigh future highway restoration projects against their position on the region’s highway network; traffic volumes; surface conditions; percentage of trucks, and the latest date the roadway in question was resurfaced.

Of the five criteria established for this project type, North Central has weighted the candidate project’s relationship to the Core System, along with existing surface condition, as the two most important considerations in evaluating candidate projects. This generally means that North Central will be prioritizing roadway improvements toward the highest-order roadways in the region, on the primary roadways that connect the region’s economic centers and priority investment areas such as KOZ sites and highway interchanges. **Table 11-7** shows the various elements of the Highway Restoration criteria and related weightings in more detail.

Table 11-7. Highway Restoration Criteria and Weighting

Project Criteria	Rating	Guidelines	Weighting
What <u>Network</u> is the project on?	1	Other State Routes (or non-network)	31%
	5	Access to KOZ or other Regional Investment Areas	
	5	Access to DCNR Investment Area (priority recreational routes/green segments)	
	10	Core System (priority transportation routes/red segments)	
What is the AADT?	1	< 2,000 vehicles per day	12%
	5	2,000 – 4,999	
	7	5,000 – 9,999	
	10	10,000 +	
What is the IRI?	1	< 150 inches per mile	31%
	3	150 - 199	
	5	200 - 299	
	10	300 +	

Project Criteria	Rating	Guidelines	Weighting
Percentage of Trucks	1	< 5 percent	14%
	5	5-10 percent	
	10	> 10 percent	
Resurfacing Date	1	< 10 years	12%
	5	10-20 years	
	10	20+ years	

Source: Gannett Fleming, Inc.

Highway/New Capacity Criteria and Weighting

New capacity projects are much less common, but much more visible and carry a higher profile in comparison to highway restoration jobs. In the future, North Central will be putting a greater emphasis on new capacity-adding projects that support business retention and growth. North Central will be evaluating future capacity-adding projects in relation to location within the region’s highway network; effectiveness (in terms of how well the project addresses existing or anticipated conditions); support of business growth; percentage of trucks; and the project’s overall value for dollar spent.

Of the five criteria established for this project type, North Central has weighted the candidate project’s ability to support business retention and expansion as the primary criterion for considering these types of projects. **Table 11-8** shows the various elements of the Highway/New Capacity criteria and related weightings in more detail.

Table 11-8. Highway/New Capacity Criteria and Weighting

Project Criteria	Rating	Guidelines	Weighting
What <u>Network</u> is the project on?	1	Other State Routes (or non-network)	19%
	5	Access to KOZ or other Regional Investment Areas	
	5	Access to DCNR Investment Area (priority recreational routes/green segments)	
	10	Core System (priority transportation routes/red segments)	
Project Effectiveness	0	Project fails to address existing conditions/problems	22%
	5	Project addresses most of existing or anticipated conditions/problems and improves mobility/reduces congestion	
	10	Project effectively addresses existing or anticipated conditions/problems and provides a significant improvement in	

Project Criteria	Rating	Guidelines	Weighting
		mobility/reduces congestion	
Supporting Business Retention & Growth	0	Does not support existing business/industry	30%
	10	Supports existing or emerging business/industry and/or development of entrepreneurs/new enterprise	
Percentage of Trucks	1	< 5 percent	8%
	5	5-10 percent	
	10	> 10 percent	
Cost Factors	1	High cost/requires additional dollars to the TIP (e.g., "spike" funds)	21%
	5	Medium cost/some additional dollars plus TIP	
	10	Relatively low cost/Can be afforded within the TIP	

Source: Gannett Fleming, Inc.

Appendix: Federal Requirements for Transportation Plans

Below is text from Moving America for Progress in the 21st Century (MAP-21) focusing on metropolitan and statewide transportation plans and use of a performance-based approach within the planning process. Key elements relative to a performance-based approach are noted in **bold** for emphasis. Other parts of law discuss the broader the metropolitan and statewide and nonmetropolitan transportation planning process, including other process-related requirements.

Metropolitan Transportation Plan

SEC. 1201. METROPOLITAN TRANSPORTATION PLANNING.

(a) In General.--Section 134 of title 23, United States Code, is amended to read as follows:

“Sec. 134. Metropolitan transportation planning

“(h) Scope of Planning Process.--

“(1) In general.--The metropolitan planning process for a metropolitan planning area under this section shall provide for consideration of projects and strategies that will--

“(A) support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;

“(B) increase the safety of the transportation system for motorized and nonmotorized users;

“(C) increase the security of the transportation system for motorized and nonmotorized users;

“(D) increase the accessibility and mobility of people and for freight;

“(E) protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;

“(F) enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;

“(G) promote efficient system management and

operation; and

“(H) emphasize the preservation of the existing transportation system.

“(2) Performance-based approach.--

“(A) In general.--The metropolitan transportation planning process **shall provide for the establishment and use of a performance-based approach to transportation decisionmaking to support the national goals** described in section 150(b) of this title and in section 5301(c) of title 49.

“(B) **Performance targets.--**

“(i) **Surface transportation performance targets.--**

“(I) In general.--Each metropolitan planning organization shall establish performance targets that address the performance measures described in section 150(c), where applicable, to use in tracking progress towards attainment of critical outcomes for the region of the metropolitan planning organization.

“(II) Coordination.--Selection of performance targets by a metropolitan planning organization shall be coordinated with the relevant State to ensure consistency, to the maximum extent practicable.

“(ii) **Public transportation performance targets.--**Selection of performance targets by a metropolitan planning organization shall be coordinated, to the maximum extent practicable, with providers of public transportation to ensure consistency with sections 5326(c) and 5329(d) of title 49.

“(C) Timing.--Each metropolitan planning organization shall establish the performance targets under subparagraph (B) not later than 180 days after the date on which the relevant State or provider of public transportation establishes the performance targets.

“(D) **Integration of other performance-based plans.--**A metropolitan planning organization shall integrate in the metropolitan transportation planning process, directly or by reference, the goals, objectives, performance measures, and targets described

in other State transportation plans and transportation processes, as well as any plans developed under chapter 53 of title 49 by providers of public transportation, required as part of a performance-based program.

“(3) Failure to consider factors.--The failure to consider any factor specified in paragraphs (1) and (2) shall not be reviewable by any court under this title or chapter 53 of title 49, subchapter II of chapter 5 of title 5, or chapter 7 of title 5 in any matter affecting a transportation plan, a TIP, a project or strategy, or the certification of a planning process.

“(i) Development of Transportation Plan.--

“(2) Transportation plan.--A transportation plan under this section shall be in a form that the Secretary determines to be appropriate and shall contain, at a minimum, the following:

“(A) Identification of transportation facilities.--

“(i) In general.--**An identification of transportation facilities** (including major roadways, transit, multimodal and intermodal facilities, nonmotorized transportation facilities, and intermodal connectors) that should function as an integrated metropolitan transportation system, giving emphasis to those facilities that serve important national and regional transportation functions.

“(ii) Factors.--In formulating the transportation plan, the metropolitan planning organization shall consider factors described in subsection (h) as the factors relate to a 20-year forecast period.

“(B) **Performance measures and targets.**--A description of the performance measures and performance targets used in assessing the performance of the transportation system in accordance with subsection (h)(2).

“(C) **System performance report.**--A system performance report and subsequent updates evaluating the condition and performance of the transportation system with respect to the performance targets described in

subsection (h)(2), including--

``(i) progress achieved by the metropolitan planning organization in meeting the performance targets in comparison with system performance recorded in previous reports; and

``(ii) for metropolitan planning organizations that voluntarily elect to develop multiple scenarios, an analysis of how the preferred scenario has improved the conditions and performance of the transportation system and how changes in local policies and investments have impacted the costs necessary to achieve the identified performance targets.

``(D) **Mitigation activities.**--

``(i) In general.--A long-range transportation plan shall include a discussion of types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the plan.

``(ii) Consultation.--The discussion shall be developed in consultation with Federal, State, and tribal wildlife, land management, and regulatory agencies.

``(E) **Financial plan.**--

``(i) In general.--A financial plan that--

``(I) demonstrates how the adopted transportation plan can be implemented;

``(II) indicates resources from public and private sources that are reasonably expected to be made available to carry out the plan; and

``(III) recommends any additional financing strategies for needed projects and programs.

``(ii) Inclusions.--The financial plan may include, for illustrative purposes, additional

projects that would be included in the adopted transportation plan if reasonable additional resources beyond those identified in the financial plan were available.

“(iii) Cooperative development.--For the purpose of developing the transportation plan, the metropolitan planning organization, transit operator, and State shall cooperatively develop estimates of funds that will be available to support plan implementation.

“(F) **Operational and management strategies.**--

Operational and management strategies to improve the performance of existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods.

“(G) **Capital investment and other strategies.**--

Capital investment and other strategies to preserve the existing and projected future metropolitan transportation infrastructure and provide for multimodal capacity increases based on regional priorities and needs.

“(H) **Transportation and transit enhancement activities.**--Proposed transportation and transit enhancement activities.

“(3) Coordination with clean air act agencies.--In metropolitan areas that are in nonattainment for ozone or carbon monoxide under the Clean Air Act (42 U.S.C. 7401 et seq.), the metropolitan planning organization shall coordinate the development of a transportation plan with the process for development of the transportation control measures of the State implementation plan required by that Act.

“(4) Optional scenario development.--

“(A) In general.--A metropolitan planning organization may, while fitting the needs and complexity of its community, **voluntarily elect to develop multiple scenarios** for consideration as part of the development of the metropolitan transportation plan, in accordance with subparagraph (B).

“(B) Recommended components.--A metropolitan planning organization that chooses to develop multiple scenarios under subparagraph (A) shall be encouraged to consider--

“(i) potential regional investment strategies for the planning horizon;

“(ii) assumed distribution of population and employment;

“(iii) a scenario that, to the maximum extent practicable, maintains baseline conditions for the performance measures identified in subsection (h)(2);

“(iv) a scenario that improves the baseline conditions for as many of the performance measures identified in subsection (h)(2) as possible;

“(v) revenue constrained scenarios based on the total revenues expected to be available over the forecast period of the plan; and

“(vi) estimated costs and potential revenues available to support each scenario.

“(C) Metrics.--In addition to the performance measures identified in section 150(c), metropolitan planning organizations **may evaluate scenarios developed under this paragraph using locally-developed measures.**

“(5) Consultation.--

“(A) In general.--In each metropolitan area, the metropolitan planning organization shall consult, as appropriate, with State and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation concerning the development of a long-range transportation plan.

“(B) Issues.--The consultation shall involve, as appropriate--

“(i) comparison of transportation plans with State conservation plans or maps, if available; or

“(ii) comparison of transportation plans to inventories of natural or historic resources, if

available.

“(6) Participation by interested parties.--

“(A) In general.--Each metropolitan planning organization shall provide citizens, affected public agencies, representatives of public transportation employees, freight shippers, providers of freight transportation services, private providers of transportation, representatives of users of public transportation, representatives of users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, and other interested parties

with a reasonable opportunity to comment on the transportation plan.

“(B) Contents of participation plan.--A participation plan--

“(i) shall be developed in consultation with all interested parties; and

“(ii) shall provide that all interested parties have reasonable opportunities to comment on the contents of the transportation plan.

“(C) Methods.--In carrying out subparagraph (A), the metropolitan planning organization shall, to the maximum extent practicable--

“(i) hold any public meetings at convenient and accessible locations and times;

“(ii) employ visualization techniques to describe plans; and

“(iii) <<NOTE: Public information.>> make public information available in electronically accessible format and means, such as the World Wide Web, as appropriate to afford reasonable opportunity for consideration of public information under subparagraph (A).

“(7) <<NOTE: Public information.>> Publication.--A transportation plan involving Federal participation shall be published or otherwise made readily available by the metropolitan planning organization for public review, including

(to the maximum extent practicable) in electronically accessible formats and means, such as the World Wide Web, approved by the metropolitan planning organization and submitted for information purposes to the Governor at such times and in such manner as the Secretary shall establish.

“(8) Selection of projects from illustrative list.--

Notwithstanding paragraph (2)(C), a State or metropolitan planning organization shall not be required to select any project from the illustrative list of additional projects included in the financial plan under paragraph (2)(C).

Statewide Transportation Plan

SEC. 1202. STATEWIDE AND NONMETROPOLITAN TRANSPORTATION PLANNING.

(a) In General.--Section 135 of title 23, United States Code, is amended to read as follows:

“Sec. 135. Statewide and nonmetropolitan transportation planning

“(a) General Requirements.--

“(2) Contents.--The statewide transportation plan and the transportation improvement program developed for each State shall provide for the development and integrated management and operation of transportation systems and facilities (including accessible pedestrian walkways and bicycle transportation facilities) that will function as an intermodal transportation system for the State and an integral part of an intermodal transportation system for the United States.

“(3) Process of development.--The process for developing the statewide plan and the transportation improvement program shall provide for **consideration of all modes of transportation** and the policies stated in section 134(a) and shall be continuing, cooperative, and comprehensive to the degree appropriate, based on the complexity of the transportation problems to be addressed.

“(d) Scope of Planning Process.--

“(1) In general.--Each State shall carry out a statewide transportation planning process that provides for consideration and implementation of projects, strategies, and services that will--

“(A) support the economic vitality of the United States, the States, nonmetropolitan areas, and metropolitan areas, especially by enabling global competitiveness, productivity, and efficiency;

“(B) increase the safety of the transportation system for motorized and nonmotorized users;

“(C) increase the security of the transportation system for motorized and nonmotorized users;

“(D) increase the accessibility and mobility of people and freight;

“(E) protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;

“(F) enhance the integration and connectivity of the transportation system, across and between modes throughout the State, for people and freight;

“(G) promote efficient system management and operation; and

“(H) emphasize the preservation of the existing transportation system.

“(2) **Performance-based approach.**--

“(A) In general.--The statewide transportation planning process **shall provide for the establishment and use of a performance-based approach to transportation decisionmaking to support the national goals** described in section 150(b) of this title and in section 5301(c) of title 49.

“(B) **Performance targets.**--

“(i) Surface transportation performance targets.--

“(I) In general.--Each State shall establish performance targets that address the performance measures described in section 150(c), where applicable, to use in tracking progress towards attainment of critical outcomes for the State.

“(II) Coordination.--Selection of

performance targets by a State shall be coordinated with the relevant metropolitan planning organizations to ensure consistency, to the maximum extent practicable.

“(ii) **Public transportation performance targets.**--In urbanized areas not represented by a metropolitan planning organization, selection of performance targets by a State shall be coordinated, to the maximum extent practicable, with providers of public transportation to ensure consistency with sections 5326(c) and 5329(d) of title 49.

“(C) **Integration of other performance-based plans.**--A State shall integrate into the statewide transportation planning process, directly or by reference, the goals, objectives, performance measures, and targets described in this paragraph, in other State transportation plans and transportation processes, as well as any plans developed pursuant to chapter 53 of title 49 by providers of public transportation in urbanized areas not represented by a metropolitan planning organization required as part of a performance-based program.

“(D) **Use of performance measures and targets.**--The performance measures and targets established under this paragraph shall be considered by a State when developing policies, programs, and investment priorities reflected in the statewide transportation plan and statewide transportation improvement program.

“(3) **Failure to consider factors.**--The failure to take into consideration the factors specified in paragraphs (1) and (2) shall not be subject to review by any court under this title, chapter 53 of title 49, subchapter II of chapter 5 of title 5, or chapter 7 of title 5 in any matter affecting a statewide transportation plan, a statewide transportation improvement program, a project or strategy, or the certification of a planning process.

“(f) **Long-range Statewide Transportation Plan.**--

“(1) **Development.**--Each State shall develop a long-range statewide transportation plan, with a **minimum 20-year forecast period for all areas of the State**, that provides for the

development and implementation of the intermodal transportation system of the State.

“(2) Consultation with governments.--

“(A) Metropolitan areas.--The statewide transportation plan shall be developed for each metropolitan area in the State in cooperation with the metropolitan planning organization designated for the metropolitan area under section 134.

“(B) Nonmetropolitan areas.--

“(i) In general.--With respect to nonmetropolitan areas, the statewide transportation plan shall be developed in cooperation with affected nonmetropolitan officials with responsibility for transportation or, if applicable, through regional transportation planning organizations described in subsection (m).

“(ii) Role of secretary.--The Secretary shall not review or approve the consultation process in each State.

“(C) Indian tribal areas.--With respect to each area of the State under the jurisdiction of an Indian tribal government, the statewide transportation plan shall be developed in consultation with the tribal government and the Secretary of the Interior.

“(D) Consultation, comparison, and consideration.--

“(i) In general.--The long-range transportation plan shall be developed, as appropriate, in consultation with State, tribal, and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation.

“(ii) Comparison and consideration.-- Consultation under clause (i) shall involve comparison of transportation plans to State and tribal conservation plans or maps, if available, and comparison of transportation plans to

inventories of natural or historic resources, if available.

“(3) Participation by interested parties.--

“(A) In general.--In developing the statewide transportation plan, the State shall provide to--

“(i) nonmetropolitan local elected officials or, if applicable, through regional transportation planning organizations described in subsection (m), an opportunity to participate in accordance with subparagraph (B)(i); and

“(ii) citizens, affected public agencies, representatives of public transportation employees, freight shippers, private providers of transportation, representatives of users of public transportation, representatives of users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, providers of freight transportation services, and other interested parties a reasonable opportunity to comment on the proposed plan.

“(B) Methods.--In carrying out subparagraph (A), the State shall, to the maximum extent practicable--

“(i) develop and document a consultative process to carry out subparagraph (A)(i) that is separate and discrete from the public involvement process developed under clause (ii);

“(ii) hold any public meetings at convenient and accessible locations and times;

“(iii) employ visualization techniques to describe plans; and

“(iv) make public information available in electronically accessible format and means, such as the World Wide Web, as appropriate to afford reasonable opportunity for consideration of public information under subparagraph (A).

“(4) Mitigation activities.--

“(A) In general.--A long-range transportation plan **shall include a discussion of potential environmental**

mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the plan.

“(B) Consultation.--The discussion shall be developed in consultation with Federal, State, and tribal wildlife, land management, and regulatory agencies.

“(5) Financial plan.--The statewide transportation plan **may include--**

“(A) **a financial plan** that--

“(i) demonstrates how the adopted statewide transportation plan can be implemented;

“(ii) indicates resources from public and private sources that are reasonably expected to be made available to carry out the plan; and

“(iii) recommends any additional financing strategies for needed projects and programs; and


“(B) for illustrative purposes, additional projects that would be included in the adopted statewide transportation plan if reasonable additional resources beyond those identified in the financial plan were available.

“(6) Selection of projects from illustrative list.--A State shall not be required to select any project from the illustrative list of additional projects included in the financial plan described in paragraph (5).

“(7) Performance-based approach.--The statewide transportation plan should include--

“(A) **a description of the performance measures and performance targets used in assessing the performance of the transportation system** in accordance with subsection (d)(2); and

“(B) **a system performance report and subsequent updates evaluating the condition and performance of the transportation system with respect to the performance targets** described in subsection (d)(2), including progress achieved by the metropolitan planning



organization in meeting the performance targets in comparison with system performance recorded in previous reports;

“(8) Existing system.--The statewide transportation plan should include **capital, operations and management strategies, investments, procedures, and other measures to ensure the preservation and most efficient use of the existing transportation system.**

“(9) Publication of long-range transportation plans.--Each long-range transportation plan prepared by a State shall be published or otherwise made available, including (to the maximum extent practicable) in electronically accessible formats and means, such as the World Wide Web.

Resources

FHWA/FTA Transportation Planning Resources

Federal Highway Administration and Federal Transit Administration, Performance Based Planning and Programming Guidebook.

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

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Federal Highway Administration, Financial Planning and Fiscal Constraint for Transportation Plans and Programs Questions & Answers. https://www.fhwa.dot.gov/planning/guidfinconstr_qa.cfm.

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http://www.fhwa.dot.gov/planning/freight_planning/index.cfm.

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http://environment.fhwa.dot.gov/integ/corridor_nepa_guidance.pdf.

Federal Highway Administration, Visualization for Transportation Planning.

http://www.fhwa.dot.gov/planning/scenario_and_visualization/visualization_in_planning/visplanning.cfm.

Involvement Statutory/Regulatory Requirements.

<http://www.tribalplanning.fhwa.dot.gov/consult.aspx>.

U.S. Department of Transportation, Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations.

http://www.fhwa.dot.gov/environment/bicycle_pedestrian/overview/policy_accom.cfm.

Asset Management

Federal Highway Administration, Transportation Asset Management Plans.

<http://www.fhwa.dot.gov/asset/plans.cfm>.

Federal Highway Administration, Asset Management Publications.

<http://www.fhwa.dot.gov/asset/pubs.cfm>.

Federal Transit Administration, State of Good Repair and Asset Management.

<http://www.fta.dot.gov/13248.html>.

Congestion Management Process

Federal Highway Administration, Congestion Management Process Guidebook.

http://www.fhwa.dot.gov/planning/congestion_management_process/cmp_guidebook/.

Environment

Federal Highway Administration, *A Performance-Based Approach to Addressing Greenhouse Gas Emissions through Transportation Planning*.

http://www.fhwa.dot.gov/environment/climate_change/mitigation/publications_and_tools/ghg_planning/

Federal Highway Administration, Climate Change Adaptation.

http://www.fhwa.dot.gov/environment/climate_change/adaptation/.

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U.S. Environmental Protection Agency, Guide to Sustainable Transportation Performance Measures. http://www.epa.gov/smartgrowth/pdf/Sustainable_Transpo_Performance.pdf.

Federal Highway Administration, Economic Analysis Primer.

<http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer04.cfm>.

Federal Highway Administration, HERS-ST Highway Economic Requirements System – State Version. <http://www.fhwa.dot.gov/infrastructure/asstmgmt/hersfact.cfm>.

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<http://www.fhwa.dot.gov/tpm/resources/nbias/>.

Federal Highway Administration, Office of Highway Policy Information, National Highway Construction Cost Index. <http://www.fhwa.dot.gov/policyinformation/nhcci/pt1.cfm>.

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Volume 1 : Research Report, and Volume 2: Guide for Target Setting and Data Management.
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