

Transportation Alternatives Program Performance Management Guidebook

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16. Abstract The Transportation Alternatives Program (TAP), established under the Moving Ahead for Progress in the 21 st Century Act and continued under the Surface Transportation Block Grant Program of the Fixing America's Surface Transportation Act, provides resources for a variety of eligible transportation alternatives projects. This guidebook assists State Department of Transportation (DOT) and metropolitan planning organization (MPO) program managers in implementing a performance-based approach to ensure that staff and decisionmakers understand program goals, and that program actions are making progress towards achieving those goals. The guidebook includes an overview of the principles of performance-based planning and management; an introduction to FHWA's performance-based planning framework; a discussion of how to implement performance management with limited resources; and a step-by-step roadmap for creating a tailored performance-based planning and programming approach. Appendices present examples of relevant performance measures; information on data sources; examples for a DOT and an MPO; and additional resources.			
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1.0 Introduction to the Guidebook

The Moving Ahead for Progress in the 21st Century Act (MAP-21) placed a new emphasis on performance management to introduce accountability and transparency into transportation decisionmaking, improve the performance of the transportation system, and achieve better returns on investment, measured in terms of social, environmental, and economic outcomes. MAP-21 also created the Transportation Alternatives Program (TAP) under sections 101(a)(29) and 213 of title 23 United States Code (23 U.S.C.). While performance management was not required specifically for the TAP, program administrators should find value in a performance and outcome-based program approach. This guidebook assists State Department of Transportation (DOT) and metropolitan planning organization (MPO) program managers in implementing a performance-based approach to ensure that staff and decisionmakers understand program goals, and that program actions are making progress towards achieving those goals.

The Fixing America's Surface Transportation (FAST) Act, enacted December 4, 2015, repealed the definition of TAP under section 101(a)(29) and the program under section 213, but replaced it with the "STP Set-Aside" under the Surface Transportation Block Grant Program (STBGP). This program replaced the Surface Transportation Program (STP). The STP Set-Aside provides funds "for projects or activities described in section 101(a)(29) or 213, as such provisions were in effect on the day before the date of enactment of the FAST Act."

The Federal Highway Administration (FHWA) performed the research and developed this guidebook prior to the enactment of the FAST Act. The FAST Act did not include any significant changes to performance management affecting this guidebook. The concepts developed for TAP are applicable to the STP Set-Aside, and references to the TAP in this guidebook also apply to the STP Set-Aside. This guidebook will continue to refer to the STP Set-Aside as the Transportation Alternatives Program.

A State DOT or MPO's existing performance management approach for the transportation program as a whole should be the foundation for a performance-based management approach to the TAP. Every component of the TAP performance management framework—including program-specific goals and objectives, performance measures and targets, project selection criteria, and monitoring, evaluation, and reporting systems—should relate to and build on existing policies, data, and tools. For example in agencywide performance reports that State DOTs and MPOs must submit periodically to U.S. DOT, a State DOT or MPO could include TAP-specific performance measures that complement the measures required by 23 U.S.C. 150(c).

The FHWA's seven-step Performance Management Framework serves as the basis for this guidebook. The steps, which are described in more detail in section 4.0, include:

- **Step 1**—Develop Goals and Objectives;
- **Step 2**—Select Performance Measures;
- **Step 3**—Identify Trends and Targets;

- **Step 4**—Identify Strategies and Analyze Alternatives;
- **Step 5**—Develop Plan-Level Investment Priorities;
- **Step 6**—Develop Program-Level Investment Priorities; and
- **Step 7**—Ongoing Monitoring, Evaluating, and Performance Reporting.

The framework is intended for agencies to apply to transportation planning and programming processes, including development of the statewide and regional long-range transportation plan (LRTP) and development of the State or MPO’s transportation improvement program (STIP or TIP). It also applies to program-specific processes, like one developed for the TAP, which are carried out within the overall planning and programming process.

It is not necessary to read this guidebook from cover to cover. Table 1.1 identifies what information is contained in each section of the guidebook. Readers should feel free to proceed to the section(s) that they find of most interest and value. The primary portions of the guidebook are sections 1.0 through 6.0. Appendices A through F provide case studies, examples, and information sources.

This is the first edition of this guidebook. FHWA may revise this guidebook as the program evolves and performance management practices mature. FHWA will make minor reference and other updates to the web-posted version as needed.

Table 1.1 Outline of This Guidebook

Section	Contents
1.0	An overview of this guidebook
2.0	An introduction to the TAP as established under MAP-21
3.0	An overview of the principles and terminology of performance-based planning and management
4.0	An introduction to FHWA’s performance-based planning framework
5.0	Discussion of resource requirements, and how to make performance management work with the limited resources often available to a program manager
6.0	A step-by-step roadmap for creating a performance-based planning and programming approach tailored to TAP
Appendix A	Examples of performance measures relevant to TAP project types
Appendix B	Information on data sources that might be used to calculate performance measures
Appendices C and D	Two examples of how a comprehensive approach to TAP performance management might look—one for a smaller MPO with limited resources, and one for a State DOT with more capacity for program and project evaluation
Appendix E	Additional resources that program managers and other guidebook users might find helpful
Appendix F	Examples of project evaluation criteria

While the primary audience for this guidebook is State and MPO managers, others involved in designing and implementing TAP-funded projects and programs, bicycle and pedestrian programs, Safe Routes to School (SRTS) programs, Complete Streets programs, asset management plans, and transportation environmental mitigation programs may find the resources in this guidebook useful.

Program managers and stakeholders can use performance measures to help answer questions such as:

- Are funds obligated and spent and projects delivered in a timely manner (which may include projects using remaining Transportation Enhancement funds)?
- How effective is the overall program at achieving national goals and additional goals that might be included in State DOT and MPO plans, such as improving safety, increasing the number of trips taken by foot or bicycle, reducing emissions, or improving water quality?
- How well are specific funded projects supporting achievement of stated TAP and overall transportation program goals and objectives?
- What community and economic benefits do these projects generate?
- More specific questions such as “are we seeing improved safety and connectivity for bicycle users?”
- How have these projects attracted or leveraged private investments?

There is no “one-size-fits-all” approach to performance management. The guide is designed to help managers tailor a program to unique regional characteristics, needs, and priorities, while recognizing the need to work within limited agency resources for program management and administration.

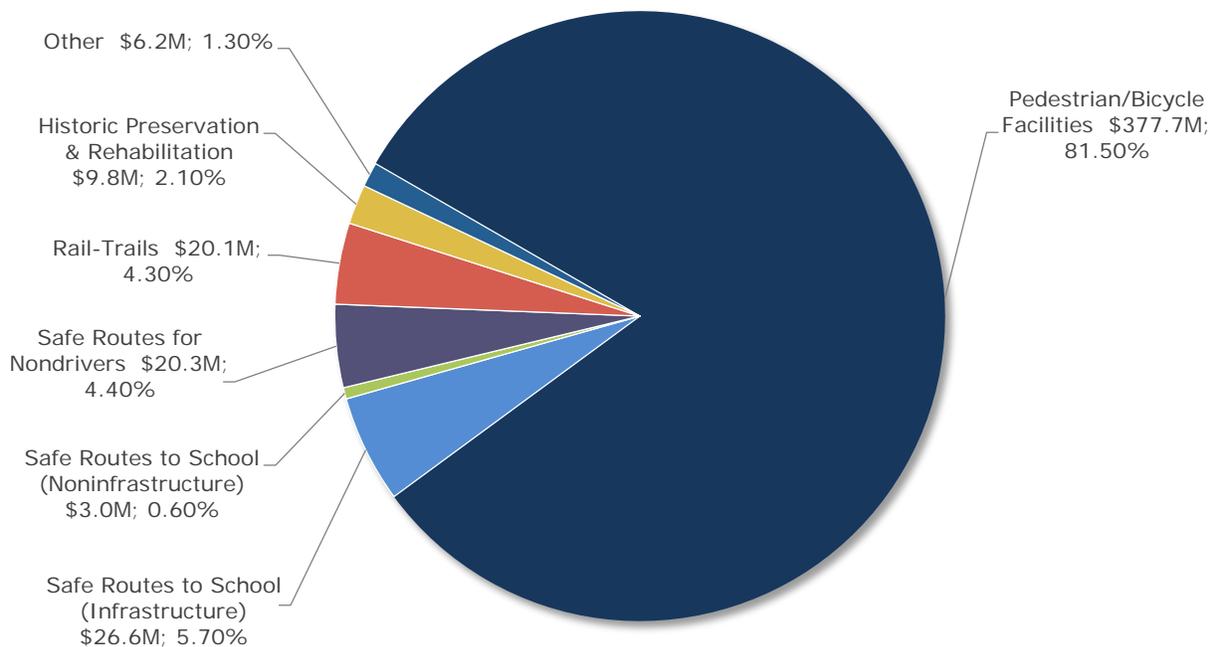
2.0 The Transportation Alternatives Program

2.1 Overview of the Transportation Alternatives Program

The Transportation Alternatives Program was established in 2012 and authorized under section 1122 of MAP-21 and codified in 23 U.S.C. sections 101(a)(29) and 213. This program consolidated three programs from the 2005 Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)—Transportation Enhancement (TE) activities, Safe Routes to School (SRTS), and Recreational Trails Programs (RTP). Under MAP-21, Federal law provided for the reservation of funds apportioned to a State under section 104(b) of title 23 to carry out the TAP. The TAP provided funding for programs and projects defined as transportation alternatives, as described in the sidebar on page 6.

Figure 2.1 illustrates the percentage of spending by general project type under the first two years of the TAP. More than 80 percent of TAP funds in 2013 and 2014 were directed towards pedestrian and bicycle facilities with another 15 percent directed towards safe routes and rail-trail projects.

Figure 2.1 Distribution of Federal Funding by Transportation Alternatives Activity, FY 2013-2014



Source: Transportation Alternatives Data Exchange at the Rails-to-Trails Conservancy (2015).
Transportation Alternatives Spending Report: FY 1992-FY 2014.

TAP Eligibility

MAP-21 codified TAP eligibility under 23 U.S.C. 101(a)(29) and 213. The FAST Act repealed these sections, but authorized “projects or activities described in section 101(a)(29) or 213, as such provisions were in effect on the day before the date of enactment of the FAST Act.” Therefore, all TAP eligibility remains unchanged.

The project selection process and the eligible project sponsor requirements apply for all TAP eligibility. Projects are not required to be located along Federal-aid highways. Activities eligible under TAP are eligible for STP (and STBGP) funds. Some aspects of activities also may be eligible under other Federal-aid highway programs.

For SRTS noninfrastructure projects, traffic education and enforcement activities must take place within approximately two miles of a primary or middle school (grades K-8). Other eligible noninfrastructure activities do not have a location restriction. SRTS infrastructure projects are eligible for TAP funds regardless of their ability to serve school populations, and SRTS infrastructure projects are broadly eligible under other TAP eligibilities, which do not have any location restrictions.

Eligible activities under the TAP consist of:

1. Transportation Alternatives as defined:
 - a. Construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other nonmotorized forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety-related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990.
 - b. Construction, planning, and design of infrastructure-related projects and systems that will provide safe routes for nondrivers, including children, older adults, and individuals with disabilities to access daily needs.
 - c. Conversion and use of abandoned railroad corridors for trails for pedestrians, bicyclists, or other nonmotorized transportation users.
 - d. Construction of turnouts, overlooks, and viewing areas.
 - e. Community improvement activities, which include but are not limited to:
 - i. Inventory, control, or removal of outdoor advertising;
 - ii. Historic preservation and rehabilitation of historic transportation facilities;
 - iii. Vegetation management practices in transportation rights-of-way to improve roadway safety, prevent against invasive species, and provide erosion control; and
 - iv. Archeological activities relating to impacts from implementation of a transportation project eligible under title 23.
 - f. Any environmental mitigation activity, including pollution prevention and pollution abatement activities and mitigation to:
 - i. Address stormwater management, control, and water pollution prevention or abatement related to highway construction or due to highway runoff, including activities; or
 - ii. Reduce vehicle-caused wildlife mortality or to restore and maintain connectivity among terrestrial or aquatic habitats.
2. The recreational trails program.
3. The safe routes to school program eligible projects and activities:
 - a. Infrastructure-related projects.
 - b. Noninfrastructure-related activities.
 - c. Safe Routes to School coordinator.
4. Planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former Interstate System routes or other divided highways.

2.2 Requirements for a Performance-Based Approach to Transportation

MAP-21 created a performance-based transportation program with the intent of increasing accountability and transparency and improving transportation investment decisionmaking. It created a new section of title 23 of the United States Code, section 150, which designates seven national goals for the Federal Aid Highway Program (See Table 2.1). MAP-21 also amended section 5301 of title 49, U.S.C., to include a declaration of policy regarding public transportation and associated general purposes stating the Federal Government's role in funding public transportation infrastructure and services.

Key features of performance-based transportation planning requirements include:

- State DOTs, MPOs, and transit agencies must establish and demonstrate the results of a transportation planning and investment program based on performance and outcomes. The intent is for State DOTs, MPOs, and transit agencies to use the information and data generated as a result of the new regulations to better inform their transportation planning and programming decisionmaking. Reporting requirements provide an opportunity for the U.S. DOT to evaluate whether surface transportation funds are being used to improve national surface transportation performance.
- State DOTs, MPOs, and transit agencies must adopt specific performance measures established by U.S. DOT, establish performance targets associated with these measures that can be aggregated at the national level, report on progress and achievement towards these targets, and demonstrate how planning and programming decisions are helping them make significant progress towards their targets.

At the time of the writing of this guidebook, the FHWA was in the process of establishing performance measures through rulemakings covering performance in 12 areas related to safety, pavement and bridge condition, traffic congestion, emissions, freight movement, and system performance. For public transportation facilities and services, the Federal Transit Administration (FTA), in a parallel process, was establishing performance measures through rulemakings for the areas of transit safety and transit asset management. Jointly, FHWA and FTA were engaged in rulemaking to establish the performance management and performance reporting requirements for specific programs like the Congestion Mitigation and Air Quality Improvement (CMAQ) program, and were specifying how State DOTs, MPOs, and transit agencies must establish performance measures and targets, report on their performance, and demonstrate how planning and programming decisions are informed by and influence performance.

A full list of MAP-21 performance management provisions and statutory references are in the Performance Management Questions and Answers at <http://www.fhwa.dot.gov/map21/qandas/qapm.cfm>.

Title 23 *does not* require a performance-based approach for the TAP. Nevertheless, such an approach can be of great benefit in helping make decisions about the best use of funds and demonstrating that funds are being spent wisely. This guidebook provides voluntary best practices to measure the impact of the TAP and ensure transparency and accountability. It provides guidance on how to align the TAP with national, State, and local performance goals and measures, and how to measure progress towards meeting performance targets. By implementing the approach described in the guidebook, program managers should be able to better describe the objectives of the program and how projects are achieving those objectives.

This guidebook provides voluntary best practices for agencies to measure the impact of the TAP and ensure transparency and accountability.

2.3 The TAP and National Performance Goals

Table 2.1 shows national transportation performance goals established under MAP-21 and codified in title 23 (23 U.S.C. §150(b)). It also shows sample considerations for the TAP program that relate to each goal. The TAP does not have formally defined objectives, either established by Congress or U.S. DOT, so these considerations are shown as examples only.

The TAP Mission and Vision are:

Mission: To improve our Nation’s communities through leadership, innovation, and program delivery.

Vision: The Transportation Alternatives Program (TAP) creates safe, accessible, attractive, and environmentally sensitive communities where people want to live, work, and recreate.

The objectives of TAP-funded projects are relatively broad and multifaceted. TAP projects may provide a wide array of economic, environmental, and community benefits, not all of which are easily captured by quantitative metrics. Agencies may use place-based metrics derived from the local context to augment State- and national-level performance measures. For example, goals related to the human environment, economic development, multimodal mobility, or access to jobs could be included along with those listed in table 2.1.

Table 2.1 National Goals and Relationship to TAP Considerations

Goal Area	National Goal	Sample TAP Considerations
Safety	To achieve a significant reduction in fatalities and serious injuries on all public roads	Improve safety for all project users
Infrastructure condition	To maintain the highway infrastructure asset system in a state of good repair	Maintain good to excellent pavement quality on shared-use paths and key bicycle facilities; ensure accessible pedestrian facilities

Goal Area	National Goal	Sample TAP Considerations
Congestion reduction	To achieve a significant reduction in congestion on the National Highway System	Reduce vehicle travel by providing nonmotorized alternatives
System reliability	To improve the efficiency of the surface transportation system	Expand bicycle infrastructure in congested urban core areas to provide a more reliable alternative to driving
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	Improve nondriver access to jobs, education, services, public transit, and community amenities
Environmental sustainability	To enhance the performance of the transportation system while protecting and enhancing the natural environment	Reduce emissions and energy use by encouraging nonmotorized travel Improve stormwater management, vegetation management, and ecological performance of the transportation system
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	Many projects will qualify as categorical exclusions or can use programmatic agreements. Most TAP projects benefit the environment

2.4 The TAP and Other Local and National Priorities

TAP funds can also support other important local and national priorities such as:

- **Ladders of Opportunity**—Through its Ladders of Opportunity agenda the U.S. DOT aims to ensure a better quality of life by revitalizing neighborhoods; providing people with safe, reliable, and affordable connections to employment, education, services, and other opportunities; and creating pathways to jobs through improved transportation connections. TAP-funded projects can make communities more attractive and also provide safe first- and last-mile infrastructure to connect people to jobs and other opportunities.
- **Equity**—Lower-income Americans rely on walking and bicycling to reach public transportation and jobs, yet too often live in neighborhoods with limited sidewalks and safe bikeways. TAP-funded projects can help improve the equity of the transportation system.
- **Health**—TAP-funded projects support active transportation and encourage physical activity, helping to improve public health and reduce health care costs.

- **Livability**—TAP-funded community improvement activities focused on control of outdoor advertising, historic preservation, archeology, and environmental mitigation can make communities more attractive places to live and work. Pedestrian and bicycle facilities also make important contributions to livability. The sidebar on p. 11 provides examples of performance measures for livability.
- **Connectivity**—TAP-funded projects can help fill critical gaps in pedestrian and bicycle infrastructure, providing safe, continuous facilities for local trips and to access longer-distance trips by public transportation.

Different communities may frame these issues in different ways but they represent common themes of importance throughout the Nation. Performance measures that relate to these priorities can help an agency measure how well its TAP is contributing to these and other important transportation priorities.

Performance Measures for Livability	
Addressing livability issues in transportation planning, development, and implementation ensures that transportation investments support both mobility and broader community goals. A variety of livability-related measures are available that could be influenced by TAP projects. Some examples are shown below.	
Livability Principle	Example Measures
Provide more transportation choices	Percent of population living within one-quarter mile of a bicycle facility
Promote equitable, affordable housing	Percent of affordable housing units located in a neighborhood with pedestrian or bicycle network connectivity score > x
Enhance economic competitiveness	Percent of jobs accessible within one-quarter mile walk of transit stops by a connected network of pedestrian facilities Spending by visitors to TAP-funded projects
Support existing communities	Percent of TAP investments dedicated to enhancing accessibility of existing transportation system
Coordinate policies and leverage investment	Amount of local or private funding leveraged by TAP dollars
Value communities and neighborhoods	Percent of housing located in walkable neighborhoods with mixed-use destinations located nearby

3.0 What Is Performance Management?

This section provides an introduction to performance management, explaining the benefits of measuring and managing for performance, defining key terminology, and providing examples of how performance management is currently used in transportation planning and programming.

Performance management is a strategic approach in which an agency coordinates external decisionmakers, internal staff, key stakeholders, and the general public to guide investment and policy decisions and to improve its performance in accomplishing its mission and goals. FHWA defines *transportation performance management* as a strategic approach that uses system information to make investment and policy decisions to achieve national performance goals. Transportation performance management represents the opportunity to introduce accountability and transparency into transportation decision making, improve the performance of the transportation system, and achieve better returns on investment, measured in terms of social, environmental, and economic outcomes.

Performance management centers around *performance measures* that relate to overall program goals. Targets are set for each measure, and progress towards meeting those targets is tracked and reported. Under title 23, State DOTs and MPOs are required to set targets and report on progress, but other agencies (such as municipal agencies) may also have their own performance management procedures. Figure 3.1 illustrates key elements of performance management, as identified by FHWA.

Figure 3.1 Transportation Performance Management under Federal Surface Transportation Law



3.1 Why Measure Performance?

Although title 23 does not require performance measures or a performance management approach for the TAP, there are several reasons for program managers to adopt a performance management approach toward the administrative and project selection responsibilities of the program. Beyond legislative requirements, the reason why many transportation agencies, as well as nontransportation entities, have implemented performance-based decision making is that when done well, it produces better results. The FHWA Performance-Based Planning and Programming Guidebook (2013) identifies four types of benefits:

1. **Improved investment decisionmaking**—Ensures that the program supports overall objectives for transportation in the Nation, State, and/or region; enables agencies to answer the question “how are we doing?”; and enables agencies to develop strategies that target areas for improvement.

For TAP, this may mean... supporting the selection of projects that best address program goals and objectives; ensuring timely obligation and expenditure of funds (including previous Transportation Enhancement funds).

2. **Improved return on investments and resource allocation; demonstrates link between funding and performance**—Creates important linkage between allocation of funds, human and programmatic resources, and outcomes; creates opportunities for efficient use of funds and human resources.

For TAP, this may mean...better results of investments as demonstrated by project outcomes—such as for each dollar spent, seeing better outcomes as to the increase in the completeness and quality of a pedestrian and bicycle network, including increased linkages connecting networks.

3. **Improved system performance**—Better decisions and better investment should lead to better outcomes for system infrastructure development and performance.

For TAP, this may mean... improvements in the amount and/or quality of stormwater or vegetation management, improved safety, increases in bicycling and walking, or a reduction in air pollution from automobile travel.

4. **Increased accountability and transparency**—Increases transparency of agencies' activities, programs, and projects and agency performance.

For TAP, this may mean... being able to demonstrate outcomes of investments in terms of outcomes meaningful to the general public. Program results can be described in terms of real measureable results (as defined in performance metrics). A few examples might include: reduced time to approve projects through environmental streamlining procedures, programmatic agreements, and project design flexibility; new miles of trails; number of traffic calming installations or improvements; number of projects that will improve safe pedestrian travel; or the number of historic sites preserved or rehabilitated.

3.2 Terminology

Several terms are used to represent similar concepts in performance-based planning and programming. Below is a list of key terms used in this guidebook and in Federal and State transportation performance management:

- **Vision**—Framework for considering the long-term desired outcomes for general social issues, such as environmental sustainability, social equity, or economic development.
- **Goal**—A broad, socially driven aim that guides overall decisionmaking and describes a desired end state.
- **Objective**—A specific aim that supports the attainment of a broader goal and can be quantified to measure progress.
- **Performance Management**—A strategic approach that uses data and information to support decisions that help to achieve performance outcomes.
- **Performance Measurement**—A process of assessing progress toward achieving goals using data.
- **Performance Measure**—An expression based on a metric that is used to establish targets and to assess progress toward achieving the established targets.¹
- **Performance Metric**—A quantifiable indicator of performance or condition.¹
- **Performance Target**—A quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a given time period.¹
- **Analytical Method**—A process by which an agency collects performance data and uses that data to measure progress.
- **Decision Support**—A system for using performance measures to influence decisionmaking by identifying potential consequences.
- **Evaluation Criteria**—Any factors or standards that are used to support decisionmaking. They are developed to support a specific set of goals and objectives of a transportation agency or planning institution, and to harmonize with a State's laws, policy, and regulations.

¹ Definitions for performance measure, performance metric, and performance target were to be added to U.S.C. titles 23 and 49 (e.g., 23 CFR 490) through the final rulemakings to implement the new performance-based planning provisions in MAP-21. The definitions had not been finalized at the time this guidebook was written.

3.3 How Is Performance Management Being Used in Transportation Planning?

3.3.1 Performance Management in Transportation

Performance management is widely applied in the private, nonprofit, and public sectors. Among transportation agencies, measuring project performance to guide management decisions became an important focus in the 1990s, but measurement practices have been around since the 1960s. While agency performance measurement efforts were initially focused on addressing dominant concerns of transportation engineering such as automobile congestion and traffic safety, they now consider a broader range of transportation users, including pedestrians, bicyclists, and transit users. Measurement has also broadened to include economic development, social equity, livability, environmental sustainability, and other key areas related to quality of life.

At the Federal level, performance management in transportation is often referred to as performance-based planning and programming (PBPP). In 2013, FHWA published a Performance-Based Planning and Programming Guidebook to help State DOTs, MPOs, regional transportation planning organizations, transit agencies, and other partner organizations understand the key elements of a PBPP process, the relationship of these elements within existing planning and programming processes, and examples of best practices to help support implementation.

A few examples of performance management at transportation agencies include the following:

- At the State level, nearly all DOTs are using some form of strategic planning, and all State DOTs use performance measures at various program levels.²
- At regional level, a large majority of MPOs use performance measures in some fashion. Examples include Hampton Roads Planning District Commission (Virginia), Sacramento Area Council of Governments (California), Atlanta Regional Commission (Georgia), the Southeast Michigan Council of Governments (Michigan); Crater Planning District Commission (Petersburg, Virginia); and Champaign County Regional Planning Commission (Illinois).
- Transit agencies and other transportation agencies also collect data that are used to support decisionmaking. For example, transit agencies in Atlanta, Boise, Chicago, and San Francisco collect performance information related to condition of their assets, on-time performance, and operating costs.

² Washington State DOT, "Performance Measurement Library," <http://www.wsdot.wa.gov/Accountability/Publications/Library.htm>.

A majority of TAP resources are spent on pedestrian and bicycle-related projects. A 2014 survey of pedestrian and bicycle planning practices revealed that of the 28 State DOTs and 92 regional planning organizations who responded, most (77 percent) have not established performance measures related to outcomes of pedestrian and bicycle projects.³ Of the ones that do use performance measures, safety, mode share, volume counts, and infrastructure provision were frequently cited measures. The following is a sampling of the performance measures reported:

- Washington DOT reports bicycle and pedestrian collisions and serious injuries by mode share/population, and is considering doing so by bicycle miles traveled (BMT) and pedestrian miles traveled (PMT) as part of their quarterly LRTP Performance Measures report. They also track on a monthly basis fatal and serious crashes involving bicyclists and pedestrians as well as biking and walking mode shares as part of Results Washington.⁴
- Missouri DOT uses a performance management tool, Tracker, that includes the number of bicycle fatalities and serious injuries, the amount of resources invested in pedestrian facilities, and the progress made towards meeting the State's Americans with Disabilities Act (ADA) transition plan.⁵
- Florida DOT releases an Annual Performance Report⁶ that tracks fatalities and serious injuries for vulnerable road users (such as pedestrians and bicyclists). FDOT also annually provides a Multimodal Mobility Performance Measures Sourcebook⁷ that includes pedestrian level of service (LOS), percent sidewalk coverage, bicycle LOS, and percent bike lane/shoulder coverage.

FHWA's *Guidebook for Evaluating Pedestrian and Bicycle Performance Measures* presents a broad range of potential measures and highlight their effectiveness at different scales (anticipated spring 2016).

3.3.2 Performance Management for the TAP

In the process of developing this guidebook, Internet research was conducted in the fall of 2014 on 248 State and MPO programs, and interviews were conducted with 20 State DOTs and MPOs to understand then current TAP performance measurement practices, opportunities, and challenges. The research found that the monitoring of the performance of TAP projects or administrative outcomes is limited. The following examples were identified of TAP performance monitoring among State DOTs:

³ Planning Snapshot 4: Bicycle and Pedestrian Planning." National Cooperative Highway Research Program (NCHRP) Project 8-36 Task 120.

⁴ <http://www.results.wa.gov>.

⁵ <http://www.modot.org/about/Tracker.htm>.

⁶ <http://www.dot.state.fl.us/planning/performance/2013Report.shtm>.

⁷ <http://www.dot.state.fl.us/planning/statistics/sourcebook/2014.pdf>.

- Of 51 DOTs researched, only California provides readily available information on the Internet regarding performance monitoring of TAP-funded projects (see sidebar). California's monitoring component deals with the administration and implementation of the project, but does not address the central question of the actual performance of funded projects after completion.

Performance Monitoring in California's TAP

California has consolidated its TAP under the Active Transportation Program (ATP). For ATP projects, including TAP-funded projects, the California Transportation Commission requires the implementing agency to submit semi-annual reports on the activities and progress made toward implementation of the project and a final delivery report. Additionally, within one year of the project becoming operable, the implementing agency must provide a final delivery report to the Commission which includes:

- Oregon DOT has produced annual reports tracking obligation and project delivery rates since the year 2000.
- New Jersey DOT uses data from its online application and tracking program to inform monthly progress meetings. It credits strong project management at the State level for its high level of project delivery. New Jersey DOT maintains a separate SRTS program, and the State SRTS Coordinator tracks changes in rates of bicycling and walking to school following all projects built with SRTS funds.
- Michigan DOT holds regular status meetings with DOT staff, MPO coordinators, and local agencies to monitor project delivery.
- New York DOT is currently tracking program administration, and South Dakota DOT is developing tools to do so.
- Additionally, New York State DOT reported it is in the process of developing safety-based performance measures for all projects that receive public funds.
- The National Center for Safe Routes to School released [Creating Healthier Generations: A Look at 10 Years of the Federal Safe Routes to School Program](#), in September 2015 to examine the accomplishments of the Federal Safe Routes to School Program from 2005 through 2015. Many States that fund SRTS under TAP continue to measure performance consistent with earlier program practice.

- The scope of the completed project as compared to the programmed project;
- Before and after photos documenting the project;
- The final costs as compared to the approved project budget; and
- Its duration as compared to the project schedule in the project application.

Internet-based research revealed little information about TAP performance monitoring at the MPO level. Only one MPO was identified that provides information on performance monitoring: Fresno Council of Governments in California. The language is directly from the California Transportation Commission requirement stated above. It is likely other MPOs across the country do monitor performance at some level, and/or follow guidance on performance monitoring, though publicly available information about this aspect of the TAP is lacking. While

not specifically for the TAP, the Chicago Metropolitan Agency for Planning reported that in the past that it partnered with local universities to conduct bicycle and pedestrian surveys and calculate mode shift numbers after local trail projects have been completed. Other MPOs, such as the Broward County (Florida) MPO, are developing and implementing pedestrian and bicycle counting systems. FHWA has a bicycle and pedestrian count pilot program underway (see http://www.fhwa.dot.gov/environment/bicycle_pedestrian/countpilot).

While few agencies reported using performance measures in TAP administration, a number expressed interest in measuring performance of TAP-funded projects. Specific topics of interest included bicyclist and pedestrian travel, economic benefits, support for “last-mile” connections, a project’s effect on crash rates, and reduced motor vehicle congestion and greenhouse gas emissions. A number of agencies are interested in evaluating the number of new bicycle and pedestrian trips that will be generated by the proposed project. Applications often request current bicycle and pedestrian usage estimates, which can be used to establish a baseline for ongoing performance metrics. Some of these activities may be eligible for planning or other Federal-aid funds.

3.3.3 Performance Management across Different Levels of Government

Transportation performance measures are used at the State level by DOTs, at the regional level by MPOs, councils of governments, transit providers, and other regional agencies, and also at the local jurisdiction level. The sidebar beginning on p. 20 provides examples of the use of performance measures at all of these levels in Maryland.

As demonstrated by the Maryland examples, similar measures are often used at the State, regional, and local level. This is a reflection of common transportation priorities and challenges that lead to common goals and objectives being set at each level of government. If approaches to methodologies for tracking and reporting performance measures are

If approaches to methodologies for tracking and reporting performance measures are consistent across the levels of government, measures can be “rolled up” to demonstrate a broader view of performance.

consistent across the levels of government, performance measure data, as well as the related performance information (such as, why is performance changing), can be rolled up to higher levels of government to demonstrate a broader view of performance across a larger geographic region. The use of consistent methodologies can also help governments compare performance in various jurisdictions, and can also lead to data sharing opportunities and tracking and reporting efficiencies.

It is important to note that even though national performance metrics may already be in place, State and local agencies will benefit from developing their own unique and place-based performance measures, such as the number of locally sponsored car-free days, the percentage of local bicyclists who “feel safe” on area cycle infrastructure, or the average travel distances for noncommute trips. While it is helpful if local metrics can be rolled up into categories of performance at the State or national level, data congruency may not be achievable given unique local conditions as well as resource constraints.

Example—Maryland’s Use of Transportation Performance Measures at the State, Regional, and Local Scale

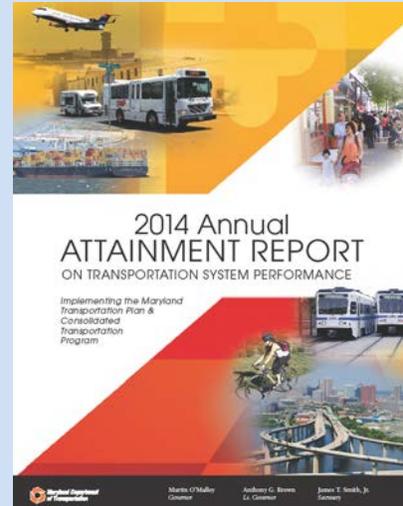
State Level

The Maryland Department of Transportation (MDOT) and its modal agencies have developed performance measures to assess transportation system performance according to the goals and objectives as outlined in the Maryland Transportation Plan (MTP). The MTP goals include the following:

- **Safety and Security**—Enhance the safety of transportation system users and develop a transportation system that is resilient to natural or man-made hazards;
- **System Preservation**—Preserve and maintain the State’s existing transportation infrastructure and assets;
- **Quality of Service**—Maintain and enhance the quality of service experienced by users of Maryland’s transportation system;
- **Environmental Stewardship**—Ensure that the delivery of the State’s transportation infrastructure program conserves and enhances Maryland’s natural, historic, and cultural resources;
- **Community Vitality**—Provide options for the movement of people and goods that support communities and quality of life; and
- **Economic Prosperity**—Support a healthy and competitive Maryland economy.

For the purpose of illustration, the Community Vitality goal will be used as an example. This goal includes the following objectives:

- Better coordinate transportation investments and land use planning to support the environmental, social, and economic sustainability of Maryland’s existing communities and planned growth areas;
- Enhance transportation networks and choices to improve mobility and accessibility, and to better integrate with land use; and
- Increase and enhance transportation connections to move people and goods within and between activity centers.



The progress toward the Community Vitality goal and objectives is assessed through seven performance measures, across the modal agencies (coordinated under the umbrella of MDOT). Some measures related to TAP include:

1. State Highway Administration (SHA) percentage of State-owned roadway directional miles within urban areas that have sidewalks and percent of sidewalks that meet Americans with Disabilities Act (ADA) compliance;
2. SHA percentage of State-owned roadway centerline miles with a bicycle level of comfort (BLOC) grade "D" or better; and
3. SHA number of directional miles improved for bicycle access.

The measures are tracked annually by the corresponding administration that is responsible for the data. Every year MDOT develops the Annual Attainment Report on System Transportation Performance that reports 10-year data trends, annual performance information, and future strategies for all performance measures associated with each goal.

Regional Level

The Baltimore Regional Transportation Board is an example of an agency that uses performance measures at a regional level in Maryland. The Baltimore Regional Transportation Board is the designated MPO for the Baltimore region, encompassing the Baltimore Urbanized Area, and includes official representatives of the cities of Annapolis and Baltimore, the counties of Anne Arundel, Baltimore, Carroll, Harford, and Howard, as well as representatives of the MDOT, the Maryland Department of the Environment, the Maryland Department of Planning, and the MTA.



The Baltimore Regional Transportation Board developed the 2015 Baltimore regional transportation plan, *Maximize2040: A Performance-Based Transportation Plan*. The plan reflects the intent of Federal legislation contained in title 23 and the metropolitan planning regulations. The Board approved a series of performance measures for use in monitoring future transportation system performance and adopted goals and strategies of the regional long-range plan, *Maximize2040*. Examples of the performance measures and targets for achievement include the following:

Highway Safety: (Measure addresses title 23 requirements)

1. Serious injuries per 100 million vehicle-miles traveled (VMT): Reduce serious injuries per 100 million VMT (all public roads) to 3.0 by 2040.
2. Fatalities per 100 million VMT: Reduce fatalities per 100 million VMT (all public roads) to zero for region by 2040.
3. Number of serious injuries: Reduce number of serious injuries (all public roads) to 676 for region by 2040.
4. Number of fatalities: Reduce number of fatalities (all public roads) to zero by 2040.

Data sources:

- Data from Maryland Highway Safety Office; formulas (from draft Federal regulations): Five-year rolling average of serious injuries and fatalities divided by 100 million VMT on all public roads for a calendar year. Five-year rolling average of serious injuries and fatalities on all public roads for a calendar year.

Accessibility: (Measure not required by title 23)

1. Sidewalks: Increase percentage of State-owned urban area directional roadway miles that have sidewalks on both sides of the roadway to 25 percent by 2040.
2. Nonauto mode share: Increase bike-pedestrian-to-work mode share to 4.0 percent by 2040.
3. Transit ridership: Increase average weekday MTA and locally operated transit systems ridership (all modes) to 500,000 by 2040.

Data Sources:

- Sidewalks: Data from MDOT Attainment Report: On SHA roads where pedestrian access is allowed within urban areas as defined by the U.S. Census Bureau.
- Nonauto mode share: From American Community Survey (U.S. Census) data.
- Transit ridership: As reported by MTA and locally operated transit systems.

Local Level

As an example of performance measure use at the local level, the City of Rockville, Maryland Draft 2014 Bikeway Master Plan includes a series of objectives and performance measures. The plan's objectives 1 and 4 follow, along with the corresponding policies and performance metrics.

Draft 2014 Bikeway Master Plan, Objective 1—Mobility:

Enhance the mobility of bicyclists by improving the bicycle facility network. The recommendations within this plan are intended to help create a more comprehensive bicycle network. It is also helpful to be knowledgeable about Rockville's bicycle ridership. Statistics allow us to better plan for the future by knowing current ridership numbers and compare them to past and future ridership data.

Policies:

- Policy 1.1—Install bike paths, lanes, signs, crossings, signals and other facilities recommended in this Plan.
- Policy 1.2—Gather bicycle counts and public input to determine where new facilities and improved maintenance are needed.

Performance Measures:

- Number of miles of bikeways of all types.
- Progress towards implementing the total number of miles of bikeways proposed in this plan.
- Results of public surveys and bicycle counts, including the annual National Bicycle and Pedestrian Documentation Project.

Draft 2014 Bikeway Master Plan, Objective 4—Safety:

Improve the safety of bicycling in Rockville for users of all groups.

Policies:

- Policy 3.1—Increase enforcement of motorist and bicyclist behavior to reduce bicycle and motor vehicle crashes.
- Policy 3.2—Ensure that children have a safe and accessible way to get to school using active transportation.
- Policy 3.3—Collect, monitor, and review bicycle-related crashes and analyze reasons and potential solutions to prevent future crashes.
- Policy 3.4—Identify potentially strong bicycle routes where ridership may be depressed because of safety concerns.

Performance Measures:

- Number of warnings or citations targeting road user behaviors that compromise bicycle safety.
- Number of warnings or citations given to parties determined at fault in a crash involving a bicycle where warranted.

4.0 The FHWA Performance Management Framework

FHWA has developed a seven-step Performance Management Framework that is intended for agencies to apply to the transportation planning and programming process, including development of the statewide and regional long-range transportation plan and regional or State transportation improvement program. The steps include:

- **Step 1**—Develop Goals and Objectives;
- **Step 2**—Select Performance Measures;
- **Step 3**—Identify Trends and Targets;
- **Step 4**—Identify Strategies and Analyze Alternatives;
- **Step 5**—Develop (Plan-Level) Investment Priorities (in the LRTP);
- **Step 6**—Develop (Program-Level) Investment Priorities (in the TIP/STIP); and
- **Step 7**—Ongoing Monitoring, Evaluating, and Performance Reporting.

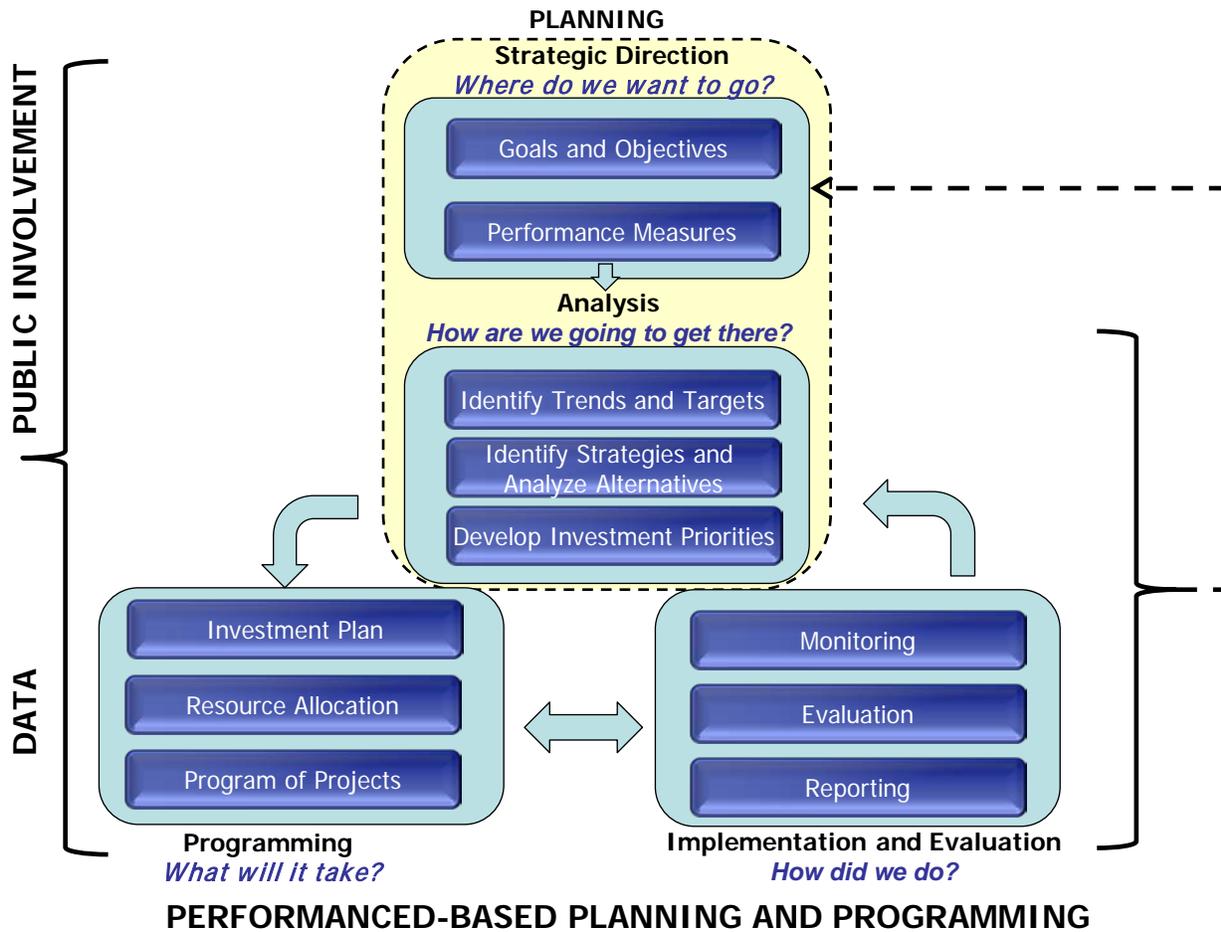
This framework is illustrated in figure 4.1. FHWA's Planning and Programming Guidebook describes in more detail how this framework can be applied to the transportation planning and programming processes. The TAP should be carried out within the broader performance management framework created by an agency. The framework also can be adapted for specific application to the TAP. The remainder of this section provides a brief overview of the framework, illustrating how it can be applied to the TAP.

Step 1—Develop Goals and Objectives

A *goal* is a broad, socially driven aim that guides overall decisionmaking and describes a desired end state, while an *objective* is a specific aim that supports the attainment of a broader goal and can be quantified to measure progress. Federal surface transportation law sets national goals for transportation, as described in section 2.3, and agencies may also set their own goals. Although the U.S. DOT has not set specific goals for the TAP, program guidance and the delineation of funding areas indicate the overall intentions of the program. Based on this guidance, some States and MPOs have defined their own vision, goals, and/or objectives for the TAP. Doing so is an important first step in developing a performance-based process. Such program-specific goals and objectives should be consistent with the agency's broader goals and objectives for transportation.

For example, goals could include *improve safety on the transportation system, or improve multimodal connectivity and accessibility in the region*. Objectives could include *reduce pedestrian and bicycle injuries through investments in Complete Streets and other supportive infrastructure, or create a network of low-stress or protected bicycle facilities*.

Figure 4.1 FHWA Framework for Performance-Based Planning and Programming



Generally, an agency establishes a process with a hierarchy which includes four to six goals, two to four objectives for each goal, and at least one, but often more, performance measures to track the progress towards goals and objectives. In many cases, the performance measures may be responsive to more than one goal or objective. Goals, objectives, and performance measures may be revised or replaced as a performance-based process evolves over time.

Step 2—Select Performance Measures

As performance measures are designed to do just that—measure performance—the selection of measures should focus on direct outcomes of investments and programs that can be represented in terms of measureable data points. The data must be readily available or can be collected without significant resource burden, and the data must be measured consistently over time.

Section 6.2 discusses criteria that can help guide the process of creating performance measurements that matter. Examples of relevant performance measures are in appendix A.

Step 3—Identify Trends and Targets

After performance measures are selected, the next step is to set numerical targets that quantify the desired trends. Several types of targets may be used, including *directional* (such as improve, reduce, or increase), *aspirational* (not realistic, but frame the ultimate goal, such as “zero deaths on roadways”), or *realistic* (based on past trends and current constraints). Table 4.1 shows an example of a goal and related objective, performance measure, and target.

Table 4.1 Example Goal, Objective, Performance Measure, and Target

Goal	Provide a transportation system that is safe for all users
Objective	Reduce the rate of pedestrian and bicycle crashes and injuries
Performance Measure	Number of pedestrian and bicycle fatalities reported in the State per walk/bike commuter
Target	25 percent reduction from 2012 levels by 2020

Step 4—Identify Strategies and Analyze Alternatives

The next step in the framework is to use performance information to inform and identify potential projects or types of projects for consideration for funding. For a program like the TAP, where projects tend to be relatively small as measured in terms of the dollar value of capital investment, it may be difficult to pick and evaluate specific projects in detail at this stage. Instead, agencies often establish funding “buckets” to support different project types—e.g., trails, safe routes to school, or historic preservation. Performance information, to the extent that it is available, is used to help direct funding into the different buckets. The amount of funding in different buckets reflects overall priorities across the transportation plan—e.g., roadway expansion versus system preservation versus Complete Streets and nonmotorized improvements—as well as within the TAP itself. The “alternatives” or “scenarios” that are analyzed can be different allocations of funding amongst buckets. An example from the Boston MPO’s LRTP development is shown in the sidebar.

At this stage, the performance analysis is likely to be sketch-level in nature. For example, the analyst may use tools that relate miles of pedestrian or bicycle facility (by type) to overall levels of walking or bicycling, crash rates, emissions, and/or other outcomes. Proxies for actual benefits may be used (e.g., population served, observed usage of similar facilities). Some performance indicators may be qualitative (e.g., community livability). Likert scales (e.g., 1 to 3 or -2 to +2) can be used to place measures with different units in common terms or to grade qualitative measures. Different mixes of funding can then be compared based on how they score on different measures. To minimize the bias introduced by any particular analyst on qualitative scoring, scores assigned by multiple people can be averaged, or a “Delphi” approach can be used in which a first round of scoring is returned to the evaluators to help achieve “convergence.”

Boston MPO—LRTP Scenario Analysis

In 2014 and 2015, the Boston MPO undertook development of its latest long-range transportation plan, *Charting Progress to 2040*. The MPO developed scenarios to weigh the benefits and tradeoffs of different investment strategies for the anticipated \$2 billion available over the next 25 years. The three scenarios compared include:

- **Current LRTP Funding Allocation**—which has about 60 percent of funds in major infrastructure projects;
- **Operations and Maintenance Funding Allocation**—Shifting all resources out of major infrastructure projects and into intersection improvements, complete streets, bicycle and pedestrian network, and clean air and mobility projects such as transit; and
- **High-Cap Funding Allocation**—placing 80 percent of funds in major infrastructure projects.

These scenarios were compared using various performance measures, such as:

- Changes in VMT and PMT;
- Mode share;
- Additional jobs in the region;
- Number of high-crash locations addressed;
- Miles of substandard pavement, sidewalks, and bicycle lanes; and
- Number of projects with safety improvements in environmental justice (EJ) areas.

The scenarios were meant to illustrate opposite ends of the investment spectrum. Transportation models were used to evaluate major investment projects while off-model techniques were used to evaluate spending in the various Operations and Maintenance areas. After analysis demonstrated that the Operations and Maintenance scenario performed similarly or better than the other scenarios on all performance measures, the MPO voted to adopt this as the preferred scenario.

While in this example the scenario analysis is applied to the LRTP as a whole, a similar analysis could be conducted just for TAP investment alternatives. Also, different types of TAP investment may be represented in the different LRTP scenarios analyzed.

Source: Boston MPO (March 2015). “*Charting Progress to 2040 The Boston Region’s Next Long-Range Transportation Plan Scenario Planning Results.*” <http://www.ctps.org/lrtp>.

Step 5—Develop Plan-Level Investment Priorities

The fifth step builds on the strategy analysis conducted in step 4. It involves prioritizing strategies and investments and making tradeoffs between different goal areas with a system-level understanding of the level and mix of investments in a given area, for inclusion in the long-range transportation plan and related supporting plans.

Program and Project Prioritization Methods

NCHRP Project 8-36 Task 112, Cross Mode Project Prioritization—An Assessment of Current Practice, provides guidance on and examples illustrating the use of methods for prioritizing projects across modes. The challenge of cross-mode prioritization is similar to the challenge faced in prioritizing resources across different TAP project types. Prioritization methods include:

- **Benefit/cost**, using methods such as return on investment, internal rate of return, equivalent uniform annualized cost or net present value to compare all benefits and costs in monetary terms. This requires monetizing benefits such as time, cost, and health savings for walkers and bicyclists or the value of prevented damage from pollution.
- **Cost effectiveness**, where all costs are monetized but benefits are quantified in natural units. For example, cost-effectiveness could be measured in terms of new pedestrian or bicycle trips, or crashes prevented, per dollar spent.
- **Process-based**, involving steps such as project applications, or public hearings, and a predetermined process, for making funding decisions.
- **Goal-based**, which establishes goals and levels of performance within each mode and identifies the necessary expenditures to achieve the goal(s). For example, program goals could include increasing bicycle mode share or reducing pollutant loadings by some percentage.
- **Multicriteria evaluation matrices** are also commonly used in transportation decisionmaking. Criteria (performance measures) are listed in each row and alternatives listed in each column. Symbols are used, based on quantitative data or qualitative assessment, to rate each alternative on each criterion. However, the criteria are not weighted into an overall score. A decisionmaking body then makes a judgment regarding the preferred alternative considering the information presented.

Project selection criteria should be consistent with LRTP performance criteria. This step requires prioritizing what performance outcomes are most important. The FHWA PBPP Guidebook notes that this process of prioritization should account for performance outcomes using analytical methods, policy priorities, and concerns such as equity, environmental justice, and other considerations. The various performance criteria evaluated in step 4 can be weighted and a scenario can be selected that maximizes the sum of the weighted criteria. Since the selection of weights is arbitrary and many of the performance estimates uncertain, different weights may be tested to show how they will affect the mix of project types funded. The final allocation of funds may reflect not only quantitative performance estimates, but also judgment (based on stakeholder input) as to a mix of spending that best supports the region's interests. Assigning at least some minimum level of funding to different project types can help ensure that a variety of interests and objectives are satisfied.

Step 6—Develop Program-Level Investment Priorities

Step 6 links performance-based planning to programming in the Transportation Improvement Program and State TIP or other agency capital plan. The TIP, STIP, or other capital plan identifies specific projects to be funded over a short-term (typically three- to five-year) horizon. Project prioritization or selection criteria are used to identify specific investments or strategies for a capital plan or TIP/STIP. Projects included in the TIP/STIP are selected on the basis of expected performance, and show a clear link to meeting performance objectives.

Program managers and staff can prioritize projects for inclusion in the TIP/STIP informed by performance data. In a PBPP approach, programming decisions are made based on their ability to support attainment of performance targets or contribute to desired trends, and account for a range of factors. At the program level, evaluation of individual projects—rather than just overall programs or buckets of projects—must be conducted. Therefore, analysis tools specific to individual projects should be applied. Again, some of the criteria may be evaluated quantitatively as data become available (e.g., population served, forecast ridership), while others may be evaluated qualitatively (e.g., equity, community support). Practical factors such as project readiness must also be considered.

In order to connect the LRTP, which has an outlook of at least 20 years, to selection of projects in a TIP/STIP, some areas develop a mid-range (e.g., 10-year) investment plan or investment program. The investment plan may be incorporated into the LRTP for an MPO, or may involve a set of investment plans for a State DOT or transit agency, addressing different modes, districts, or program areas.

Programming may not be the first time that evaluation criteria are applied to a project. Evaluation criteria can play a formative role (improving a particular project as it develops), as well as an assessment role (judging a project's relevance, effectiveness, or success). Formative criteria can be applied over the process of developing the project, to help shape a project that performs more strongly on the assessment criteria used in program development.

Boston MPO TIP Evaluation Criteria

The Boston MPO's TIP evaluation criteria include six categories: System Preservation, Modernization and Efficiency (36 total points possible), Livability and Economic Benefit (29 total points possible), Mobility (25 total points possible), Environment and Climate Change (25 total points possible), Environmental Justice (10 total points possible), and Safety and Security (29 total points possible). Examples of specific criteria relevant to TAP projects include:

Design is consistent with complete streets policies (up to 4 points)

- +1 Project is a complete street
- +1 Project provides for transit service
- +1 Project provides for bicycle facilities
- +1 Project provides for pedestrian facilities
- 0 Does not provide any complete streets components

Provides multimodal access to an activity center (up to 3 points)

- +1 Project provides transit access (within a quarter mile) to an activity center
- +1 Project provides bicycle access to an activity center
- +1 Project provides pedestrian access to an activity center
- 0 Does not provide multimodal access

Additional examples are included in Appendix A. For the full set of criteria, see: http://www.ctps.org/Drupal/data/html/plans/TIP/TIP_Evaluation_Scoring.html, accessed 3/4/2015.

Step 7—Ongoing Monitoring, Evaluating, and Performance Reporting

The final step in the iterative and evolving performance-based planning process is implementation and evaluation. Activities that occur throughout implementation and continue on an ongoing basis include:

- **Monitoring**—Gathering information on actual conditions (e.g., trail use, school walk mode share, vegetation species in right-of-way, stormwater runoff volume);
- **Evaluation**—Conducting analysis to understand to what extent implemented strategies have been effective; and
- **Reporting**—Communicating information about system performance and the effectiveness of plans and programs to policymakers, stakeholders, and the public.

Although there is significant value in using the same data sources and methods of calculation from year to year to measure performance, there will be opportunities for a performance management program to evolve as new data sources and analysis tools become available. For example, there is growing interest in bicycle and pedestrian counts as a way of measuring performance, demonstrating bicycle and pedestrian infrastructure return on investment, and supporting planning, programming and project prioritization. Historically, transportation agencies have done a good job of monitoring vehicular traffic and transit ridership, but not walking and bicycling. New methods of bicycle and pedestrian data collection are being developed and National Cooperative Highway Research Program (NCHRP) Report 797: Guidebook on Pedestrian and Bicycle Volume Data Collection documents current practices. Bicycle and Pedestrian monitoring methods have been included in the latest version of FHWA's Traffic Monitoring Guide (chapter 4). New tools, such as models to predict bicycle demand, are being advanced as well.



The Silvio O. Conte Community School Safe Routes to School Project resulted in new sidewalks in this Pittsfield, Massachusetts neighborhood.

Program managers and stakeholder groups should consider updating performance measure data sources and methods of calculation to take advantage of these new resources as they become available.

5.0 Making Performance Management Work for My TAP

Performance management can assist in making more efficient use of resources and making sure that funds are spent in an effective manner. However, performance measurement is an activity requiring the collection and analysis of data. Thus, the benefits of performing this activity must outweigh the costs for it to be worthwhile. Introducing performance management into a program with limited funding and staffing resources may be a challenge for many agencies. This section provides guidance on the resources that may be required for performance management, along with suggestions for leveraging existing data, procedures, and staff resources to minimize the additional demands on program staff.

5.1 Resource Requirements

One approach to performance management for the TAP involves existing program staff making incremental changes to add PBPP elements consistent with available resources and data. Other agency staff may also support performance management across programs—including the TAP—to take advantage of common data needs and skill sets. Depending upon staff capacity and resources at the agency, performance management for programs across an agency will benefit from contributions of staff with the following key competencies:

- **Performance Measurement “Champion”/Project Manager**—To centrally manage performance reporting steps, understand internal agency dynamics and performance measurement needs over time, and oversee data collection programs.
- **Community Outreach/Interagency Cooperation/Public Private Partnership Specialist**—To gather public feedback, assemble community goals into measurable performance metrics, and guide partnerships between agencies and commercial entities to access and share data resources.
- **Transportation Planner/Performance Measurement Researcher**—To research best practices for project performance measurement, validate community preferences for measurements, operationalize agency data collection regime, validate performance data that are collected, and identify existing performance measures that do not appear to provide sufficient value to warrant continued generation and reporting.
- **Open Data/IT Systems Analyst**—To develop and maintain a performance measurement “data warehouse,” coordinate interagency performance measurement data access, ensure that open source data standards are followed, validate data that are received, and ensure that data is correctly entered into the database.
- **Computer Scientist/User Interface/Visualization Specialist**—To develop internal and public interfaces to explain the data to decisionmakers and the general public, to complete exploratory data analysis to summarize complex data sets and improve data collection, and to develop shared data management tools.

- **GIS Technician/Spatial Analyst**—To assemble GIS databases from partner agencies and data service organizations (such as crash data), and to develop geospatial inventory of assets where performance will ultimately be measured.

The resources required to support a performance management scheme depend on the needs and capacity of each agency. The key questions to be asked are:

- To what extent will investment in performance management improve the agency's decisionmaking?
- What are the tradeoffs of investing in performance management versus other areas where agency staff could spend their time?

To meet initial project objectives, a simple reporting process may be all that is required. As the needs of performance management and project analysis grow more complex, performance dashboards with real-time data retrieval and report generation capabilities can improve data access and quality, but this requires a significant financial and staff resource investment. Allocating additional staffing resources, such as for the computer scientist position described above, would support a performance management system with the ability for various agency units to develop customized reports by tapping into a centralized, transparent, and accessible database providing the flexibility to tailor reporting to the specific needs.

Appendix E provides a variety of resources to assist agency staff with understanding and applying performance management practices.

5.2 Building on Existing Practices

Challenges exist to performance measurement for the TAP. The easiest data to track are often not the most useful. Some agencies are concerned that creating and tracking performance measures for all of the eligible project categories would prove to be labor-intensive. Additionally, data collection often happens at the local level, leading to concerns over consistency in collection capacity, methodology, and reporting. Agencies can build on existing practice to minimize the additional resource requirements for TAP performance management, especially if the agency has already established a robust performance management process.

Coordinate with agencywide performance management practices. Managing through performance measurement can be a relatively new strategy for many State DOTs, MPOs, and municipal transportation agencies. Departmental communication silos may be reflected in an agency's performance measurement planning. For example, if measurement efforts are piecemeal and uncoordinated, then data is inconsistently collected, described, and stored. Such fragmented procedures across a State or region greatly reduce the data usability (ease, timeliness, and accuracy) and challenge effective data access and analysis. Thus, in identifying resources to effectively measure project performance, it is equally important to plan for how program-specific measures are integrated into an agencywide performance measurement regime.

The steps in TAP performance measurement may be achieved through a program-specific process, a centralized process (agencywide performance management), or developed with the ultimate goal of integration into a common performance management system if one does not yet exist. At an agency level, a clear “home” for performance measurement should be established, and a single section or unit be given the responsibility for seeking improvements across a range of activities that support performance management.

Build on existing performance measures. Some agencies are already using performance metrics that can be applied to TAP, such as in pedestrian and bicycle programs, SRTS, or safety planning. For example, the Boston Region MPO reported it performs before and after analyses of projects included in its TIP. The analyses measure crash rates, level of service, and intersection delay at project sites. Moving forward, MPO staff would like to apply these reviews to other projects, including those funded wholly or in part by TAP dollars.

As of late 2014, New York State DOT was developing safety-based performance measures for all projects that receive public funds. Measurable criteria include the “Core Four” high-level performance measures already in place for State projects:

- Number of pedestrian/bicyclist fatalities;
- Number of serious pedestrian/bicyclist injuries;
- Number of pedestrian/bicyclist fatalities per vehicle-mile driven; and
- Number of serious pedestrian/bicyclist injuries per vehicle-mile driven.⁸

Build on existing data collection efforts. Many agencies are collecting information on an ongoing basis due to other reporting requirements, or to feed into other work activities such as transportation asset management systems. For example, mode share data at a community level can be updated on a regular basis from the Census Bureau’s American Community Survey. Almost all State DOTs and many local agencies already have robust crash data collection programs. Coordination of data collection and data sharing among agencies—for example, a consistent approach and centralized database for local pedestrian and bicycle counts—can support both regional and local performance measurement.

⁸ In the context of measuring relative pedestrian/bicyclist safety it is important to compare fatality and crash rates to overall mobility numbers such as pedestrian miles traveled or bicycle miles traveled. The pedestrian death rate per PMT, bicyclist death rate per BMT, and motor vehicle occupant deaths per VMT could be compared to understand the relative risk of traveling by each mode and to how mobility infrastructure performs across the modes. Previously the cost of household travel surveys has made collecting these data prohibitive; however, as DOTs and MPOs expand their existing practices and capacities for pedestrian and bicycle data collection, they can better inform statewide or regional estimates for BMT and PMT. See: Nordback, K. and M. Sellinger (2014). “Methods for Estimating Bicycling and Walking in Washington State.”

Use project selection criteria to support performance measures. State DOTs and MPOs select projects for TAP funding based on locally established selection criteria. Some of the selection criteria could become the basis of a performance measure program. Also, existing selection criteria could be modified so that the same criteria are measured through baseline and post-implementation data to evaluate whether or not the project is meeting its intended goals.

For example, the Chicago Metropolitan Agency for Planning (CMAP) bicycle and pedestrian selection criteria points are allocated as shown in table 5.1, to address connectivity of the trail system and level of accommodation for nonmotorized transportation.

Table 5.1 CMAP Project Selection Criteria (Example)

Criterion	Points
Completion of Regional Greenways and Trails Plan (30 points max)	
Connecting two existing regional trail sections	30
Extending an existing regional trail	25
Building a new isolated section of planned regional trail	20
Building a new facility that intersects an existing regional trail	10
Level of Accommodation for Nonmotorized Transportation (30 points max)	
Safety/attractiveness rating:	= (score after less score before) * 6
0: Impassable barrier for walking and bicycling	
1: Arterial road with no bike/ped accommodation	
2: Arterial road with some bike/ped accommodation, including marked shared lanes, and collector streets with no accommodation	
3: Low-speed, local streets with no bike/ped accommodation	
4: Unprotected bike lane; local and collector streets with full accommodation	
5: Trail or arterial sidepath, cycletrack, protected bike lane, or buffered bike lane	

Source: Memorandum to Transportation Committee from Chicago Metropolitan Agency for Planning Staff re: Programming of the Federal Fiscal Year 2015-2016 Transportation Alternatives Program Funds and Management of the Program, August 2014.

Performance metrics can be built based on the above criteria. For example, a hypothetical program-level metric might be “number of trail gaps closed,” “number of regional trails connected,” or “number of facilities with safety/attractiveness rating raised to at least 4.”

6.0 How Do I Create a Performance Management System for My TAP?

This section addresses how to develop a performance management system that meets State and local agency needs, consistent with the FHWA framework described in section 4.0. The information provided here is tailored to be appropriate for the TAP, considering the constraints on fiscal and human resources typically encountered at State and MPO TAP programs. The steps described here include:

- Identify stakeholders involved in the process;
- Define program and project performance objectives;
- Define associated performance measures, data sources, and measurement tools; and
- Define how performance measures, evaluation, monitoring, and reporting will be incorporated into the TAP administration process.

6.1 Identify Stakeholders Involved in the Process

The setting of a vision, goals, objectives, and performance measures associated with a program is a process that should include the input of stakeholder groups and communities affected by the program. To ensure that stakeholders are involved early in the process, the program manager should develop a list of potential stakeholders/groups. This list might include groups such as:

Public Participation Requirements

Federal surface transportation law requires MPOs and States to develop and document a public involvement process for transportation planning.

Each MPO is required to develop a Public Participation Plan and to 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.

The State's public involvement process at a minimum shall: establish early and continuous public involvement opportunities that provide timely information about transportation issues and decisionmaking processes to citizens...and other interested parties; provide reasonable public access to technical and policy information used in the development of the long-range statewide transportation plan and the STIP; and provide adequate public notice of public involvement activities and time for public review and comment at key decision points (23 CFR 450.210).

States and MPOs should 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 (23 CFR 450.210(a)(1)(viii) and 450.316(a)(1)(vii)).

- Local and regional transportation practitioners;
- Environmental groups with an interest in environmental mitigation, invasive species, and/or water quality;
- Bicycle and pedestrian interest groups, including statewide advisory committees;
- Safe Routes to School organizations and committees;
- Complete Streets or Smart Growth organizations;
- The State Historic Preservation Officer (SHPO) and other historic preservation groups;
- Disability rights advocacy organizations;
- Recreational trails coordinator or representative;
- Local Business Improvement District representatives;
- Transit rider representatives or advocacy organizations; and
- Advocates for groups traditionally underserved by existing transportation systems, such as low-income and minority households.

Resources for Stakeholder Engagement

Stakeholder engagement is an essential component of any transportation planning process. Agencies should have experience reaching out to the public about proposals and translating stakeholder comments into program goals and project details. The iterative process of cultivating and gathering informed public comment (communicative planning) is an art as much as it is a science. In regard to TAP projects, agencies should seek to be versed in state of practice strategies and techniques.

The Minnesota DOT's *Developing Your Public Involvement Plan* is an example of a resource to help agencies ID stakeholders and develop a stakeholder engagement plan. See: <http://www.dot.state.mn.us/publicinvolvement/pdf/developingyourpublicinvolvementplan.pdf>

The Michigan Department of Transportation's *Guidelines for Stakeholder Engagement* includes a good stakeholder checklist. See: https://www.michigan.gov/documents/mdot/MDOT_Guidelines_For_Stakeholder_Engagement_264850_7.pdf.

PlanWorks provides resources for linking community visioning and transportation investments. See: <https://fhwaapps.fhwa.dot.gov/planworks/>

Many other States and MPOs have their own public engagement guidebooks. Statewide and metropolitan transportation plans often contain valuable information on stakeholder groups to involve.

Coordination with Other Transportation Stakeholder Input Processes

Because TAP funds can be used for a wide variety of project types, the administering DOT or MPO may want to define the overall objectives for its program before identifying the specific stakeholders with an interest in the program. This can be done with the support of the agency's existing public involvement processes that incorporate a diverse group of stakeholders. If project eligibility is set to be narrower than the Federal guidelines for TAP project eligibility, it may be appropriate to involve only the stakeholders with an interest in program-eligible project types.

The administering DOT or MPO also may choose to make use of existing input processes for related programs. For example, environmental groups may already be providing input to environmental mitigation activities in the State's highway program. Pedestrian and bicycle groups may be providing input to the use of State and local funding for pedestrian and bicycle improvements. Consistency between goals and objectives and measures for the TAP and related policy or funding areas can be desirable.

Once general TAP goals and eligibility are identified, interested stakeholder groups can be consulted specifically with respect to the development of objectives, performance measures, and performance monitoring procedures for the TAP and funded projects.

Existing Documented Input

Existing local and regional visioning and planning documents may be informed by stakeholder viewpoints related to program goals and objectives and should be reviewed. Such documents might include:

- Regional visioning documents;
- State and regional long-range transportation plans;
- Local jurisdictions' comprehensive plans, including transportation elements;
- Bicycle and pedestrian plans;
- Complete Streets policies, manuals, or other guidance;
- Safe Routes to Schools documents or reports that express goals and priorities; and
- Environmental documents that might address TAP funding areas, such as watershed management plans, ecosystem management plans such as described in FHWA's Eco-Logical report,⁹ or historic preservation plans.

⁹ Brown, J. (2006). Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects. Prepared for FHWA by Volpe National Transportation Systems Center.

Outreach Example—Minnesota DOT

In 2013, MnDOT conducted a stakeholder outreach process to develop its TAP. The outreach focused on two key questions—the role of formerly independent programs in the TAP, and whether TAP projects should be selected on a statewide or regional basis. MnDOT held a series of 14 outreach meetings around the State in two phases. The feedback from both phases was collected and synthesized by a TAP working group.

While the outreach process did not focus specifically on performance measurement, one of the recommendations was to “Evaluate Program Processes and Outcomes.” Performance and evaluation are critical components of how MnDOT does business from planning through construction. To the extent possible, the performance evaluation will be incorporated into the overall structure for the TAP. This can help ensure that the structure put in place is producing the desired results (i.e., are the projects selected through the TAP solicitation consistent with the Statewide Program Outcome Objectives). These objectives, as identified through stakeholder outreach, include:

- Promote projects identified in statewide and regional plans;
- Support Safe Routes to School;
- Serve a transportation purpose; and
- Ensure project delivery.

While project selection was recommended to occur at a regional rather than State level, it was also recommended that the State be involved in the development of the selection process and criteria to ensure consistency in goals for both the process and outcomes.

For more information, see: “TAP Outreach Summary” (September 2013) and “TAP Outcome Objectives” (September 2013), <http://www.dot.state.mn.us/map-21/tap.html>.

6.2 Set Program Performance Goals and Objectives

Performance-based resource allocation decisions are anchored in policy goals and objectives which identify an organization's desired direction. As described in section 2.0, TAP goals and objectives should be influenced by the language of title 23 and the guidance documents provided by the FHWA. Program managers should review project definitions originally provided in title 23, section 101(a)(29)¹⁰ as well as section 213 (Transportation Alternatives),¹¹ and also check for the most current guidance provided by the FHWA on the TAP Web pages. When developing objectives, the focus should be on the desired outcomes of program investments.

Program managers can coordinate with stakeholder groups to set a limited number of goals (three to four) that address State and local issues and priorities. Goals are broad and socially driven guides to overall decisionmaking; they describe a desired end state. The goals should:

- Reflect Federal priorities for the program, based on the Federal program description and guidance;
- Align with the national goals established under MAP-21 legislation and codified under Federal surface transportation law in titles 23 and 49; and
- Align with relevant State, regional, and local goals and priorities.

TAP goals might address priority performance issues such as safety, congestion reduction through multimodal transportation options, system reliability, livability, environmental sustainability, access to economic opportunity, equity, and reduced project delivery delays, as well as any local goals. The sidebar on p. 43 discusses how equity can be measured in pedestrian and bicycle planning.

Once goals have been identified, the next component of a PBPP process is developing objectives. Whereas goals relate to the “big picture” or desired end result, objectives should be specific and measurable. An objective is not just a subgoal, but provides a level of specificity necessary to fully implement broader-based goals.

A good objective should include or lead to development of a performance measure in order to support decisions necessary to help achieve each goal. Objectives that lead to performance measures with specific targets and delivery dates, such as reducing pedestrian fatalities by 15 percent from 2010 levels by 2018, are commonly called “SMART” (specific, measurable, agreed-upon, realistic, time-bound). Initially, a State, region, or agency may start out by developing a general objective, which identifies an issue of concern or focus area under a goal area through public and stakeholder outreach. Data and analysis tools used as part of a Congestion Management Plan, Transportation Asset Management Plan, State Highway Safety Plan, or other processes are helpful for identifying focus areas.

¹⁰ Section 101, Title 23, U.S.C., Page 9—<http://www.fhwa.dot.gov/map21/docs/title23usc.pdf>.

¹¹ Section 213, Title 23, U.S.C., Page 196—<http://www.fhwa.dot.gov/map21/docs/title23usc.pdf>.

TAP objectives and performance measures should address the areas of eligibility for the program (as shown in section 2.1). While these objectives and measures should be linked to the national performance measures to the extent possible, not all national goals will be applicable for projects. Goals and objectives also have the flexibility to include issues not explicitly stated in the national goals, such as those relating to community and the human environment. It is important that project performance measurements specifically include those that are place-based and reflect local community interests and needs.

States may prioritize projects that meet national performance measures, and TAP projects can assist States in achieving nationally set goals. For example, title 23 requires an increased focus on elements and features of an unsafe road and crash potential. The TAP can assist States in meeting safety goals by selecting their own measures that prioritize pedestrian and bicycle safety. In 2013, pedestrian and bicycle fatalities made up about 15 percent of the transportation system fatalities and about 3 percent of the injuries.¹² TAP projects can have a positive impact on safety outcomes for bicyclists and pedestrians. Projects that complete networks, fill gaps, and remove barriers to biking and walking not only provide transportation choices but have the potential to reduce transportation emissions and congestion and increase economic development.

The Washington State DOT provides an example of an agency statement of goals for the TAP. WSDOT interpreted the title 23 TAP guidance to reflect the following goals:

- The Transportation Alternatives Program builds upon the previous Transportation Enhancement Program by clarifying the program's goals that address the following: expanding travel choices, strengthening the local economy, improving the quality of life, and protecting the environment.

Examples of other objectives that have been or could be used by TAP and related past Federal programs include:

- Reduce bicycle fatalities by 50 percent by year 2030 (align with Strategic Highway Safety Plan objectives);
- Eliminate bicycle system network gaps identified in (local) bicycle and pedestrian plans by 2020; and
- Complete missing sidewalk connections within one-half mile of schools, hospitals, parks, and transit stations.

TAP objectives may also be inclusive of green infrastructure, eco-tourism, and economic development objectives that honor social and historic community character and improve the aesthetic quality of place.

¹² "NHTSA Quick Facts 2013" (Released December 2014) <http://www-nrd.nhtsa.dot.gov/Pubs/812100.pdf>.

Measuring Equity in Pedestrian and Bicycle Planning

Transportation professionals are familiar with the concept of the 5 “Es”: Education, Enforcement, Engineering (and Policies), Encouragement, and Evaluation. In recent years, a 6th “E,” Equity, has been suggested as an additional consideration for transportation and health officials working on developing connected multimodal systems. Numerous studies have shown that enhancing the ability of traditionally underserved populations to travel by nonmotorized modes can potentially lead to improved outcomes in public health, safety, and economic development; promote resource efficiency; strengthen inclusive neighborhood relations; and bolster public transit services.

Transportation equity relates to how transportation planners can provide access to affordable and reliable transportation, and specifically, pedestrian and bicycle facilities and programs, to meet the needs of all community members, particularly traditionally underserved populations.

A key concept is that equity can be looked at as both a *process* and an *outcome*. For the outcome to be equitable, the process to get there should also be equitable and based on the principles of transparency, inclusiveness, respectfulness, and building trustworthy relationships with the community. Transportation planners can make equity a bigger part of the decisionmaking process by discussing what “equitable” outcomes mean and would look like, setting goals for equitable transportation outcomes, and changing processes to better meet those goals. Decisionmakers can ask “who would benefit from pedestrian and bicycle services?” and “who would not benefit from these services?” under different resource distribution scenarios.

Planners and transportation decisionmakers also may have access to many sources of data that can help identify areas where vulnerable groups exist and demand is not met, or where more engagement may be needed. For example, pedestrian and bicycle crash data can be overlaid on census data to help identify potentially vulnerable neighborhoods within a community. A look at broader public health data can also potentially point to traditionally underserved communities that would likely benefit from targeted investment in pedestrian and bicycle programs. Planners can use facility inventory data to identify gaps in transportation facility connectivity or access to essential services. Established indicators such as percentage of population with access to transit, number and/or percentage of jobs located near affordable housing, and change in average commuting times can be used to assess the equity impacts of TAP and other transportation projects.

Source: Sandt, L., T. Combs, and J. Cohn (2016). “The 6th “E”: Pursuing Equity in Pedestrian and Bicycle Planning.” Prepared for FHWA (pending publication).

6.3 Define Associated Performance Measures, Targets, Data Sources, and Measurement Tools

Performance measures must be selected with consideration of available data and analysis methods for calculating the measures. A measure will be of no value to the agency if reliable data cannot be consistently obtained to compute the measure.

Consider Measures Already Used in Practice

The practice of performance management and use of performance measures in transportation planning has been well-documented over the last three decades. Measures have evolved as agencies have worked to define, test, and refine them. Program managers can leverage this experience when developing performance measures. Examples of performance measures and programs already used in the transportation industry are listed in appendix A. FHWA is also publishing a Pedestrian and Bicycle Performance Measure Guidebook that provides more detailed examples of pedestrian- and bicycle-related measures.

Existing measures that may apply to the TAP can be found in planning and programming documents at the Federal level, at the State or regional/MPO level, and locally in the communities where TAP investments are made. Federal examples include FHWA's Community Vision Metrics Web site and the Environmental Protection Agency's (EPA) Guide to Sustainable Transportation Performance Measures. Program managers may want to review the following information to look for relevant performance measures:

- State and MPO TIP selection criteria;
- Regional or State performance management systems;
- Local pedestrian and bicycle plans; and
- Other local guidelines for community improvements.

Performance measures may focus on processes, outputs, or outcomes.

- **Process** measures relate to following specific procedures, or including certain practices, such as a minimum number of public stakeholder meetings;
- **Product or output** measures relate to how much of a product is produced, such as number of new trails, miles of new or improved facilities, network gaps closed, percent of projects serving environmental justice communities, etc.; and
- **Outcome** measures relate to the ultimate effect of a transportation system on a community, such as access to jobs, quality of life, environmental health, equitable distribution of benefits and costs, economic development, safety, and security.

An agency must evaluate each performance measurement option and determine the most effective focus. For example, outcome measures are of ultimate interest in terms of the

benefits of the TAP projects to society. DOTs in particular have shifted from using narrow goals and internal measures to using broad goals and external measures that are harmonized with long-term objectives. However, output measures can be harnessed to provide an important metric of intermediate program accomplishments, especially when it is difficult to directly link outcomes to program investments. The process of empowering community stakeholders and ensuring that all voices are heard is difficult to quantify. Thus, process indicators are used to assess the quality of community engagement.

Performance Measure Selection Criteria

When defining and refining performance measures, the following criteria should be considered.

A performance measure should have a clear relationship to a goal and an objective.

When reviewing data trends for the measure a program manager should be able to answer the question “how are we doing” for that goal or objective.

For example—If one program goal is to achieve connected pedestrian and bicycle networks, a simple measure of linear miles of facilities added will not directly address that goal; instead, some measure of network connectivity (such as gaps filled, routes intersected, or contiguous miles of low-stress facility) will be needed.

Each measure should meet the needs of a performance program. A program manager can ask, “Would this metric respond directly to program investments and policies and demonstrate investment outcomes?” Many measures are available, but it is important to focus on selecting a few that will be most responsive to program decisions.

For example—Regional air quality is an outcome measure that may be influenced by TAP projects. However, the impact of any single project (or even the program) on regional air quality is likely to be small and/or difficult to measure. Instead, a measure of estimated emissions reduced from eligible projects may be preferable.

A performance measure should be relevant to policymakers and the public.

Measures should reflect key concerns of the public and should be easy to understand. Some DOTs have identified “storytelling potential” as a consideration in selecting performance measures, so that the measures can be used as an effective communication tool.

Finding Out What People Care About

Surveys and/or focus groups can be good tools for finding out what issues people care about and describing them in meaningful ways. For example, a survey conducted by North Carolina DOT in support of the 2040 Statewide Transportation Plan found that the top three benefits NCDOT should consider when prioritizing transportation efforts are:

1. Reducing congestion;
2. Strengthening local/State/regional economies; and
3. Reducing accidents.

See: Atkins for North Carolina DOT, Technical Memorandum: Initial Survey, July 15, 2011, <http://www.ncdot.gov/performance/reform/2040plan/>.

For example—In seeking to measure the quality of a bicycle network, there are a variety of potential measures, such as lane-miles, bicycle level of comfort, feeling of safety, connectivity, etc. A measure such as the average number of destinations (jobs, retail establishments, etc.) that can be reached via a low-stress bicycle network is an example of framing the measure in a way that may be meaningful to the public.

Data should be both readily available and reliable. Agencies should be aware of the common misconception that available data is valuable data. Metrics need to be supported by consistent, high-quality data. If such data is not already available, the agency may want to commit to collecting data in the future that can support the preferred performance measures.

A framework for identifying valuable but currently unavailable metrics should be developed. Exploring new ways to collect transportation data can result in interesting, fruitful partnerships with other agencies. Building these relationships can take time, and require adjustments to existing practices.

A performance-based program should be developed incrementally, and focus initially on existing, available data. Over time, new data sources may be included as agencies expand or shift their data collection priorities. New technologies are rapidly expanding the information available to transportation planners. Program managers should anticipate sources that may become viable in the near future if they could significantly improve performance management, such as new mobile apps, counting technologies, and simulation models.

Program managers may find new data sets and analysis tools through State and national partners. For example, the National Bicycle and Pedestrian Documentation Project, as well as other groups and agencies, are working to improve the collection of data on pedestrians and bicyclists (see sidebar).

National Bicycle and Pedestrian Documentation Project

NBPD is a nationwide effort to provide consistent models of data collection and ongoing data for use by planners, governments, and bicycle and pedestrian professionals. Cosponsored by Alta Planning and Design and the Institute of Transportation Engineers (ITE) Pedestrian and Bicycle Council, this project pushes agencies to conduct bicycle and pedestrian counts and surveys in a consistent manner. It also provides extensive resources in the form of methodologies and surveys that agencies can adapt to estimate existing and future bicycle and pedestrian demand and activity in their own regions.

See <http://bikepeddocumentation.org/>.

The measure should have a clear direction for performance improvement. In some cases, agencies choose measures but do not state clearly whether they desire the measure to increase or decrease, which is particularly problematic when the measure could be interpreted differently depending on one's perspective. While the number of fatalities is a measure with an obvious preferred direction (lower), other measures such as vehicle-miles traveled (VMT) per capita may not be as straightforward. While a decrease in VMT may indicate enhanced viability of alternative modes of travel, it can also be caused by declining economic or employment conditions. Thus, agencies should make the preferred direction clear in their publications, as well as provide justification for why this is preferred.

The number of measures should be manageable. The selection of performance measures should be limited to a manageable number that can be tracked, reported, analyzed, and refined using existing agency resources. The number of measures should be sufficient to inform decisionmakers as to how a system or services are performing based on investments and policies, but not so many as to create excessive demands on staff time and resources. General guidelines suggest four to five goals, two or three objectives for each goal, and at least one performance measure for each objective.

General guidelines suggest four to five goals, two or three objectives for each goal, and at least one performance measure for each objective.

Data and Measurement

Charles Babbage, a 19th century mathematician, philosopher, and scientist, reported having been twice asked, “Pray, Mr. Babbage, if you put into the machine wrong figures, will the right answers come out?”¹³ (No, they will not.) Performance measures work the same way—to end up with useful, informative performance information, correct, reliable, consistent data must be used. Table 6.1 provides an example of a resource and data assessment matrix that can be used to evaluate the adequacy of data sources to support each proposed performance measure.

To end up with useful performance results, reliable and consistent data is needed.

When considering data sources, program managers should consider the following questions:

- Is the data significantly affected by outside forces beyond program control?
- Does tracking and analysis of the data inform decisionmaking?
- Will the data (and future changes in data) reflect outcomes or outputs of program investments?
- Is the data being considered for use in performance management because they are useful, or just because they are available?
- Are there two data components that could be combined to create a more informative performance measure? (e.g., VMT versus VMT per person)
- Is there another way of presenting data that produces a better measure? (e.g., number versus percent)
- How much time will be required to track, analyze, and report this data?
- How much funding might be required to track, analyze, and report this data?

Table 6.1 can be used as a worksheet when developing performance measures. Doing so should help program managers avoid common pitfalls—such as developing measures that

¹³ Babbage, C. (1864). *Passages from the Life of a Philosopher*, as cited in <http://en.wikiquote.org/>.

require too much staff time to track, analyze or report, or relying upon data sources that are not dependable. Appendices C and D include examples of completed assessments for an MPO and a State DOT.

Table 6.1 Performance Measure Resource and Data Assessment

Performance Measure under Consideration For Example: Bicycle Mode Share				
Data Source				
Data Source (where do we get the data)?	Does the program collect this data internally?	If collected by program, what is the level of effort? Consider hours required to collect data, or general level of effort—H/M/L.	Is there a cost associated with this data? If so, what is the cost?	Is funding for this data consistent?
Data Availability and Data Quality				
Data history—how far back is data available? Is it sufficient to identify trends?	Data frequency: How often is the data made available from year to year?	Is reporting consistent, or has there been variation in methods of calculation over time? Would this variation make data incomparable over time?	Is the reported data considered an estimate or is the data actual?	How reliable is this data source? If the source were to discontinue, is there a back-up source?
Data Analysis—Level of Effort				
What is the level of effort to analyze this data for the purpose of estimating past trends?	What is the level of effort to analyze this data for reporting?	Does this data need to be assessed by using a Transportation Model?	Does this data need to be assessed by using GIS?	How complex would the method of calculation be? Describe method.
Data Usefulness to Performance Reporting				
How directly does data address the stated goals and objectives?	Would changes in the data be a direct result of program investment and activities?	What is the likeliness that changes in the data are due to influences outside the program?	What is the likeliness that changes in the data are due to outside influences?	

It is a best practice to develop a data profile or summary template for a performance measure to ensure continuity of data access and consistent application of the data calculation methodology. The data profile or summary template also provides an opportunity to better describe why collecting the data is important in regard to transportation infrastructure and community benefits. The following characteristics are recommended for each profile:

- General description, including calculation methodology;
- Value and importance of data;
- How data relates to community well-being;
- How data relates to possible effects of transportation infrastructure, including hypothesized direction of effects;
- How a transportation agency may incorporate this measure into practice, and how it differs from current practice:
 - Actual data source and agency;
 - How to retrieve data/location;
 - Primary and secondary contacts, and contact information for data;
 - Timeline for data availability;
 - Quality assurance/quality control processes for data; and
 - Cost.
- Other information that is beneficial to long-term tracking and reporting of performance.

Figure 6.1 is an example of a performance measure summary template. Once measures have been chosen for use in the program, the function of the performance measure summary template is to document all of the metadata about the measure in one place. The program manager would consult this document to address any questions about data source, data file location, calculation methodology, quality control, etc. Having such a summary documented for each measure can be especially helpful in the case of turnover of staff or management—legacy knowledge is not lost as this critical information is documented. Having this information documented helps to ensure that the same data and calculation methodologies are used for reporting over time.

The performance measure summary template helps ensure that legacy knowledge is not lost as staff turns over.

Figure 6.1 Performance Measure Summary Template

General Information					
Goal					
Objective					
Performance Measure					
Performance Measure Term Definitions					
Method of Calculation					
Why This Measure is Tracked					
Data Location					
Performance Measure/Component					
Data Location	From Hard Copy <ul style="list-style-type: none"> • Document Name: • Agency Responsible: From Electronic Copy <ul style="list-style-type: none"> • File/Database Name: • Agency Responsible: 				
Data Update and Review					
Performance Measure/Component					
Frequency Data is Updated	(e.g., annually or monthly)				
Frequency Data is Reviewed					
Data Ownership					
	<table border="1"> <thead> <tr> <th>Primary</th> <th>Secondary</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	Primary	Secondary		
Primary	Secondary				
Contact Name/Responsible Office					
Contact Phone No.					
Contact Email					
Performance Measure Audit					
Performance Measure/Component					
Data Control Procedures					

Set Performance Targets

After performance measures have been selected, the next step is to set numerical targets that quantify the desired trends. The desired trends should be specified for each measure. For example, is the intent to reduce, increase, or maintain? Specific numerical figures for targets may also be established for each performance measure. This provides direction to strategy analysis and performance tracking.

Several types of targets may be used, including directional, aspirational, and realistic.

- **Directional** targets do not define a specific numerical target—but rather indicate the direction an agency would like to see a trend move in—directional targets include terms such as improve, reduce, or increase.
- **Aspirational** targets are those that describe the result that an agency would like to achieve. Aspirational targets represent an ideal, and are not likely to demonstrate an achievable target within a short- or often long-term timeframe given resource constraints and other factors, such as required modification of human behavior.
- **Realistic** targets are numerical targets that are set within the context of constraints such as available funding, staff resources, current trends, and other factors. The first step to set realistic targets is to review existing data and past trends, and use the analysis to determine what might be realistic short- and long-term targets.

To develop targets, it is useful to first analyze data to recognize past trends. Next, to see how performance might look without intervention, extrapolate historical performance trends, or assume the same level of projects and programming. Based on this analysis, which may be supplemented with a review of targets and achievements in other similar areas, the program manager can determine what is achievable based on funding levels. As staff develop more experience with performance-based planning and programming and participate in several cycles, more information will be acquired to develop realistic targets.

Establishing target timeframes. Program managers not only need to determine what target they want to achieve, but by when. Associating a timeframe with a target will help to inform what target level is feasible to accomplish. As noted in the FHWA PBPP Guidebook, targets may be set in the context of several analysis periods:

- **Long-range**—As part of the process of developing the long-range transportation performance, a target may be set for the long-range horizon period (20 or more years in the future). These types of targets may be particularly useful for metrics that change very slowly or for which there is a long time lag between policy implementation and expected effects.
- **Mid-range**—Several State DOTs, transit agencies, and MPOs have been developing investment plans or programs that set targets and examine performance over a 10-year period. Although current Federal regulation does not require planning analysis over this

time horizon, some agencies have found it useful to support their planning and programming efforts.

- **Short-range**—Targets may also be set over a three- to five-year time horizon. These targets may be particularly useful for topic areas where transportation agencies have more direct control, such as operational considerations and asset conditions (e.g., number of bike racks on buses, sidewalk or trail conditions).

Desired trends and targets over the long-range time horizon should form a basis for investment decisionmaking in planning and programming, as it is important to make sure that a program of projects does not focus on near-term improvement at the expense of long-range priorities.

Methods for Setting Performance Targets

- Extrapolate historical performance trend.
- Determine what is achievable.
- Base on policy considerations and desired outcome.
- Predict performance depending on funding level.
- Revise project evaluation and prioritization criteria to reflect performance objectives.
- Establish data collection and monitoring process.
- Report on progress towards meeting targets.
- Adjust projections and targets if needed based on experience.

6.4 Define How Performance Measures, Evaluation, Monitoring, and Reporting Will Be Incorporated into the Program Administration Process

The final step in creating a performance management process is to define how performance measures, evaluation, monitoring, and reporting will be incorporated into the program management and administration process. For example, elements of performance management that are newly introduced—or coordinated with other transportation performance management activities—might include some or all of the following:

- Funds are allocated among project types based on overall goals and objectives set for the program.
- Project prioritization and selection criteria are defined that include performance metrics (e.g., population served by new facility, whether project addresses a high-crash location, anticipated reduction in air pollutant emissions, improvement in water quality). See appendix A for examples of project evaluation criteria.

- Project sponsors are asked to report information that informs these metrics as part of their project proposal.
- The DOT or MPO develops standard estimation methods for the project performance criteria. For example, many agencies have developed standard procedures or templates for estimating emission reductions for CMAQ-funded projects.
- An electronic tracking system is established to provide ready access to the status of funding obligation and project implementation activities.
- The DOT or MPO will collect data to evaluate the post-implementation performance of a sample of projects. See sidebar for the American Tobacco Trail.
- The DOT or MPO is committed to improving data collection to inform long-term monitoring of broad trends in program-related indicators such as pedestrian and bicycle safety, demand, air pollutant emissions, water quality, and invasive species.

Many of these activities are similar to those that have long been practiced in the CMAQ program, for the purpose of tracking estimated emissions benefits. However, program evaluation and monitoring would focus on a broader set of objectives and performance measures consistent with locally defined outcomes for the program.

The TAP offers an opportunity to use a post implementation analysis—Do the projects perform the way we want given all of the needs and uses we have of them? For example, *Rethinking Streets*, a product of the University of Oregon’s Sustainable Cities Initiative, provides evidence-based research for 25 Complete Street conversions (from mobility-based to accessibility-based designs). This resource is recommended to provide some insight for agencies to create a post-analysis framework. The research looks at safety, economic, aesthetic, environmental, and other community benefits.

Post-Project Evaluation Example—The American Tobacco Trail

North Carolina DOT conducted a before-and-after study to document the benefits of a new bridge linking two segments of the 22-mile American Tobacco Trail in Durham and Wake County, North Carolina. Before (2013) and after (2014) data were collected and compared to determine changes in trail usage affecting transportation, health, and economic behaviors resulting from the construction of the bridge. The survey found that trail users traveled 27 percent farther, on average, after completion of the bridge, and spent an additional \$3.7 million annually on goods and services.

See: Institute for Transportation Research and Education at, North Carolina State University, *Bridging the Gap: Economic, Health, and Transportation Impacts from completing a critical link in a 22-mile rail trail*. Prepared for NCDOT, et al.

Appendix A. What Are Some Examples of Performance Measures?

A.1 Introduction

This section provides examples of performance measures relevant to the TAP, drawn from literature and practice. These are intended to be illustrative examples of measures meeting the criteria set forth in section 6.2. Additional resources listed in appendix E—such as FHWA’s Pedestrian and Bicycle Performance Measures Guidebook—provide more extensive lists of potential performance measures.

Measures are provided for **project delivery performance** (section A.2), as well as by general project type in four categories encompassing all of the eligible project types as specified in 23 U.S.C. 101(a)(29) and 213:

- **Pedestrian and bicycle**, including safe routes to school, rail to trail conversions, and routes for nondrivers (section A.3);
- **Human environment**, including cultural and aesthetic improvements, including historic preservation and rehabilitation, archeological activities, outdoor advertising management, and scenic turnouts and overlooks (section A.4);
- **Natural environment**, including mitigation and enhancement, including vegetation management, runoff/water quality, and habitat connectivity (section A.5); and
- **Boulevards and other roadways** formerly in highway right-of-way (section A.6).

Each subsection provides a table of sample measures that identifies data requirements, advantages, and limitations of each measure. The tables also identify:

- The **scale of application** for which the measure is best suited:
 - Project level, either to support project prioritization/selection, or to measure effectiveness post-implementation; or
 - Program level, to measure the overall effectiveness of all the projects implemented through the program.
- The **type of measure**, specifically whether it is:
 - *Process*—How the project was developed and delivered;
 - *Product or output*—What was produced (e.g., bike lanes, sidewalks, route to school);
 - *Outcome (pre)*—The benefits of the project, as forecast or estimated in advance (e.g., increase in number of bicycling and walking trips); or
 - *Outcome (post)*—The benefits of the project, as observed after implementation.

Outcome measures describe meaningful impacts to travelers and society such as safety improvements, mode shift, and reduction in pollution. Outcome measures are of ultimate interest in terms of the benefits of the TAP to society. However, outcomes are often difficult to measure, or it may be a challenge to connect outcome measures (such as regional mode shares or water quality) specifically to program investments. In such cases, *product* measures (e.g., miles of trail completed or acres of vegetation replanted) can provide an important intermediate metric of program accomplishments. *Process* measures (for example, was the project designed using a sustainability checklist or tool such as INVEST) can also serve as a proxy for how well the project is expected to support overall program goals and objectives and to describe the level of community/stakeholder engagement in shaping the project.

Many of the outcome measures are suited for both pre- and post-project estimation. However, the data sources will likely be very different, as forecasting methods are required before the project is built, whereas field measurements can often be used to observe impacts after the project is built. Also, some measures will be difficult or impossible to forecast ahead of time due to limitations in data or analysis methods. Appendix B provides more information on data sources that can be used to estimate the various measures.

A.2 Project Delivery Performance

One of the performance goal areas is reduced project delivery delays. Specifically, a goal is 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. A number of agencies work to expedite delivery by providing technical support to project sponsors (see sidebar).

Program managers can evaluate how well the project delivery process is performing, by evaluating whether funds are obligated in a timely manner, and whether projects are completed consistent with expected schedules. Program performance can be affected by the administering agency's internal procedures, implementation of design flexibility, and timelines, as well as by the sponsor agency's actions. Project readiness is an often-used project selection criterion that indicates whether the project sponsor is ready to undertake the proposed work. A well-functioning program that selects ready-to-go projects and expedites their delivery ensures that communities receive the mobility, economic, environmental, and other benefits of TAP projects in a timely manner.

Table A.1 provides sample measures for project delivery performance.

Managing for Project Delivery

One cause of project delays is when project sponsors are not familiar with all the requirements associated with Federal-aid funding or the TAP. Some States and MPOs have found technical assistance to be very effective in helping to expedite project delivery and completion.

For example, Maryland DOT convenes a mandatory day-long training for TAP applicants to review each application and the administrative requirements of the project. The Atlanta Regional Commission has a two-stage process where they first ask potential sponsors to submit a fairly brief (two to three page) letter of interest describing the project, how it aligns with regional goals, data points about the project, and their experience with the TAP program. The agency also assigns local liaisons to help jurisdictions with project identification and administration.

The Delaware DOT directly manages almost all of the TAP projects beginning with award and ending with construction management and project close-out. The agency's focus on program performance has had noteworthy results. Through TAP and earlier with Transportation Enhancements, only three projects over a 14-year period have not gone through to completion. The average completion of TAP projects is between 18 and 20 months from award date. The State's small size and ongoing technical support for the duration of the project are factors in facilitating effective management of the program. Larger States may not be in the position to provide the same level of direct assistance over the entire duration of all TAP projects, but may be able to engage at strategic points to ensure that project sponsors remain on track.

FHWA has resources to accelerate project delivery in its Environmental Review Toolkit, see <https://www.environment.fhwa.dot.gov/index.asp>.



Anacostia River Trail in Bladensburg, Maryland.

Table A.1 Sample Measures for Project Delivery Performance

Measure	Program-Level	Project-Level	Process	Product	Outcome (pre)	Outcome (post)	Data	Advantages	Limitations
							Requirements		
Number of applications received	✓		✓				Program administration data	Measures awareness of and interest in program	More applications does not necessarily mean better projects or outcomes
Percent of available funds obligated within x time period of authorization	✓			✓			Program administration data	Supports goal of timely project delivery	
Percent of projects completed within x time period of obligation	✓			✓			Program administration data	Supports goal of timely project delivery	Projects may have different expectations for completion timeframe

A.3 Pedestrian and Bicycle Facilities

This category of projects includes facilities for pedestrians and bicyclists as well as programs to encourage walking and bicycling and improve safety. This includes the following project types as originally listed in the legislation under the former section 213:

- **Pedestrian and Bicycle Facilities**—Construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other nonmotorized forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety-related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990;
- **Safe Routes for Nondrivers**—Projects and programs that allow children, older adults and individuals with disabilities to access daily needs, such as schools, clinics, libraries, markets, and public transportation;
- **Safe Routes to School**—Including infrastructure projects, noninfrastructure projects, and program coordination; and
- **Rail Corridor to Trail Conversions**—To help expand travel and recreational opportunities within communities.

These projects are intended to make nonmotorized transport safe, convenient, and appealing. They support the following national goal areas as specified in 23 U.S.C. 150:

- **Safety**—By reducing injury and fatality rates for pedestrians and bicyclists;
- **Infrastructure Condition**—By reducing wear and tear on the roadway system;
- **Congestion Reduction**—By encouraging mode-shifting from automobiles to walking and bicycling;
- **System Reliability**—By providing reliable alternatives to driving;
- **Freight Movement and Economic Vitality**—By saving households money, providing low-cost access to jobs, and supporting economic activity in local communities; and
- **Environmental Sustainability**—By reducing energy consumption and air pollution emissions from automobiles.

Table A.2 provides sample measures for pedestrian and bicycle projects.

Table A.2 Sample Metrics for Pedestrian and Bicycle Programs and Projects

Metric	Program-Level	Project-Level					Data Requirements	Advantages	Limitations
			Process	Product	Outcome (pre)	Outcome (post)			
Percent of funded projects that come from a local or regional pedestrian or bicycle plan (or, project comes from a plan)	✓	✓	✓				Project source A ped or bike plan can be a systematic approach to identifying investment priorities	Plan may not have been developed or may be out of date	
Miles of new facilities funded by facility type (shared use path, bike lane/track, sidewalk, etc.)	✓	✓		✓			Project design details Simple to measure	Distance of facility provided may not correlate to ridership, safety improvement, etc.	
Number of intersections with improved crossings	✓	✓		✓			Project design details Simple to measure	May not to relate to where pedestrian activity occurs or is desired	
Percent of street-miles within one-half mile of schools with accessible routes (sidewalks, crossings)	✓			✓			Project locations and design, school locations Measure specifically addresses school accessibility	Simple linear measure may not indicate priority of problems or need/demand addressed	
Bike network connectivity index	✓			✓			GIS analysis of bicycle facility data Measures not just facility provision, but how well facilities interconnect	Network connectivity indices still under development; requires some effort to calculate	
Change in crash modification factor (CMF)		✓		✓			CMF for old and new facility Proxy for expected crash reduction	Not always good information on CMFs for ped and bike facilities	

Metric	Level		Type				Data Requirements	Advantages	Limitations
	Program-Level	Project-Level	Process	Product	Outcome (pre)	Outcome (post)			
(Percent of) population, employment and/or zero-car households served by facility(ies) (e.g., within one-quarter mile of bike facility)	✓	✓		✓			Sociodemographic data	Indicates how many people could potentially benefit from facility	Does not indicate how many people will actually use it Facility may not be readily accessible to all of service area
Proportion of new facility mileage serving designated environmental justice communities, compared to proportion of population in those communities	✓			✓			Facility lengths and locations EJ community designations	Measure of equity in facility provision	Does not indicate actual use/value of facility to community
Average number of jobs accessible via low-stress bicycle facilities	✓				✓		Locations of workers and jobs Bike network by facility stress level	Measures potential access to economic opportunity	Jobs accessible may not match skill levels of workers
Forecast change in walk and bike trips on new facility(ies) or in areas with TAP-funded programs	✓	✓			✓		Demand forecasting model or method	Relates to mobility and environmental benefits	Difficult to reliably forecast demand
Observed change in walk and bike trips on new facility(ies) or in areas with TAP-funded programs	✓	✓				✓	User counts, before and after	Relates to mobility and environmental benefits	May need to also observe parallel facilities to account for diversion

Metric	Level		Category				Data Requirements	Advantages	Limitations
	Program-Level	Project-Level	Process	Product	Outcome (pre)	Outcome (post)			
Number of trips on funded facilities diverted from automobile, or diverted VMT	✓	✓				✓	User counts; surveys on prior mode of travel and trip length	Reduced vehicle trips/VMT directly relates to environmental and congestion benefits	May be data-intensive to develop facility-specific estimates
Reduction in energy or pollutant emissions	✓	✓				✓	VMT reduction and emission factors	Direct measure of environmental impact	May be data-intensive to develop facility-specific estimates
Total regional walk and bike trips, PMT, and/or mode shares	✓					✓	American Community Survey (commuting), regional household travel survey, comprehensive user counts	Relates closely to mobility and environmental benefits	Data-intensive, surveys may be infrequent Other contributing factors besides TAP
Regional pedestrian and bicycle fatality and injury rates	✓					✓	State crash data systems, Fatality Analysis Reporting System, General Estimates System; exposure metrics	Relates closely to safety benefits	Other contributing factors besides TAP May be small number of fatalities and/or unreliable injury data
Change in crash rates along facility		✓				✓	State or municipal crash data systems	Direct observation of safety benefits	May be confounding factors especially if small number of incidents
Number of traffic incidents involving children walking or bicycling to or near schools	✓					✓	State or municipal crash data systems	Direct observation of safety benefits for school-focused programs	May be confounding factors especially if small number of incidents

A.4 Human Environment—Cultural and Aesthetic Improvements

This category of projects includes the following eligible activities:

- **Historic Preservation/Rehabilitation**—Projects that allow communities to restore transportation facilities eligible for inclusion in the National Register of Historic Places, to educate the public, and to give communities a unique sense of character that attracts tourists and generates a vibrant economic life. Examples include:
 - Restoration and reuse of historic buildings with strong link to transportation history;
 - Restoration and reuse of historic buildings constructed or used for transportation-related purposes;
 - Interpretive displays at historic sites;
 - Access improvements to historic sites and buildings;
 - Restoration of railroad depots, bus stations, and lighthouses;
 - Rehabilitation of rail trestles, tunnels, bridges, and canals;
 - Research, preservation planning, and interpretation;
 - Developing interpretive signs, exhibits, and guides; and
 - Inventories and surveys.
- **Archeological Activity**—Allows communities to explore another facet of history with archeological survey, excavation, and interpretation in conjunction with highway construction projects. Examples include:
 - Developing and improving GIS systems and electronic databases of archeological surveys and site information to assist highway development planning;
 - Summarizing and synthesizing information that resulted from archeological excavations and surveys in conjunction with highway projects in a format accessible to the public and useful for archeological research;
 - Developing management and public interpretation plans for archeological sites found in conjunction with highway construction projects; and
 - Collaborating with descendent communities to develop historical narratives from archeological data from sites found in conjunction with highway construction projects.

- **Scenic Turnouts and Overlooks**—These activities include the construction of turnouts, overlooks and viewing areas, that communities use to develop the scenic and historic character of highways. These projects make the travel experience educational and attract tourists to local roads.
- **Advertising Management**—These activities include the management of outdoor advertising, including completing billboard inventories and the removal of illegal and nonconforming billboards.

These projects all generally are intended to support cultural resources and improve the aesthetic experience in the Nation’s communities. They support the following national goal areas as specified in 23 U.S.C. 150:

- **Safety**—Turnouts and overlooks can provide a safe place for admiring scenic views, and advertising management can reduce driver distractions;
- **Infrastructure Condition**—Rehabilitating historic transportation structures can ensure they are available to serve future generations;
- **Freight Movement and Economic Vitality**—Cultural resources and aesthetic improvements can draw visitors who spend money in the local economy, as well as improving property values; and
- **Environmental Sustainability**—Scenic turnouts and advertising management support appreciation of the natural environment.

Table A.3 provides sample measures for human environment projects.

Table A.3 Sample Metrics for Human Environment Projects

Measure	Program-Level	Project-Level	Process	Product	Outcome (pre)	Outcome (post)	Data Requirements	Advantages	Limitations
(Percent of funded) project(s) designed with CSS approach	✓	✓	✓				Description of project development process	Uses CSS approach as a proxy for improving the human environment	No guarantee that outcomes will be consistent with program goals/objectives
(Percent of funded) project(s) subject to or emerging from sustainability assessment (e.g., INVEST)	✓	✓	✓				Description of project development process	Uses sustainability assessment as a proxy for improving the human environment	No guarantee that outcomes will be consistent with program goals/objectives
(Percent of funded) project(s) applying relevant best management practices (BMP) (e.g., visual impact assessment)	✓	✓	✓				List of possible BMPs for each funded project type and actual project features	BMPs will vary widely by project type, so this may be easier to use than looking at specific BMPs as metrics	Requires some effort and judgment to assess whether BMPs are being applied
(Number of) recognized important historic facilities preserved	✓	✓		✓			Historical significance designations; project features/activities	Measure for historic preservation	Number of facilities may not relate to significance
Number of scenic turnouts/overlooks constructed	✓	✓		✓			Project information	Measure for scenic turnouts/overlooks	Number may not relate to quality/use
Number of informational or interpretive facilities	✓	✓		✓			Project information	Measures educational potential of historic, archeological, scenic sites	Number may not relate to quality/use
Number of outdoor advertising signs modified or removed	✓	✓		✓			Project information	Measure for advertising control	May not directly relate to change in visual experience

Measure	Program-Level	Project-Level	Process	Product	Outcome (pre)	Outcome (post)	Data Requirements	Advantages	Limitations
Number and/or significance of artifacts collected at site location	✓	✓				✓	Report on archeological activity	Measure for archeological activity	Number may not relate to significance
Number of people engaged in public outreach or interpretation activities of archeological sites	✓	✓				✓	Web site hits, number of people attending tours or visiting museums or interpretive sites	Measure for archeological activity	Number may not relate to level of enhanced understanding of archeological information gathered
Visitor traffic to project/project area	✓	✓				✓	Traffic counts (before/after), visitor surveys	Measures how many people benefit from improvements that are attractions (scenic, historic)	Difficult to forecast; pre/post counts may be required to measure changes in visitors
Business sales in vicinity of project	✓	✓				✓	Economic Census data; local surveys	Economic impact related to visitation	Difficult to separate impact of project from other factors
Property values in vicinity of project		✓				✓	Assessors databases; sale prices	Economic impact related to aesthetic improvements	Difficult to separate impact of project from other factors
Community and visitor satisfaction		✓				✓	Resident and visitor surveys	Outcome measure of user experience	Requires site-specific survey
Percent reduction in crash rates in vicinity of project		✓				✓	State or local crash data systems, FARS, GES; traffic volumes	Can measure safety benefit of turnouts, sign removal, etc.	Other contributing factors besides TAP—may be hard to attribute a change to program

A.5 Natural Environment—Mitigation and Enhancement

This category of projects includes the following eligible activities:

- **Vegetation Management**—Practices that are employed in transportation rights-of-way to improve roadway safety, prevent against invasive species, and provide erosion control, such as:
 - Clearing of low-hanging branches or other vegetation encroaching on a travel corridor;
 - Landscaping to improve sightlines or other safety considerations;
 - Control of invasive species; and
 - Planting grasses and/or wildflowers to manage erosion along transportation corridors;
- **Stormwater Management**—Management, control, and water pollution prevention or abatement related to highway construction or due to highway runoff, such as:
 - Detention and sediment basins;
 - Stream channel stabilization;
 - Storm drain stenciling and river clean-ups;
 - Water pollution studies;
 - Wetlands acquisition and restoration; and
 - Stream channel stabilization;
- **Wildlife Management and Habitat Connectivity**—Activities to reduce vehicle-caused wildlife mortality or to restore and maintain connectivity among terrestrial or aquatic habitat, such as:
 - Wildlife underpasses or overpasses which may include bridge extensions to provide or improve wildlife passage and wildlife habitat connectivity;
 - Monitoring and data collection on habitat fragmentation and vehicle-caused wildlife mortality; and
 - Developing habitat to protect and promote pollinators.

These projects all generally are intended to mitigate the effects of transportation on the natural environment and to enhance the quality of the natural environment. They support the following national goal areas as specified in 23 U.S.C. 150:

- **Safety**—Vegetation management can improve sightlines and clear zones, reducing crash risk, and wildlife management activities can reduce motor vehicle-wildlife collisions; and
- **Environmental Sustainability**—These activities can improve water quality, reduce the prevalence of invasive species, improve habitat connectivity, and reduce wildlife mortality rates due to motor vehicle collisions.

Table A.4 provides sample measures for natural environment projects.

Table A.4 Sample Metrics for Natural Environment Projects

Metric	Program-Level	Project-Level	Process	Product	Outcome (pre)	Outcome (post)	Data Requirements	Advantages	Limitations
(Percent of funded) project(s) designed with CSS approach	✓	✓	✓				Description of project development process	Uses CSS approach as a proxy for improving the human environment	No guarantee that outcomes will be consistent with program goals/objectives
(Percent of funded) project(s) subject to or emerging from sustainability assessment (e.g., INVEST)	✓	✓	✓				Description of project development process	Uses sustainability assessment as a proxy for improving the human environment	No guarantee that outcomes will be consistent with program goals/objectives
(Percent of funded) project(s) applying relevant best management practices (e.g., stormwater treatment)	✓	✓	✓				List of possible BMPs for each funded project type and actual project features	BMPs will vary widely by project type, so this may be easier to use than looking at specific BMPs as metrics	Requires some effort and judgment to assess whether BMPs are being applied
Number of wildlife crossings/connectivity features completed	✓	✓		✓			Project design information	Relates to potential for habitat connectivity	May not be used by animals
Number of stormwater management facilities completed	✓	✓		✓			Project design information	Relates to potential for stormwater management	Does not directly measure water quality impact
Change in impervious surfaces due to direct facility construction		✓		✓			Project design information	Impervious surface affects water quality	Benefits may vary by context
Amount of runoff treated (percent of annual volume)		✓		✓			Project engineering calculations	Direct measure of impact on water quality	May be difficult to estimate or measure accurately

Metric	Program-Level	Project-Level	Process	Product	Outcome (pre)	Outcome (post)	Data Requirements	Advantages	Limitations
Change in pollutant loadings for nutrients		✓				✓	Project engineering calculations	Direct measure of impact on water quality	May be difficult to estimate or measure accurately
ROW miles or acres revegetated with native species and plants that protect or promote pollinators	✓	✓				✓	Project design information	Direct measure of vegetation management activities	
Number of threatened or endangered species in region	✓					✓	Threatened/ endangered species listings	Measures overall progress for habitat/ wildlife preservation	Difficult to relate specifically to TAP impacts
Change in number of threatened or endangered species observed	✓					✓	Field surveys	Measure trends apart from just listing/ delisting	Data-intensive, difficult to relate specifically to TAP impacts
Index of Biological Integrity or habitat connectivity	✓					✓	Ecological modeling	Measures quality of habitat for variety of species	Data-intensive, difficult to relate specifically to TAP impacts
Water Quality Index—local streams and rivers	✓					✓	Water quality monitoring	Direct measure of water quality	Difficult to relate specifically to TAP impacts
Percent of roadway miles with invasive species present in ROW	✓					✓	Field surveys	Direct measure of native species along transportation facilities	Data-intensive
Crash rates attributed to animal collisions in vicinity of TAP projects	✓	✓				✓	State or local crash data systems	Can indicate success of wildlife crossings	May be difficult to attribute changes specifically to TAP projects

A.6 Boulevards and Other Roadways Formerly in Highway Right-of-Way

This category of projects includes planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former Interstate System routes or other divided highways. Such projects can serve as an effective way of reknitting communities that have been separated by transportation structures, as well as reducing transportation operations and maintenance costs. In a number of cities, such projects are being contemplated as highway structures reach the end of their useful lifespan and would require costly major rehabilitation or replacement.

These projects support the following national goal areas as specified in 23 U.S.C. 150:

- **Safety**—Reducing traffic speeds, encouraging walking and bicycling;
- **Infrastructure Condition**—At-grade roadways are typically cheaper to maintain than grade-separated facilities;
- **Freight Movement and Economic Vitality**—Bringing traffic to street level can support a more favorable business climate along local streets, as traffic can stop at local businesses rather than driving past on a limited-access facility; and
- **Environmental Sustainability**—Encouraging transit and nonmotorized travel instead of vehicle travel, creating more livable urban neighborhoods that encourage people to live and work in sustainable environments.

Table A.5 provides sample measures for boulevards and other roadways formerly in highway right-of-way.



The Chattanooga Riverfront Parkway was formerly the location of a four-lane, limited-access highway.

Table A.5 Sample Measures for Boulevard/Roadway Projects

Measure	Program-Level	Project-Level	Process	Product	Outcome (pre)	Outcome (post)	Data Requirements	Advantages	Limitations
Context Sensitive Solutions (CSS) approach used in project design		✓	✓				Description of project development and environmental review process	Relates to extent to which community context is considered in project design	Does not guarantee context-sensitive outcomes
Miles of highway converted to boulevard or other surface roadway	✓	✓		✓			Project data—facility length	Relates to extent of community impacted/benefiting	Size of affected population may vary based on density
Acres of restored parkland/open space	✓	✓		✓			Project footprint/design data	Measures what can be an important community amenity	Acreage may not relate to quality or use
Average delay for drivers using old/new facility		✓			✓	✓	Microsimulation model output (forecasting) Traffic speed measurements (post-implementation)	Traditional measure of mobility benefits	Does not consider benefits/impacts to nondrivers
Average delay for pedestrians crossing facility		✓			✓	✓	Microsimulation model output (forecasting) Engineering calculations based on signal timing, path length, etc.	Incorporates multimodal considerations	Demand for pedestrian crossing may not be known if previous facility was a barrier to movement

Measure	Program-Level	Project-Level	Process	Product	Outcome (pre)	Outcome (post)	Data Requirements	Advantages	Limitations
Number of pedestrians in vicinity of the facility		✓				✓	Pedestrian counts	Increased activity demonstrates community value of improvements	Difficult to forecast
Crash rate for new facility versus old facility it is replacing		✓			✓	✓	Crash modification factors by facility type/ characteristics State or municipal crash databases	Traditional measure of safety	May be difficult to predict/forecast safety outcomes
Emissions and energy consumption	✓	✓			✓	✓	Traffic volumes and speeds (pre and post) Emission rates	Measure of environmental impact	May be difficult to accurately forecast or account for induced or diverted traffic
Number of people exposed to traffic noise exceeding guideline/threshold		✓			✓	✓	Traffic noise modeling or measurements for affected population	Measure of community quality	Depending on project size and scope, may be expensive to collect data and forecast
Estimate emissions reduced		✓			✓	✓	Traffic volumes, speeds, and emission rates (pre and post)	Measure of air quality impacts	Data/resource-intensive to model
Visual impact		✓			✓	✓	Visual Impact Assessment	Measure of community quality	Subjective, opinions may vary

Measure	Program-Level	Project-Level	Process	Product	Outcome (pre)	Outcome (post)	Data Requirements	Advantages	Limitations
Economic development—change in property values or business sales		✓				✓	Assessed property values or comparable sales Retail sales	Measures of economic health	If number of property sales small, may be hard to reliably observe changes; may be hard to get business sales data at small enough geography to attribute to project
Housing—new units of total and/or affordable housing created		✓			✓	✓	Residential building permits issued in project area	Measures of housing opportunity	Risk of gentrification reducing affordability of existing units
Community satisfaction and cohesion metrics		✓				✓	Surveys or other qualitative methods considering community input	Measure of community quality	Subjective, opinions may vary

Appendix B. How Can I Measure and Track Performance?

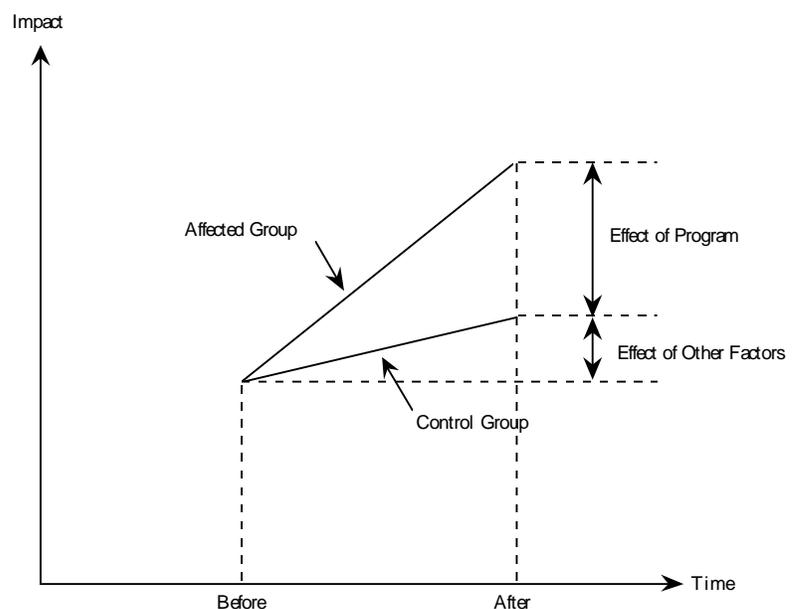
This section discusses some general concepts regarding data for measuring and tracking performance, and then discusses data sources and methods that may be helpful specifically for program evaluation.

B.1 General Data Concepts

Defining and measuring a

baseline. The impact of a project must be compared to some known baseline (see figure B.1). Depending upon the type of the project and scope of analysis, the baseline may be zero. For example, all users of a new trail will be new users, if the performance metric is usage on the new facility. For on-road facilities, there may already be some existing level of bicycling before the facility is put into place. Baseline levels are ideally measured through pre-project monitoring. If that is not possible, they may be measured through surveys conducted after the project is implemented (e.g., asking people how they used to travel before the facility was built), or using modeling techniques.

Figure B.1 Measuring against a Baseline



Ex-ante versus ex-post measurement. These terms refer to evaluating performance *ex-ante* (before the project is implemented, through forecasting) versus *ex-post* (after it is implemented, through observation). Program managers may need to do both—using *ex-ante* evaluation to support funding allocation and project selection, and *ex-post* evaluation to monitor and track performance. Some measures may be difficult to forecast; for example, methods for estimating crash reductions from pedestrian and bicycle infrastructure improvements are in many cases not well-developed due to limited data for many types of improvements. In such cases, proxy measures might be needed, such as the use of best practices in facility design for safety. Population served may be used as a proxy when forecasts of facility usage are not available.

Primary versus secondary data. Primary data include counts, surveys, monitoring, etc. Secondary data include information *derived* from primary sources such as travel demand

model output, summary statistics, or parameters such as mode choice elasticities or crash modification factors. For TAP projects and programs, secondary data will often be used to estimate or forecast outcomes (ex-ante measurement), while primary data may be collected for ex-post measurement. In some cases, a combination of primary and secondary data may be used even for ex-post evaluation. For example, observed data on trail usage may be combined with modeled data on trip lengths to estimate person-miles of travel by walking or bicycling.

Different geographic scales. Program managers may look at both project- and system-level performance measures. Project-level measures look directly at usage or other impacts of a specific project (e.g., trail counts), while system-level measures look at broader metrics such as city or regional mode share. Project-level measures are easier to relate directly to the impact of the TAP, but may overlook broader network effects, such as changes in walk or bike travel that occur off in the vicinity of the project, or the “synergistic” effects of multiple projects. System-level measures should capture the entire influence of the set of funded projects, but it may not be possible to isolate the impacts of TAP from other effects on the measure.

Recognizing variability in data. Observations of any real-world data will vary from day to day due to a wide variety of factors, some which can be explained and some of which cannot. The more observations (based on a longer and/or geographically broader monitoring period), the higher the confidence in results. This holds true for air or water pollution levels, transportation facility usage, crash statistics, or other outcomes affected by the TAP. The program manager must strike a balance between budget for data collection and monitoring and confidence that the measured change in outcomes represents the true impact of the program.

B.2 Data Resources

The remainder of this section provides a guide to existing data sources that can be helpful for evaluating project and program performance and computing the measures listed in appendix A. The data sources include national as well as State and local sources, and models/forecasting methods in addition to observed data. The data sources are organized into the following categories that generally correspond with the performance goal areas:

- Safety (table B.1);
- Infrastructure condition (table B.2);
- Congestion and reliability, including mobility and travel/trip data (table B.3);
- Economic vitality (table B.4); and
- Environmental sustainability, including both the human and natural environment (table B.5).

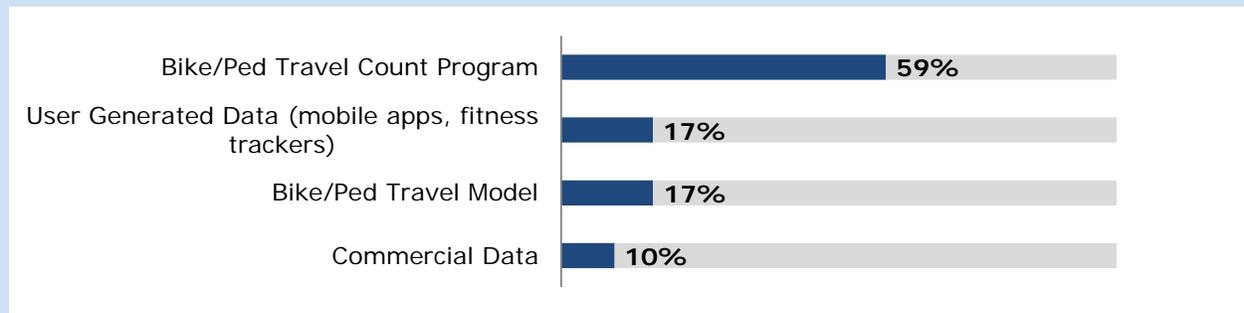
Each data source is listed with a brief description of the source’s contents, geographic scale of reporting, update frequency, and comments on particular advantages or limitations of the data source. References (hyperlinks or bibliographic references) are also included where available.

Pedestrian and Bicycle Data Collection

A survey on pedestrian and bicycle planning was conducted for NCHRP Project 8-36 Task 120, as part of a series of “snapshots” on transportation planning activities. The survey included questions about data collection. A total of 28 State DOTs and 92 metropolitan and regional planning organizations responded to the survey, which was conducted in 2014.

Survey respondents indicated that they were predominantly relying on volume counts to measure performance for TAP projects (figure B.2). They also noted the importance of data such as pedestrian and bicycle crash data, demographic data, Title VI and Environmental Justice data, as well as feedback from advisory committees and the general public. Some respondents worked with local departments of health to access ZIP code-level data on chronic diseases that are associated with the lack of physical activity.

Figure B.2 Survey Findings—Pedestrian and Bicycle Usage Data Collection



When asked to share “ideas for other data, sources, or tools that could be useful for pedestrian and bicycle planning efforts,” survey respondents noted using mobile apps such as *Cycle Tracks*. Others noted that local advocacy groups or schools have contributed volunteer monitoring and volume counts.

The survey asked participants if they evaluated pedestrian and bicycle improvements in terms of return on investment, public health benefits or assessments, or economic development impacts. Eighty percent of respondents indicated that no real evaluation or analysis of these types of performance data was completed.

Respondents noted that access to performance measurement data sources was dependent on collaboration and interagency relationships. Coordinating collection and sharing data among State DOTs, MPOs, municipalities, and nongovernmental organizations was necessary to effectively use agency funding. Many respondents also expressed concern that agency resources and skillsets may limit the benefit of complex analyses, such as return on investment, health impact assessment, or economic benefit assessment for TAP projects.

NCHRP Report 797, *Guidebook on Pedestrian and Bicycle Volume Data Collection*, and the associated TRB webinar “Tools for Pedestrian and Bicycle Data Collection” (<http://www.trb.org/Main/Blurbs/171697.aspx>) provide a compendium of information on count technologies, methodologies, and protocol development.

Table B.1 Data Sources: Safety

Source	Data Contents	Geography	Update Frequency	Comments
National Highway Traffic Safety Administration (NHTSA)—Fatal Accident Reporting System	All fatalities in motor vehicle crashes in the U.S., including pedestrians and bicyclists	Nation; State summary reports; disaggregate data	Annual	Small numbers of fatalities means data may not be meaningful at small geographic scales; includes only crashes between motorists and bicyclists and pedestrians
NHTSA—General Estimates System	Sample of injuries in motor vehicle crashes in the U.S.	Nation; State summary reports; disaggregate data	Annual	Sample; injuries may not be consistently reported across States
State and municipal crash databases	Motor vehicle crashes, including those involving pedestrians and bicyclists; injury severity; contributing factors	May summarize by municipality or evaluate disaggregate data to look at facilities/subareas	Ongoing	Many injuries unreported; State and local procedures vary; trends for small geographic areas may not be meaningful; many local agencies record more than required to go to the State for FARS reporting
Highway Safety Manual, NCHRP Report 500	Crash Modification Factors—relative crash rates by facility characteristics	N/A	N/A	Many factors contribute to crash rates, these are rough guidelines; very limited evidence to support CMFs on many ped/bike facility types

Table B.2 Data Sources: Infrastructure Condition

Source	Data Contents	Geography	Update Frequency	Comments
Regional or local ped and/or bike facilities database	Location and type of facilities, possibly condition	Roadway/pathway network	Varies locally	Many regions do not yet have a consolidated facility database; even if they do, may not be updated frequently
Open-source and private mapping applications (e.g., Open Street Maps)	Location and type of bicycle facilities	Roadway/pathway network	User- or developer-initiated	Data may not be open source or publicly available, or may not be consistently updated
Highway Performance Monitoring System or State roadway database	Pavement condition measures, roadway geometry	Roadway segment, State, possibly county level summaries	Annual or less	General roadway characteristics only, does not currently track information specific to bicycle or pedestrian facilities

Table B.3 Data Sources: Mobility, Congestion, Reliability

Source	Data Contents	Geography	Update Frequency	Comments
Decennial Census	Population by detailed geography and limited characteristics (race/ethnicity, income)	Census block, block group or tract	10 years	No transportation information, not updated frequently
American Community Survey	Population by various characteristics, including auto ownership, commute mode	Census block group, tract, municipality	Annual	Sample—small geography data is on a three- to five-year rolling basis; mode share data is only for commuting
Pedestrian and/or bicycle counts	Counts of users by type, facility, possibly characteristics	Facility or subarea	Varies	Few areas have systematic counting programs, although the practice is increasing rapidly
National Household Travel Survey	Sample of population—characteristics of trips (mode, purpose, length, frequency) by person and household characteristics; household vehicle ownership	State-level reporting, also for 50 largest metro areas; smaller areas could be analyzed in States with oversamples	Approximately every 8 years (last in 2009)	Data not available at small scales of geography; limited update frequency
State or regional travel survey	Sample of population—characteristics of trips (mode, purpose, length, frequency) by person and household characteristics; household vehicle ownership	State or metropolitan; subareas through analysis—depends upon sample size	Typically every 10 years or so	May require custom analysis; limited update frequency; may be few walk or bike trips in sample
MPO travel demand model	Forecasts of trips by mode, time of day, origin/destination; VMT; congestion/delay; accessibility (e.g., number of jobs reachable in x minutes)	Facility, subarea, or region	Typically every 5 years or so	Many areas do not have a mode choice model that includes ped/bike; few areas have a robust model capable of predicting impacts of NMT facility investment

Source	Data Contents	Geography	Update Frequency	Comments
Micro or mesoscopic traffic simulation model	Forecasts of traffic speed, operations, and delay, possibly also for pedestrians and bicyclists	Intersection, facility, or corridor	N/A	Typically resource-intensive to develop and apply, only done for large projects
Highway Capacity Manual multimodal LOS methods	Methods for estimating level of service for pedestrians, bicyclists, transit, and traffic	Intersection, facility	N/A	Analysis can be data-intensive
NCHRP Report 770	Bicycle and pedestrian demand forecasting methods	Facility, subarea	N/A	May be data-intensive to apply
Highway Performance Monitoring System/ State DOT traffic data	Traffic volumes and VMT	Road segment, State, possibly county	Annual	Availability of published reports (e.g., county level) varies by State; may be hard to relate changes to TAP projects
National Transit Database or local transit agency	Transit ridership (passengers, passenger-miles)	Transit line, system/mode	Annual	May be hard to relate changes to TAP projects

Table B.4 Data Sources: Economic Vitality

Source	Data Contents	Geography	Update Frequency	Comments
Municipal tax assessors' databases	Assessed property values	Parcel level and aggregations thereof	Typically annual or more frequent	May be a fee to obtain data; data formats not always consistent; assessment procedures may not be consistent or updated recently
Longitudinal Employer-Household Dynamics	Employment by industry Worker earnings (3 categories)	Census block, but most reliable at tract or higher levels of aggregation	Quarterly	Partially synthetic data for small-area geography
Visitor surveys	Visitation frequency, spending levels	Study area, tourist destination	Varies	A focused survey would need to be conducted to measure specific impact of TAP investments
Economic Census	Establishments, employment, and sales by industry	Census place and higher levels of census aggregation	Every 5 years (2007, 2012, etc.)	Geography and update frequency may not be detailed enough to support TAP evaluation
U.S. Census Bureau and Assistant Secretary for Planning and Evaluation (ASPE)	Families living in Near Poverty—Number of families whose combined income is between 100% and 125% of poverty thresholds	Census block groups	Annually	
U.S. Census Bureau—American Community Survey	Median household income by race/ethnicity Unemployment by race/ethnicity	Census block groups and higher levels of census aggregation	Annually	
U.S. Economic Development Administration tools	Distress report or social and economic context report for selected geography	State, county, metropolitan area	Annually	Online tool to calculate whether a county, region, or neighborhood may meet EDA eligibility thresholds for unemployment and income

Source	Data Contents	Geography	Update Frequency	Comments
Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages	Count of employment and wages reported by employers, by industry	Nation, State, county, metropolitan area	Quarterly	Covers 98 percent of U.S. jobs
BLS Current Employment Statistics	Industry data on employment, hours, and earnings of workers on nonfarm payrolls	Major metropolitan areas	Monthly	
State Labor Market Information	Jobs, businesses, wages levels	Small cities	Varies	
U.S. Census Bureau County Business Patterns	Economic data by industry, including the number of establishments, employment during the week of March 12, first quarter payroll, and annual payroll	County, ZIP code	Annually	Data not published until 18 months after end of year
U.S. Census Small Area Income and Poverty Estimates	Estimates of income and poverty statistics	School district, county, State	Annually	Previous year's estimates released in December (e.g., 2013 estimates released December 2014)
BLS Local Area Unemployment Statistics	Employment, unemployment, and labor force data	Census regions and divisions, States, counties, metropolitan areas, and many cities, by place of residence	Monthly and annually	
BLS Occupational Employment Statistics	Mean and median hourly wages, mean annual wages	Nation, State, metropolitan and nonmetropolitan area	Annually	Estimates produced for over 800 occupations

Source	Data Contents	Geography	Update Frequency	Comments
Bureau of Economic Analysis Regional Economic Accounts	Gross Domestic Product (GDP) by State, GDP by metropolitan area, quarterly State personal income, annual State personal income and employment, local area personal income and employment, real personal income and regional price parities	State, county; metropolitan, micropolitan, and combined statistical area	Varies	
Internal Revenue Service Tax Stats—County Data	Detailed income information, including number of returns, number of personal exemptions, adjusted gross income, wages and salaries, dividends, and interest	State, county	Annually	Available for 1989 through 2012; annual updates released 2 years later

Table B.5 Data Sources: Environmental Sustainability

Source	Data Contents	Geography	Update Frequency	Comments
MOVES or EMFAC emission factor model	Pollutant emission and energy consumption rates by vehicle type and speed	N/A	Can be run for any year through 2050	
Clean Water Act section 303d list of impaired waters	List of bodies of water not meeting Federal water quality standards	State	Clean Water Act requires States to report biennially to the U.S. EPA	
U.S. EPA How's My Waterway tool	Water quality index (percent of geographical area for a region)	National Watershed Region, State, metropolitan area, municipality	Clean Water Act requires States to report biennially to the U.S. EPA	
Index of Biological Integrity (IBI)	State Departments of Natural Resources, other regional managers of wetland conditions per Clean Water Act	State, metropolitan area, municipality	Varies	IBIs are used to assess the relative condition of selected habitats. IBI methodology is generalized and requires local application.
EPA Regional Ecological Framework or State Wildlife Action Plan	GIS habitat database—locations of critical habitat	Varies, e.g., polygon level	Varies	

Source	Data Contents	Geography	Update Frequency	Comments
USFWS IPaC (Information, Planning, and Conservation) threatened and endangered species assessment tool	Wetlands, GAP land cover, USFWS critical habitat, other nature resource map layers	State, metropolitan area, municipality, project development area, site polygon level	Dynamic/ongoing	
Visual Impact Assessment	Degree of visual impact (positive or negative) of a project or facility	Project development area, community level	Varies	
Performance measures for nationally or locally identified historic structures	Data sources include: <ul style="list-style-type: none"> • National Register of Historic Places Program • Certified Local Governments for Federal Preservation Program • Preserve America Community • State Historical Commissions and Historic Preservation Officers • Municipal/County Assessor Databases • Local Historic Preservation Commissions • Tribal Historic Preservation Officers and cultural heritage preservation organizations 	National, State, metropolitan area, municipality, project development area, Tribe, community level	Annually	

Source	Data Contents	Geography	Update Frequency	Comments
Nationally or locally identified archeological sites	<p>Data sources include:</p> <ul style="list-style-type: none"> • National Park Service—Archeological Sites Management Information System • Bureau of Land Management—Performance Management Data System, State Offices Annual CRM (Cultural Resource Management) Reports • U.S. Fish and Wildlife Service—Enterprise Planning Operations Plan Module • Bureaus of Indian Affairs—Regional Staff Reports, field reports completed by professional archeologists • State Departments of Archeology and Historic Preservation • State professional archeological councils and societies • National archeological societies (e.g., the Society for American Archeology) 	State, metropolitan area, municipality, project development area, Tribe, community level	Annually	Data on archeological site location is confidential and is protected from public disclosure

Appendix C. Example Approach to TAP Performance Management—Smaller MPO

This section provides a high-level example of the development of a performance management approach for the TAP administered by a smaller MPO. A smaller MPO might be one serving a population of less than 500,000, with an MPO staff of no more than five people. Appendix D provides an example program for an agency with more resources, such as a State DOT or larger MPO. This example follows the seven-step approach to performance management outlined in section 2.4 of this guidebook.

Primary differences between a smaller MPO and a larger MPO or State DOT TAP performance management program might include:

- A smaller MPO may choose to have a smaller number of goals, objectives, and/or measures;
- The smaller MPO will most likely be able to commit less overall resources (staff time or cost) to manage the program; and
- The smaller MPO may specify less complex performance measures and a less complex or time consuming level of data analysis.

In this example, MPO ABC is located in a Midwestern State and serves an urbanized area with a population of 320,000. The MPO is staffed by an executive director, two planners, and an administrative assistant. MPO ABC receives \$400,000 in TAP funds annually to program in the region.

Step 1—Develop Goals and Objectives

A smaller MPO may have three to five high-level goals for the TAP. In this example, MPO ABC has set the following three goals after consideration as to how they align with local, State, and Federal goals.

- **Goal 1**—Create pedestrian and bicycle transportation systems that provides a safe, reliable, and convenient alternative to driving.
- **Goal 2**—Support activities that improve the environmental sustainability of the transportation system and support a healthy and wide variety of transportation choices.
- **Goal 3**—Accelerate TAP project delivery.

MPO ABC has also set the following objectives for the stated goals:

- **Goal 1**—Create pedestrian and bicycle transportation systems that provides a safe, reliable, and convenient alternative to driving.

- Objective 1—Invest in pedestrian and bicycle safety improvements and support the implementation of Complete Streets policies.
- Objective 2—Connect gaps in the bicycle and pedestrian networks.
- Objective 3—Provide attractive, high level-of-service facilities serving a broad range of users—including users of various bicycle riding skills sets, comfort, and age.
- **Goal 2**—Support activities that provide for environmental sustainability of the transportation system and support a healthy and wide variety of transportation choices.
 - Objective 1—Decrease vehicle emissions.
 - Objective 2—Increase the proportion of bicycle and walking trips.
 - Objective 3—Improve bicycle and pedestrian access to transit.
- **Goal 3**—Accelerate project delivery.
 - Objective 1—Meet project milestones on time and on budget.
 - Objective 2—Reduce project delivery delays.
 - Objective 3—Establish partnerships with key stakeholders to gain community support.

Step 2—Select Performance Measures

Next, MPO ABC will take steps to develop performance measures.

Identification of Measures

To ensure the performance measures to be selected represent regional priorities, MPO ABC establishes a TAP performance measures subcommittee to identify, review, and select potential measures, as well as discuss data trends and identify targets. The MPO has a Performance Measures Committee focused on overall implementation of PM requirements across all MPO programs, and the TAP committee is a subcommittee of that effort. Outreach activities can result in a more robust, well-informed, and meaningful set of measures for the MPO. The relationships established through the subcommittee can improve coordination and expedite the data identification and collection process.

As MPO ABC has a small staff, with limited time to develop and administer the program, and limited data collection and analysis time and resources, the program is designed to be limited in its resource demands. To identify performance measures, the program manager convenes the performance measures subcommittee to recommend performance measures for consideration, including measures used by local jurisdictions, advocacy groups, the State's DOT, and those listed as best practices in the FHWA TAP Performance Management Guidebook. The recommendations of staff and the subcommittee are affirmed by the public and the MPO board through the LRTP and TIP development process.

Selection of Measures

After brainstorming possible measures, the program manager and the performance measures subcommittee consider selecting the top 15 to 20 measures most likely to be used and then down-selecting to a smaller and more manageable number of measures. The program manager and the performance measures committee then use the Performance Measure Resource and Data Assessment table, as shown in tables C.1 and C.2, to assess this set of measures for implementation feasibility. The questions in the table are designed to bring to light if a measure is too complicated, subject to data issues, or has other limitations, and will help the MPO confirm if the performance measures selected will be manageable for data collection, analysis, and reporting.

A State DOT or a larger MPO may have access to data and tools such as transportation and land use models or GIS data that this smaller MPO does not have available to inform their decisionmaking. Additionally, a State DOT will likely have more staff available to collect, review, and report data that is used in the TAP, and the program might share data collection efforts with a sister program, such as a State bicycle and pedestrian program or environmental programs.

Over time, the MPO plans to update the table with new information and data resources as they become available. The measures will then be reevaluated as to the potential value (and level of effort) the measure might add to a performance management program. Based on these evaluations, the performance management program will be updated to evolve in tandem with performance data resources.

Table C.1 MPO ABC TAP Performance Measure Program

Goal	Objectives	Performance Measures
Goal 1: Create pedestrian and bicycle transportation systems that provide a safe, reliable, and convenient alternative to driving.	<p>Objective 1. Invest in pedestrian and bicycle safety improvements and support the implementation of Complete Streets policies.</p> <p>Objective 2. Connect gaps in the bicycle and pedestrian networks.</p> <p>Objective 3. Provide attractive, high level-of-service facilities serving a broad range of users—including users of various bicycle riding skills sets, comfort and age.</p>	<p>PM1: Bicycle and pedestrian fatalities and injuries per miles of sidewalk/linear bike facilities.</p> <p>PM2: Miles of roads with pedestrian and bicycle accommodations built with TAP funds, number of nonlinear projects.</p>
Goal 2: Support activities that provide for environmental sustainability.	<p>Objective 1. Decrease vehicle emissions.</p> <p>Objective 2. Increase proportion of bicycle and walking trips.</p> <p>Objective 3. Improve bicycle and pedestrian access to transit.</p>	<p>PM3: Mode share (percent of trips).</p>

Goal	Objectives	Performance Measures
Goal 3: Accelerate TAP project delivery.	<p>Objective 1. Meet project milestones on time and on budget.</p> <p>Objective 2. Reduce project delivery delays.</p> <p>Objective 3. Establish partnerships with key stakeholders to gain community support.</p>	PM4: Percent of available TAP funds obligated within the year.

Table C.2 shows an example resource and data assessment for **Goal 1**: Create pedestrian and bicycle transportation systems that provide a safe, reliable, and convenient alternative to driving, **Performance Measure 1**: Bicycle and pedestrian fatalities and injuries per miles of sidewalk/linear bicycle facilities.

Table C.2 Performance Measure Resource and Data Assessment: Bicycle and Pedestrian Fatalities and Injuries per Mile of Sidewalk/Linear Bicycle Facilities

Data Source				
Data Source: where do we get the data?	Does the program collect this data internally?	If collected by program, what is the level of effort for collection? Consider the number of hours required to collect data, or general level of effort required—H/M/L.	Is there a cost associated with this data? If so, what is the cost?	Is funding for this data consistent?
<i>State crash data; MPO facilities database.</i>	<i>No.</i>	<i>N/A</i>	<i>N/A</i>	<i>Yes- external, not MPO funding.</i>
Data Availability and Data Quality				
Data history—how far back is data available? Is it sufficient to identify trends?	Data frequency: How often is the data made available? From year to year?	Is the data reported consistently, or has there been a variation in the method of calculation over time? Would this variation make data incomparable from year to year?	Is the reported data considered an estimate or is the data actual?	How reliable is this data source? If the source were to discontinue, is there a back-up source?

Data Availability and Data Quality

<i>Yes, MPO/ jurisdiction have 10 years of data.</i>	<i>Monthly, but we will look at annual totals.</i>	<i>Consistent.</i>	<i>Consistent, except that police reports continue to be processed.</i>	<i>This is reliable as the police track and report the data. Biggest challenge is injuries that go unreported/no police called.</i>
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Data Analysis—Level of Effort

What is the level of effort to analyze this data for the purpose of estimating past trends?	What is the level of effort to analyze this data for reporting?	Do the data need to be assessed by using a transportation model?	Do the data need to be assessed by using GIS?	How complex would the method of calculation be for this measure? Describe proposed method of calculation.
<i>Low</i>	<i>Low</i>	<i>No</i>	<i>No</i>	<i>Simple</i>

Data Usefulness to Performance Reporting

When considering this data, how directly does it address the stated goals and objectives?	Would changes in the data be a direct result of program investment and activities?	What is the likeliness that changes in the data be due to programs outside TAP?	What is the likeliness that changes in the data be due to outside influences?
<i>Very directly.</i>	<i>Yes: they at least could be a result of program activities. Investments and program activities funded under other programs could also impact the data.</i>	<i>Likely, as there are other funding sources for pedestrian and bicycle projects.</i>	<i>Same as noted to the left.</i>

Step 3—Identify Trends and Targets

After selecting measures, MPO ABC assembles the data for each of the measures to review data trends. When possible, the MPO coordinates with local and regional specialists in the performance measure areas, or reconvenes the performance measure subcommittee to discuss reasons for the data trends, including projects, programs, or other outside influences that may have affected the data trends.

MPO ABC has established an overall performance measure and target setting process as part of performance requirements. The overall process guides how the MPO develops targets and tracks progress for other programs, including TAP. MPO ABC wants to align the TAP performance framework with this process rather than creating a separate process. Therefore they have established common timelines and reporting requirements. MPO ABC considers several types of targets, including directional, aspirational, and realistic targets. Table C.3 shows the various targets considered for each performance measure.

Table C.3 Performance Targets Considered by MPO ABC

ID	Performance Measure Name	Current Data (for MPO)	Data Trend	Directional	Aspirational	Realistic
PM1	Bicycle and pedestrian fatalities and injuries per miles of sidewalk/linear bike facilities.	2 bike fatalities. 2 pedestrian fatalities. 16 bike injuries. 22 pedestrian injuries.	Slow decline. Ped/bike fatalities were about 30% higher 5-10 years ago.	Looking for a decrease in bike/ped fatalities and injuries.	Zero bike/ped fatalities/injuries. Aligned with Strategic Highway Safety Plan (SHSP).	Calculate short- and long-term targets to achieve SHSP goal of 50% reduction in fatalities and injuries by 2030.
PM2	Miles of roads with pedestrian and bicycle accommodations built with TAP funds, number of nonlinear projects.	Ped: 12 annual average. Bicycle: 22 annual average.	Increase	Increase	All bicycle and pedestrian facilities completed as described in Bike/Ped Master Plan.	Increase from baseline by 7% per year.
PM3	Mode share (percent of trips).	Transit—12% Bike—3% Walk—2%	Increase mode share for transit, bike, walk	Increase	Transit—25% Bike—15% Walk—5%	Transit—increase by 2% per year. Bike—increase by 2% per year. Walk—increase by 1% per year.
PM4	Percent of available TAP funds obligated within the fiscal year.	Average from 5 years = 85%	Increase	Increase	95-100%	2% increase per year from next 5 years.

Step 4—Identify Strategies and Project Packages

In this step, the MPO ABC program manager and TAP performance measures subcommittee identify strategies to achieve each objective as well as the types of projects that could help achieve the objectives. Table C.4 shows the MPO ABC’s identified strategies and project types by goal. Note that some types of projects support more than one goal.

Table C.4 MPO Example Strategies and Project Types for Achieving Objectives

Goal	Objective	Strategy	Project types
Goal 1: Create pedestrian and bicycle transportation systems that provides a safe, reliable, and convenient alternative to driving	Objective 1. Invest in pedestrian and bicycle safety improvements and support the implementation of Complete Streets policies.	Identify “hot spots” that have largest number crashes that result in pedestrian fatalities and serious injuries; implement pedestrian safety projects at these locations.	Pedestrian crosswalk improvements. Add sidewalks. Multiuse path. Add bike facilities on street.
	Objective 2. Connect gaps in the bicycle and pedestrian networks.	Identify “hot spots” that have largest number of crashes that result in bicycle fatalities and serious injuries; implement bicycle safety projects at these locations.	Intersection improvements.
	Objective 3. Provide attractive, high level-of-service facilities serving a broad range of users—including users of various bicycle riding skills sets, comfort and age.		
Goal 2: Support activities that provide for environmental sustainability of the transportation system and support a healthy and wide variety of transportation choices.	Objective 1. Decrease vehicle emissions.	Improve routes between main activity centers and essential services.	Multiuse path. Add bike facilities on streets that provide safe routes that connect primary destinations.
	Objective 2. Increase proportion of bicycle and walking trips.	Place bike racks at main bus stops.	Address barriers along routes between activity centers.
	Objective 3. Improve bicycle and pedestrian access to transit.	Review jurisdictions plans that identify gaps in pedestrian/ bicycle infrastructure or advocacy group/committee wish lists that identify connectivity needs. Work with jurisdictions/advocacy groups/committees to prioritize gaps to address. Develop MPO bicycle and pedestrian plan. Hire consultant or coordinate with local jurisdictions.	

Goal	Objective	Strategy	Project types
Goal 3: Accelerate TAP project delivery	Objective 1. Meet project milestones on time and on budget.	Work with applicants prior to submission to ensure readiness.	N/A
	Objective 2. Reduce project delivery delays.	Hold meeting to discuss problems previously that encountered delays or cost increases.	
	Objective 3. Establish partnerships with key stakeholders to gain community support.	Hold monthly meetings to track progress of projects and identify and address issues early on.	

The list of project types is constrained by State and MPO limits on eligibility for the TAP. The MPO’s State has in fact made some projects ineligible for funding, including highway billboard removal and historical signage/educational kiosks, so the MPO will not include those for consideration. The MPO has also determined that projects that convert highways to boulevards will likely be too resource-intensive to be funded by TAP since a single project could use up the entire program funding in any given TIP cycle.

Step 5—Develop Plan-Level Investment Priorities

In this step, the MPO ABC program manager and TAP performance measures subcommittee recommend funding “buckets” or bundling project types based on the goals, objectives, and performance measures that had been established in the earlier steps. These recommendations are provided to the MPO Board and also reviewed by the public through the public involvement process for the LRTP.

This step requires prioritizing what performance outcomes are most important. The FHWA PBPP Guidebook notes that this process of prioritization should account for performance outcomes using analytical methods, as well as policy priorities, and concerns such as equity, environmental justice, and other considerations. For MPO ABC, the program manager, based on guidance from the performance measures subcommittee, makes a recommendation as to how much funding should go towards project category (funding bucket), and the specific types of projects that are priorities in each category. This information is included descriptively in the LRTP (see table C.5), after revisions to account for comments from the public and members of the MPO Board.

Table C.5 TAP Funding Buckets and Project Priorities in the LRTP

Funding Bucket	Target Allocation of TAP Funds	Target Dollar Amount over First Five Years	Project Priorities
Pedestrian and bicycle projects and programs	80%	\$1.6 million	Multiuse paths (30%) SRTS (30%) On-street bike facilities (20%) Other ped and bike improvements (20%)
Human environment	10%	\$200,000	Multiuse path—visitor center—historic depot rehabilitation (100%)
Natural environment	10%	\$200,000	Green streets project enhancements (100%)

MPO ABC decides to establish the following program funding buckets:

- Pedestrian and bicycle projects and programs, including safe routes to school, rail to trail conversions, and routes for nondrivers;
- Human environment—cultural and aesthetic improvements, including historic preservation and rehabilitation, archeological activities, and scenic turnouts and overlooks; and
- Natural environment—mitigation and enhancement, including vegetation management, runoff/water quality, and habitat connectivity.

The objectives shown in table C.5 only explicitly address the first bucket. However, the MPO Board has directed that some program funds be set aside to support human and natural environment enhancements. Some of these funds may be spent in projects that integrate multiple objectives, such as “green streets” projects that incorporate stormwater management measures as well as pedestrian and bicycle enhancements.

Step 6—Develop Program-Level Investment Priorities

Guided by the goals, objectives, performance measures, and funding priorities set forth in the LRTP, MPO ABC develops investment priorities in the form of specific projects for inclusion in the MPO TIP, which are later incorporated by the State DOT in the State Transportation Improvement Plan.

The MPO long-range plan vision is the driving force for programming TAP (and other) funds. The vision has public input and Board approval and serves as a framework to select projects that meet regional priorities. Project selection criteria are consistent with LRTP performance criteria.

In addition to the funding buckets, the MPO and/or State DOT may have other selection criteria to consider in the selection of projects. For example, criteria such as project readiness, quality of past projects submitted by an applicant, environmental justice and civil rights, or how the project will be used based on population and employment density within the project service area might be considered.

MPO ABC uses the following criteria and points for scoring TAP projects (50 points total):

- Population, employment, and activity centers served—up to 12 points;
- Safety improvement—up to 8 points;
- Transportation system connectivity improvement—up to 6 points;
- Environmental justice (serves EJ neighborhood)—up to 6 points;
- Project readiness—up to 12 points; and
- Sustainability features—up to 6 points.

Step 7—Monitoring, Evaluating, and Performance Reporting

The MPO tracks the progress of projects and reports on progress at quarterly meetings to encourage active project management and to address early on any issues and challenges that might cause delay. The MPO ABC program also calls for the biannual collection and review of data for the performance measures as specified above.

The data collection and review provide an opportunity to address data needs challenges, and to assess if the original set of strategies needs revisions or refinement. As part of the review, MPO ABC completes a biannual report on the status of the performance measures, including those for the TAP. The program manager and the performance measure subcommittee convene to review the report and make any revisions to improve the performance measure program or to consider policy direction and investment priorities based on the performance measure outcomes and other relevant information.

Appendix D. Example Approach to TAP Performance Management—State DOT

This section provides a high-level example of the development of a performance management approach for the TAP administered by a State DOT. Every State DOT should have a TAP process in place. Such a program is often coordinated closely with other State pedestrian, bicycle, or environmental programs. This example follows the seven-step approach to performance management outlined in section 2.4 of this guidebook. The example also includes elements relevant to a larger MPO.

Compared to an MPO, the State DOT TAP might have additional priorities, such as historic or archeological preservation or stormwater management that many MPOs do not deal with directly because they do not implement projects. Compared to a smaller MPO, a larger MPO or DOT may be able to commit additional resources (staff time or cost) to program management and may have access to enhanced data sets or analysis tools, expanding the range of performance measures that may be considered.

In this example, the State DOT has established a TAP working group to provide input to TAP program development and management. The working group includes DOT staff from the planning, environmental, and multimodal divisions as well as representatives of interest groups, regional planning agencies, and State and county health and environmental departments. The State-administered TAP budget is \$20 million per year.

Step 1—Develop Goals and Objectives

A State DOT program or a program housed within a larger MPO may have four to five high-level goals; for this example, the State DOT TAP goals are aligned with other State goals.

The TAP legislation does not require that States and MPOs fund all eligible project types. The review of TAP programs and interviews with TAP managers for this research revealed that some TAP programs limited the project types to fewer categories than the Federal eligibility criteria. This focusing of funds and project selection/prioritization is often accomplished through the development of project selection criteria. These criteria can be used to inform the performance management program, as criteria could be considered the equivalent of objectives. Examples of the criteria might include the following:

- Enhance safety;
- Increase bicycling and/or walking activity;
- Maximize transportation network connectivity;
- Improve the State and regional economy;
- Expand recreational opportunities, enhance quality of life, and improve public health;

- Provide transportation equity;
- Reduce the environmental impacts of the transportation system;
- Project readiness; and
- Integration with plans and community documented support.

Example Program Goals

For this example program, the State has developed four goals that are consistent with other State programs. These goals were developed by the TAP working group with the approval of the DOT Executive Board. The State limits the TAP funding eligibility to those projects that address the goals and objectives shown below.

- **Goal 1**—Create pedestrian and bicycle transportation systems that provides a safe, reliable, and convenient alternative to driving.
- **Goal 2**—Improve the environmental sustainability of the transportation system.
- **Goal 3**—Support a healthy and wide variety of transportation choices, improve system reliability and a reduce VMT per capita through provision of nonmotorized and transit alternatives.
- **Goal 4**—Accelerate TAP project delivery.

Example Program Objectives

The State DOT has established the following objectives for the stated goals:

- **Goal 1**—Create pedestrian and bicycle transportation systems that provides a safe, reliable, and convenient alternative to driving.
 - Objective 1—Invest in pedestrian and bicycle safety improvements.
 - Objective 2—Connect gaps in the bicycle and pedestrian networks.
 - Objective 3—Increase bicycle/pedestrian mode share by providing attractive, high level-of-service facilities serving a broad range of users—including users of various bicycle riding skills sets, comfort and age.
- **Goal 2**—Support activities that provide for environmental sustainability.
 - Objective 1—Improve stormwater and vegetation management.
 - Objective 2—Improve habitat connectivity.

- **Goal 3**—Support a healthy and wide variety of transportation choices, improve system reliability and a reduce VMT per capita through provision of nonmotorized and transit alternatives.
 - Objective 1—Improve bicycle and pedestrian access to transit.
 - Objective 2—Improve bicycle and pedestrian access to educational facilities and major employment centers.
 - Objective 3—Facilitate implementation of Complete Streets policies.
- **Goal 4**—Accelerate TAP project delivery.
 - Objective 1—Meet project milestones on time and on budget.
 - Objective 2—Reduce project delivery delays.
 - Objective 3—Conduct outreach and training to TAP applicants and recipients.

Step 2—Select Performance Measures

Next, the State DOT TAP working group develops performance measures. Members of the group identify, review, and select potential measures; discuss data trends and identify targets; and consider funding needed to track the measures. The State DOT also has a Performance Measures Committee focused on overall implementation of performance requirements across all MPO programs; the working group occasionally meets with that committee to coordinate activities.

The State DOT program manager has a small staff, but has access to additional technical and staff resources within the DOT to support some of the program activities and leverage agency data and analysis tools.

The working group reviews measures used by local jurisdictions, advocacy groups, and those listed as best practices in the FHWA TAP Performance Management Guidebook. To assist with the selection of the TAP performance measures, the program manager and working group use the Performance Measure Resource and Data Assessment table from this guidebook. The questions in the table help to confirm if the performance measures selected will be a manageable number and type for data collection, analysis, and reporting. Measures that turn out to be high level of effort, costly, or based on inconsistent/unreliable data are not considered for the performance program. The State DOT has access to data and tools such as a transportation and land use model and a detailed GIS database of transportation facilities throughout the State, including off-road facilities.

After brainstorming possible measures, the working group selects the top 15 to 20 measures most likely to be used. Agency staff and the group then use the Performance Measure Resource and Data Assessment table to assess this set of measures for implementation feasibility and select no more than a half-dozen measures. The measures selected for each goal and objective are shown in table D.1.

Table D.1 State DOT Example TAP Performance Measure Program

Goal	Objectives	Performance Measures
Goal 1: Create pedestrian and bicycle transportation systems that provide a safe, reliable, and convenient alternative to driving.	<p>Objective 1. Invest in pedestrian and bicycle safety improvements.</p> <p>Objective 2. Connect gaps in the bicycle and pedestrian networks.</p> <p>Objective 3. Increase bike/ped mode share by providing attractive, high level-of-service facilities serving a broad range of users—including users of various bicycle riding skills sets, comfort and age.</p>	<p>PM1: Bicycle and pedestrian fatalities and injuries.</p> <p>PM2: Users per miles of sidewalk/linear bicycle built with TAP funds.</p>
Goal 2: Support activities that provide for environmental sustainability.	<p>Objective 1. Improve stormwater and vegetation management.</p> <p>Objective 2. Improve habitat connectivity.</p>	<p>PM3: Stormwater management projects built with TAP funds.</p> <p>PM4: Number of wildlife crossings/connectivity features built with TAP funds.</p>
Goal 3: Support a healthy and wide variety of transportation choices, improve system reliability and a reduce VMT per capita through provision of nonmotorized and transit alternatives.	<p>Objective 1. Improve bicycle and pedestrian access to transit.</p> <p>Objective 2. Improve bicycle and pedestrian access to educational facilities and major employment centers.</p> <p>Objective 3. Facilitate implementation of Complete Streets policies.</p>	<p>PM5: Bicycle, walk, and transit, mode share.</p>
Goal 4: Accelerate project delivery.	<p>Objective 1. Meet project milestones on time and on budget.</p> <p>Objective 2. Reduce project delivery delays.</p> <p>Objective 3. Conduct outreach and training to TAP applicants and recipients.</p>	<p>PM6: Percent of available TAP funds obligated within fiscal year.</p>

Table D.2 shows a sample resource and data assessment for **Goal 3: Support a healthy and wide variety of transportation choices, improve system reliability and a reduce VMT per capita through provision of nonmotorized and transit alternatives, Performance Measure 5: Bicycle, walk, and transit mode share.**

Table D.2 Performance Measure Resource and Data Assessment – Bicycle, Walk, and Transit Mode Share

Data Source				
Data Source: Where do we get the data?	Does the program collect this data internally?	If collected by program, what is the level of effort for collection? Consider the hours required to collect data, or general level of effort required: (H/M/L).	Is there a cost associated with this data? If so, what is the cost?	Is funding for this data consistent?
<i>State or MPO models.</i>	<i>No.</i>	<i>N/A</i>	<i>N/A</i>	<i>Yes</i>
Data Availability and Data Quality				
Data history- how far back is data available? Is it sufficient to identify trends?	Data frequency: How often is the data made available from year to year?	Is the data reported consistently, or has there been a variation in the method of calculation over time? Would this variation make data incomparable from year to year?	Is the reported data considered an estimate or is the data actual?	How reliable is this data source? If the source were to discontinue, is there a back-up source?
<i>Yes, mode share has been tracked for many years, but methods for tracking have changed over time. We have some new tools to support this effort in addition to actual counts.</i>	<i>Actual counts on the street vary in their timing/availability. ACS data is available in intervals. The new State and updated MPO models do have walk/ bike mode share but should be compared against other data for quality assurance.</i>	<i>Evolving over time.</i>	<i>Estimate</i>	<i>This data is reliable.</i>

Data Analysis—Level of Effort				
What is the level of effort to analyze this data for the purpose of estimating past trends?	What is the level of effort to analyze this data for reporting?	Do the data need to be assessed by using a transportation model?	Do the data need to be assessed by using GIS?	How complex would the method of calculation be for this measure? Describe proposed method.
<i>Low</i>	<i>This depends on the preferred methodology for counts/mode share.</i>	<i>Yes, unless only using ACS data.</i>	<i>No</i>	<i>Simple to complex depending upon use of ACS vs model.</i>

Data Usefulness to Performance Reporting			
When considering this data, how directly does it address the stated goals and objectives?	Would changes in the data be a direct result of program investment and activities?	What is the likeliness that changes in the data be due to programs outside TAP?	What is the likeliness that changes in the data be due to outside influences?
<i>Very directly.</i>	<i>Many other outside influences as well as transportation projects and programs would affect this data.</i>	<i>Very likely.</i>	<i>Outside influences will impact this data.</i>

Step 3—Identify Trends and Targets

After selecting measures, the State DOT program staff assembles the data for each of the measures to review data trends. When possible, program staff coordinate with local and regional specialists in the performance measure areas to discuss reasons for the data trends, including projects, programs, or other outside influences that may have impacted the data trends.

The working group considers several types of targets, including directional, aspirational, and realistic targets, as shown in table D.3.

Table D.3 Performance Targets Considered by State DOT

ID	Performance Measure Name	Current Data (for MPO)	Data Trend	Directional	Aspirational	Realistic
PM1	Bicycle and pedestrian fatalities and injuries	8 bike fatalities. 24 pedestrian fatalities. 98 bike injuries. 104 pedestrian injuries.	Slow decline. Ped/bike fatalities were about 36% higher 10 years ago.	Looking for a decrease in bike/ped fatalities and injuries.	Zero bike/ped fatalities/injuries. Aligned with Strategic Highway Safety Plan.	Calculate short- and long-term targets to achieve SHSP goal of 50% reduction in fatalities and injuries by 2030.
PM2	Users per mile of sidewalk/linear bicycle (built with TAP funds)	See ACS data and the anticipated counts from the automated counters.	Increase	Increase	All bicycle and pedestrian facilities completed as described in jurisdictions' Bike/Ped Master Plan.	Increase from baseline by 5% per year.
PM3	Number of wildlife crossings/connectivity features completed with TAP funds	For all State programs 217 total, average increase 22 per year, including maintenance projects.	Increase	Increase	All areas of State with a population density less than xx have sufficient passages to provide habitat continuity.	4 per year
PM4	Stormwater Management projects completed with TAP funds	Statewide plan—12% of project list is complete.	Increase	Increase	Complete all stormwater project listed in the State stormwater management plan project list.	4% increase per year (or 7 projects)

ID	Performance Measure Name	Current Data (for MPO)	Data Trend	Directional	Aspirational	Realistic
PM5	Mode Share	Transit—22% Bike—4% Walk—6%	Increase mode share for transit, bike, walk	Increase	Transit—50% Bike—20% Walk—10%	Transit—increase by 2% per year Bike—increase by 2% per year Walk—increase by 1% per year
PM6	Percent of available TAP funds obligated within fiscal year	Average from 5 years = 85%	Increase	Increase	95-100%	2% increase per year from next 5 years.

Step 4—Identify Strategies and Project Packages

In this step, the State DOT program manager and working group identify strategies to achieve each objective as well as the types of projects that could help achieve the objectives. Table D.4 shows the State’s identified strategies and project types by goal. Note that some types of projects support more than one goal.

Table D.4 State DOT Example Strategies and Project Types for Achieving TAP Objectives

Goal	Objective	Strategy	Project types
Goal 1: Create pedestrian and bicycle transportation systems that provide a safe, reliable, and convenient alternative to driving.	Objective 1. Reduce pedestrian and bicyclist injuries and fatalities.	Identify “hot spots” that have largest number of crashes that result in pedestrian fatalities and serious injuries; implement pedestrian safety projects at these locations.	Pedestrian crosswalk improvements Add sidewalks
	Objective 2. Connect gaps in the bicycle and pedestrian networks.	Identify “hot spots” that have largest number of crashes that result in bicycle fatalities and serious injuries; implement bicycle safety projects at these locations.	Multiuse paths Add bike facilities on street
	Objective 3. Provide attractive, high level-of-service facilities serving a broad range of users—including users of various bicycle riding skills sets, comfort and age.		Intersection improvements

Goal	Objective	Strategy	Project types
<p>Goal 2: Improve the environmental sustainability of the transportation system.</p>	<p>Objective 1. Improve stormwater and vegetation management.</p>	<p>For stormwater projects focus on phase 2 of the stormwater master plan.</p>	<p>Project types specified in stormwater plan</p>
	<p>Objective 2. Improve habitat connectivity.</p>	<p>Prioritize passages/crossings/ other connections that are in locations that are known routes for animals, or that have exhibited the highest number of animal/vehicle crashes.</p>	<p>Wildlife crossings—culverts with daylighting Convert culverts base to rocky stream bed</p>
<p>Goal 3: Support a healthy and wide variety of transportation choices, improve system reliability and a reduce VMT per capita through provision of nonmotorized and transit alternatives.</p>	<p>Objective 1. Improve bicycle and pedestrian access to transit.</p>	<p>Review local plans that identify gaps in pedestrian/bicycle infrastructure or advocacy group/committee wish lists that identify connectivity needs. Work with jurisdictions/ advocacy groups/committees to prioritize gaps to address.</p>	<p>Add sidewalks Multiuse paths</p>
	<p>Objective 2. Improve bicycle and pedestrian access to educational facilities and major employment centers.</p>		<p>Add bike facilities on street</p>
	<p>Objective 3. Facilitate implementation of Complete Streets policies.</p>	<p>Develop statewide bicycle and pedestrian plan.</p>	<p>Bridge/overpass—or other project to eliminate barrier</p>
<p>Goal 4: Accelerate project delivery</p>	<p>Objective 1. Meet project milestones on time and on budget.</p>	<p>State DOT initiated two new approaches in the last year to address Objectives 1 and 2: closely coordinating, assisting, and offering webinar training to applicants prior to application deadlines to encourage better applications; and reporting at monthly meetings to keep projects on track.</p>	<p>All</p>
	<p>Objective 2. Reduce project delivery delays.</p>		

Step 5—Develop Plan-Level Investment Priorities

In this step, the program manager and working group recommend funding “buckets” or bundling project types based on the goals, objectives, and performance measures that had been established in the earlier steps. These recommendations are provided to the State DOT Executive Board and also reviewed by the public through the public involvement process for the LRTP. The DOT establishes the following funding buckets:

- Pedestrian and bicycle projects and programs, including safe routes to school, rail to trail conversions, and routes for nondrivers;
- Environmental enhancements—mitigation and enhancement, including vegetation management, runoff/water quality, and habitat connectivity; and
- Boulevards and other roadways formerly in highway right-of-way.

The program manager convenes the working group to identify priority project types and recommended allocations for each funding bucket. To support this effort, program staff and the working group consult existing plans, needs analysis, interest group priorities, and “wish lists.” The State’s Strategic Highway Safety Plan and regional plans are reviewed to identify safety improvement strategies, along with priority investments from the State and regional bicycle plans. The Asset Management plan is reviewed to identify goals and strategies for including pedestrian and bicycle facilities or reducing environmental impacts. Table D.5 shows the recommended funding priorities.

Table D.5 TAP Funding Buckets and Project Priorities in the LRTP

Funding Bucket	Target Allocation of TAP Funds	Target Dollar Amount over First Five Years	Project Priorities
Pedestrian and bicycle projects and programs	75%	\$15.0 million	Multiuse paths and bridges (40%) SRTS (30%) Complete Streets enhancements to roadway reconstruction projects: sidewalks, bike lanes, intersection improvements. (30%)
Environmental enhancements	25%	\$5.0 million	Stormwater management (50%) Wildlife crossings (30%) Streambed restoration (20%)
Boulevards and other roadways	0%	\$0	–

Step 6—Develop Program-Level Investment Priorities

Next, the State DOT program manager, working with local jurisdictions and MPOs, develops investment priorities in the form of specific projects and programs for inclusion in the State Transportation Improvement Plan. Projects are proposed by agency staff as well as through an annual call for projects from local jurisdictions and MPOs. MPOs are also responsible for review and approval of projects within their urbanized area.

Program staff, with input from the working group, have established project evaluation criteria that relate to the adopted performance measures. Staff evaluate each proposed project according to the criteria and review the evaluation with the working group. Table D.6 shows the project evaluation criteria and their relationship to the goals set for the program. Each criterion has specific descriptions for awarding points. For example, projects within the top quartile of population and employment served are awarded 20 points, the highest point level for this criterion. The second, third, and fourth quartiles receive 15, 10, and 5 points respectively.

Table D.6 Project Evaluation Criteria and Relationship to Goals

Project Evaluation Criterion	Number of Points	1—Safe, Convenient Pedestrian and Bicycle Systems	2—Environmental Sustainability	3—Healthy Choices	4—Accelerate Project Delivery
Population and employment served	20	✓		✓	
Activity centers served	10	✓		✓	
Safety improvement	20	✓			
Transportation system connectivity improvement	10	✓		✓	
Phase 2 project in stormwater management plan	10		✓		
Located in identified critical habitat area	10		✓		
Project readiness	20				✓

After the projects are evaluated, the evaluation results and recommended set of projects are submitted to the State Transportation Board for review and consideration for programming in the STIP.

The DOT allocates staff hours to working with potential applicants prior to the submittal deadline to refine project applications. In doing so, the DOT focuses the number of applications and helps educate project sponsors on all of the requirements for project delivery. This additional effort at the beginning of the project solicitation and application process saves valuable time and funds during obligation. Delaware, Michigan, and Oregon are examples of other DOTs that follow this approach.

Step 7—Ongoing Monitoring, Evaluating, and Performance Reporting

The State DOT work program calls for the biannual collection and review of data for the performance measures as specified above, which is integrated into the overall performance measures process put in place by the MPO. The data collection and review provide an opportunity to address data needs challenges and to begin to assess if the original set of strategies needs revisions or refinement.

The State DOT uses a tracking program to inform quarterly meetings and encourage active project management, address issues, and challenges that might cause delay. Also, using information from project sponsors, the program manager compiles an annual report on the status of the performance measures that includes:

- The original project scope compared with the details of the programmed project;
- Before-and-after photographs of the project;
- The final costs compared to the approved budget for the project; and
- The projected project timeline versus the actual time it took to complete the project.

Appendix E. Where Can I Find Additional Information?

This section includes annotated bibliographical resources related to performance management on the following topics:

Table E.1
Performance Management for
the TAP and Predecessors

Table E.2
General Performance
Management Resources

Table E.3
Resources on Performance
Measurement Related to TAP
Program Categories and
Objectives

Table E.4
State and MPO Examples of
Performance Measurement

The following Web sites also provide general information on the TAP:

- http://www.fhwa.dot.gov/environment/transportation_alternatives/resources/tap_organizations/;
- <https://www.fhwa.dot.gov/map21/factsheets/tap.cfm>;
- http://www.fhwa.dot.gov/planning/health_in_transportation/resources/moving_healthy.cfm;
and
- http://www.fhwa.dot.gov/environment/safe_routes_to_school/overview/.

Future editions of this guidebook will include supplemental resources as they become available.

Table E.1 References on Performance Management for the TAP and Predecessors

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Transportation Alternatives Data Exchange	Undated	Rails to Trails Conservancy	This Web site is an online resource that provides basic financial and description data on TAP projects across the country. It is designed to help stakeholders at the Federal, State, and local level understand and ultimately implement projects.	This resource can assist program managers in benchmarking the performance of their program against others. This resource also includes resources for peers to exchange data and share experiences related to project management and performance.	http://trade.railstotrails.org
Transportation Spending: How Transparent is Your State?	Undated (refers to FY 2014)	Advocacy Advance	This document provides an evaluation of each State's transparency as it pertains to statewide transportation improvement program (STIP) information and where funds go.	Provides a general snapshot of transparency at a State level, although not specific to the TAP.	http://www.advocacyadvance.org/site_images/content/STIP_Transparency_infographic_pdf.pdf
Benefits of Rail Trails: Fact Sheets	Undated	Rails to Trails Conservancy	This Web site provides an overview and five fact sheets of the benefits of rail-trail conversions, including health, livability, transportation, environmental, economic revitalization, and historic preservation.	This source provides a list of benefits which could potentially be used to evaluate eligible projects applying for funding.	http://www.railstotrails.org/ourWork/trailBasics/benefits.html
Project Scoring Criteria: Template Transportation Alternatives Program Competitive Grant Application	Undated	State Smart Transportation Initiative	This document provides a template to evaluate projects that are eligible for funding and provides the scoring criteria.	Provides sample of evaluation criteria for projects that are eligible for funding.	http://www.ssti.us/wp/wp-content/uploads/2013/04/MPO-Sample-Scoring-Criteria.pdf

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Creating Healthier Generations: A Look at 10 Years of the Federal Safe Routes to School Program	2015	National Center for Safe Routes to School	This report examines the accomplishments of the Federal Safe Routes to School Program from 2005 through 2015. The report quantifies increases in walking and bicycling based on data collected from parent surveys and student travel questionnaires.	SRTS projects were a TAP-eligible activity under MAP-21 and are eligible under the FAST Act STP Set-Aside. Program managers can use the data collection methods and services provided by the Center to measure their own programs and can use the findings to support project and program prioritization.	http://www.saferoutesinfo.org/program-tools/national-progress/national-reports
Lifting the Veil on State Spending: An Analysis of Problems and Priorities in Transportation Planning and What to Do About It	2014	Advocacy Advance	This report benchmarks planned bicycling and walking project spending in STIPs and discusses how State DOTs can become more transparent and responsive to community needs.	A performance management approach should include transparency in reporting of spending.	http://www.advocacyadvance.org/docs/LiftingTheVeil_Report.pdf
How MPOs are Funding Bicycle and Pedestrian Improvements	2014	Advocacy Advance	This 3-page document provides bullets on best practices to effectively integrate bicycling and walking needs into the MPO planning and funding process, in general and related to the competitive grant program, in particular.	Provides a series of best practices for how to apply for funding and how to make bicycle and pedestrian projects more competitive.	http://www.advocacyadvance.org/site_images/content/MPO_BikePed_Best_Practices_Report.pdf

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Transportation Alternatives Program Competitive Grant Processes: Examples of Regional Applications	2013	Advocacy Advance	The report is a guide for MPO staff setting up competitive grant process applications. The report spotlights example MPO applications that will help regional transportation staff evaluate potential projects for funding. It also includes details on how MPOs can address the need for Safe Routes to School (SRTS) infrastructure and programming.	Summarizes role of MPO in the competitive grant process and provides overview of how MPO is evaluating SRTS projects.	http://www.advocacyadvance.org/site_images/content/MPO_TAP_(Final).pdf
Alameda County SR 2S Program Annual Reports	2013	Alameda County Transportation Commission	Annual reports summarize SRTS program performance. The report includes data on changes in mode share by planning area, program, and school.	The reports provide an example of data-based evaluation of SRTS programming at the local/county level measuring results at a variety of scales.	http://alamedacountysr2s.org/about-us/annual-reports/
How MPOs are Handling TAP and SRTS	2013	National Center for Safe Routes to School	This report provides a summary of interviews with MPOs on how they are preparing for their new role in allocating TAP funds and how SRTS are factored into their plans.	The report provides an overview of the role of MPOs in disbursement of TAP funding as it relates to SRTS programs, which may include application of performance criteria.	http://www.saferoutesinfo.org/sites/default/files/resources/NCSRTS_MPO_Report_2013.pdf
Transportation Alternatives Program Manual Development Guide	2012	Transportation Alternatives Data Exchange (Rails-to-Trails Conservancy)	This document is provided to assist agencies in developing their own TAP Manual. The guide includes a sample outline with program background, program structure, application process, and project implementation. It includes three State examples—a letter of intent from Maine, a handbook from Iowa, and an application from Montana.	The document may be helpful for understanding a generic program approach within which a performance-based management approach would fit.	http://trade.railstotrails.org//page.php?identifier=publications

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Quantitative Selection Technical Brief	2012	National Transportation Enhancements Clearinghouse	This brief provides an overview of four States' competitive processes and offers recommendations for implementing new selection criteria.	Provides overview of how competitive processes and selection criteria are being used to evaluate projects for possible funding.	http://www.ssti.us/wp/wp-content/uploads/2013/04/Natl-TE-Clearinghouse-Quantitative-Selection-2012.pdf http://trade.railstotrails.org/action/document/download?document_id=146
NJ Safe Routes to School Program Strategic Plan	2012	New Jersey DOT	This plan includes goals, objectives, performance measures, and monitoring responsibility to guide the State's SRTS activities and shape the SRTS program through the next 5 years.	This document provides an example of a performance-based framework for program implementation.	http://www.saferoutesnj.org/wp-content/uploads/2012/12/SRTS_strategicPlanUpdate_Final.pdf

Table E.2 General Performance Management Resources

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
PlanWorks	Undated	FHWA	This web site provides a wide-ranging set of resources for all stages of transportation planning, programming, corridor planning, and environmental review. Among other things it includes resources to assist in setting long-range plan and TIP/STIP priorities; a guide and checklist for selecting performance measures; assessments to help identify and overcome barriers to successful project and plan development; and case studies.	The resources on performance measures are particularly relevant to TAP performance management. The broader resources on planning and programming topics can also help with issues such as identifying stakeholders, coordinating with other activities, etc.	https://fhwaapps.fhwa.dot.gov/planworks/
Regional Models of Cooperation	Undated	FHWA	FHWA encourages State DOTs, MPOs, and providers of public transportation to think beyond traditional borders and adopt a coordinated approach to transportation planning.	Improved multijurisdictional coordination can reduce project delivery times and enhance the efficient use of resources, with a positive impact on TAP performance measures.	https://www.fhwa.dot.gov/planning/regional_models/
Policies That Work: A Governors' Guide to Growth and Development	Undated	Governors' Institute on Community Design	This guide is intended to help governors produce more cost-efficient and environmentally sustainable patterns of growth. The transportation section describes policies to create transportation networks that are integrated with the community and accommodate multiple modes of transportation, including pedestrian, bicycling, and transit.	The guide includes performance management topics such as establishing a set of measurable State development goals and aligning State programs with State development principles and goals.	http://www.govinstitute.org/policyguide/introduction.html

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Planning Emphasis Areas for Federal Fiscal Year 2016	2015	FHWA and FTA	This memorandum to executive directors of MPOs and DOTs encourages giving priority to priority to MAP-21 implementation (including transition to performance-based planning and programming), Regional Models of Cooperation, and Ladders of Opportunity, focusing on access to essential services.	Program managers can give strong weight to access to essential services when selecting pedestrian and bicycle projects. They can also implement performance-based approaches (as described in this guidebook) and ensure a regionally cooperative approach to selecting TAP projects.	https://www.fhwa.dot.gov/planning/processes/metropolitan/mpo/fy_2016/index.cfm
Statewide Pedestrian and Bicycle Planning Handbook	2014	FHWA	This handbook is designed to help State DOTs develop or update State pedestrian and bicycle plans. It covers statewide planning from plan inception and scoping to engaging stakeholders and the general public; developing goals, objectives and strategies; collecting and analyzing data; linking to the larger statewide transportation planning process; and implementation. For each stage, the handbook provides experiences and noteworthy practices from DOTs around the country.	State-programmed pedestrian and bicycle TAP projects should be developed through a process consistent with State projects funded through other sources. This handbook can help an agency improve its pedestrian and bicycle planning process. The handbook includes a section on benchmarking and performance measurement as well as examples of measures for project selection.	http://www.fhwa.dot.gov/planning/processes/pedestrian_bicycle/pedestrian_bicycle_handbook/

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Model Long-Range Transportation Plans: A Guide for Incorporating Performance-Based Planning	2014	FHWA	This guidebook provides information for State DOTs, MPOs, and other transportation organizations about effective practices for incorporating performance-based planning into the development of a long-range transportation plan. The guide discusses each step of plan development, including public engagement, scoping, strategic vision, performance measures, system performance report, needs identification, investment analysis, and connecting the plan with programming. Five case studies are included.	This guide provides context for performance management by showing how a performance-based approach to overall transportation planning can work. Elements of various steps may also be directly adaptable to TAP management.	http://www.fhwa.dot.gov/planning/performance_based_planning/mlrtp_guidebook/
Performance-Based Planning and Programming Guidebook	2013	FHWA	This guidebook provides a comprehensive guide to performance-based planning and programming in the context of performance requirements.	The framework presented in this guidebook (planning, programming, implementation, and evaluation) can be applied to TAP management.	http://www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook/
Performance Reporting Final Report	2013	FHWA	This report provides an example of the design of an ideal transportation performance report.	The framework presented in this report (planning, programming, implementation, and evaluation) can be applied to TAP management.	http://www.fhwa.dot.gov/tpm/engage/reporting/

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Traffic Monitoring Guide	2013	FHWA	The Traffic Monitoring Guide presents recommendations to help improve and advance current traffic monitoring programs with a view towards the future of traffic monitoring and with consideration for transportation legislation. Chapter 4 includes procedures and methods for monitoring pedestrian and bicycle traffic.	Traffic data and information, including pedestrian and bicycle travel, is an essential element of performance monitoring and forecasting. This can be a resource for data collection for performance measurement.	http://www.fhwa.dot.gov/policyinformation/tmguidetmg_fhwa_pl_13_015.pdf
TDM Performance Measures	2013	Smart Growth America	This document outlines the process for setting a framework of performance measurement and tracking. It identifies a number of recommended measures meaningful to the transportation demand management strategy as well as a recommended process for data collection.	Provides an outline of how MPOs could set a framework for measuring and tracking outcomes from Transportation Demand Strategies, which include pedestrian and bicycle strategies.	http://smartgrowthamerica.org/documents/detroit-performance-measures.pdf
State DOT Comparative Performance Measurement: A Progress Report	2012	NCHRP	This report was produced under the NCHRP 20-24(37) series. It compares the current state of performance measurement across State DOTs. Peer group comparisons were made for four areas—pavement condition, bridge condition, safety (fatalities), and project delivery. Progress is also described on congestion and freight mobility.	This report provides an example of how trends in performance can be compared across States. The project delivery metrics in particular may be relevant to the TAP, although the other metrics less so.	http://maintenance.transportation.org/Documents/Progress%20Report%20Final%20Draft-5-10-2012.pdf

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Statewide Opportunities for Integrating, Operations, Safety, and Multimodal Planning	2010	FHWA	This guidebook describes how to integrate stakeholders from operations, safety, and multimodal groups and to evaluate the degree of the integration.	The framework shows how to integrate a variety of stakeholders into a project planning process, and includes self-assessments of performance.	http://www.fhwa.dot.gov/planning/processes/statewide/practices/manual/
Measuring Performance among State DOTs: Sharing Good Practices (NCHRP 20-24 Task 37)	2006-2013	NCHRP	This project included 12 tasks related to performance measurement at State DOTs. Some task reports focused on a particular issue (e.g., measurement and reporting for safety, operations, or congestion) while others explored the development of national-level performance measures and reporting. This work was a key underpinning of the performance management approach.	Some of the information on specific measures may be of value (e.g., how different States report safety, and effective practices in using this information), although most of the issues addressed in these reports are also addressed in a more user-friendly format in FHWA guidebooks and other publications listed here.	http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=543
Guidance for Evaluating TCSP Projects	2001	FHWA	This document is provided to assist individuals and organizations in effectively evaluating projects funded through the Transportation and Community and System Preservation Pilot Program (TCSP). Methods, measures, and data sources for process, product, and outcome evaluation are discussed.	While somewhat dated, this reference was specifically intended to help project sponsors meet the evaluation objectives of the early TCSP program.	http://www.fhwa.dot.gov/planning/tcsp/evaluation/

Table E.3 Resources on Performance Measurement Related to TAP Program Categories and Objectives

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Community Vision Metrics Web Tool	Undated	FHWA	This tool enables practitioners to search for performance indicators relevant to their specific circumstances, communities, and quality of life goals. The user can search for metrics by geographic scale of application, context, and mode.	The tool presents a variety of metrics that may be relevant.	http://www.fhwa.dot.gov/liquability/tools/community_vision/
Partnership for Sustainable Communities—Indicators Catalog	Undated	HUD, DOT, EPA	The Partnership’s Web site provides various resources for sustainable communities. The most relevant to TAP performance management is a filterable catalog of sustainable community indicators, including transportation, land use, and housing indicators.	The indicators catalog provides a focused set of “popular and useful” indicators based on evaluation of numerous initiatives across the U.S. Most of the transportation indicators are consistent with TAP objectives.	http://www.sustainablecommunities.gov/indicators
Bicycle-Pedestrian Count Technology Pilot Project	2016 (under development)	FHWA	The Bicycle-Pedestrian Count Technology Pilot Project is a research and technology deployment effort to identify organizational and technical capacity needs at MPOs.	Projects will use counts to measure performance.	http://www.fhwa.dot.gov/environment/bicycle_pedestrian/countpilot/
Pedestrian and Bicycle Performance Measures Guidebook	2016 (anticipated)	FHWA	This guidebook provides a comprehensive set of potential performance measures for pedestrian and bicycle programs and investments, and provides guidance on their use. Both project and network-level measures are included.	Most TAP funding is directed towards pedestrian and bicycle projects; the measures in this guidebook are highly relevant.	To be posted at http://www.fhwa.dot.gov/environment/bicycle_pedestrian/

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Transportation and Health Tool	2015	U.S. Department of Transportation and the Centers for Disease Control and Prevention	The tool provides data on a set of transportation and public health indicators for each U.S. state and metropolitan area that describe how the transportation environment affects safety, active transportation, air quality, and connectivity to destinations.	Health outcomes can be among the important benefits of projects. The toolkit provides a resource for how to define and measure such outcomes.	https://www.transportation.gov/transportation-health-tool/indicators
NCHRP Report 797, Guidebook on Pedestrian and Bicycle Volume Data Collection	2015	NCHRP	The guidebook is directed to practitioners involved in collecting nonmotorized count data. The guidebook describes methods and technologies for counting pedestrians and bicyclists; offers guidance on developing a nonmotorized count program; gives suggestions on selecting appropriate counting methods and technologies; and provides examples of how organizations have used nonmotorized count data to better fulfill their missions.	Programs and departments that fund bicycle and pedestrian infrastructure have desired to use counts as a way of measuring performance, demonstrating bicycle and pedestrian infrastructure value and return on investment. User counts can be used for planning, programming, and project prioritization.	http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_report_797.pdf
Benchmarking Report	2016	Alliance for Bicycling and Walking	This report, published biennially, provides data on bicycling and walking in all 50 States. ABW's Benchmarking Project has been collecting data since 2003 and documenting national and international trends, measuring progress, and promoting performance data collection and transparency/open data practices.	While this report's focus is mainly on the performance of cities and States where data is most readily available, MPOs can also benefit from the wide variety of performance indicators collected as well as the aggregation of national data sources.	http://www.bikewalkalliance.org/resources/benchmarking

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
INVEST Sustainability Rating Tool	2014	FHWA	INVEST is a Web-based self-evaluation tool created by FHWA to integrate sustainability considerations (social, economic and environmental) into agency actions. INVEST includes rating criteria for systems planning, project development, and operations and maintenance.	The most applicable component of this tool is the project development module. There are numerous criteria which could be potentially translated into performance or project evaluation criteria.	https://www.sustainablehighways.org/
STAR Community Rating System	2014	STAR Communities	The STAR rating system is an online tool built for local governments to “help communities identify, validate, and support implementation of best practices to improve sustainable community conditions.” The rating system is aligned to goals, objectives and evaluation measures which are linked to various goal areas.	This is a very comprehensive rating system with a wealth of metrics and actions to choose from as potential strategies to accomplish sustainability principles. Considerations related to multimodal travel are included which are applicable to eligible activities.	http://www.starcommunities.org/rating-system/download/
Performance Measures for Nonmotorized Transportation	2014	State Smart Transportation Initiative	This webinar includes presentations on the use of performance metrics for bicyclists and pedestrians used at the State level.	The webinar presentations relate performance to output and outcome metrics with examples from Minnesota, Illinois, Washington, and Wisconsin.	http://www.ssti.us/2014/09/performance-measures-for-nonmotorized-transportation/
Evaluating Nonmotorized Transport	2014	Victoria Transport Policy Institute	This Web site includes descriptions of a variety of performance metrics related to walking and cycling activity and conditions.	Potential performance metrics may be found at this repository of information.	http://www.vtpi.org/tdm/tm63.htm

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Well-Measured— Developing Indicators for Comprehensive and Sustainable Transport Planning	2014	Victoria Transport Policy Institute/ T. Litman	This report provides guidance on the use of indicators for sustainable and livable transportation planning. It defines <i>sustainability</i> and <i>livability</i> , discusses sustainable development and sustainable transport concepts, and how sustainability indicators can be applied in transport evaluation and planning. It describes factors to consider when selecting sustainable transportation indicators, identifies examples of indicators and indicator sets, and provides recommendations for selecting sustainable transport indicators for use in a particular situation. A discussion is included concerning selecting indicators as well as describing different types of indicators: process, inputs, outputs and outcomes.	The report is a comprehensive examination of tools available that relate sustainability principles to transportation goals and objectives. It could be used to select performance measures for a given project typology.	http://www.vtpi.org/wellmeas.pdf
Measuring the Performance of Livability Programs	2013	Mineta Transportation Institute	This report analyzes the performance measurement processes adopted by five large “livability” programs in the U.S. (Atlanta, Minneapolis, Portland, North Central Texas, San Francisco MPOs). It compares and contrasts these programs by examining existing research in performance measurement methods. Finally, the report explores best practices for setting performance measurement methods.	Provides best practices by MPOs on establishing performance measures for various projects.	http://transweb.sjsu.edu/PDFs/research/1126-livability-program-performance-measurement.pdf

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Sustainable Streets Index	2013	New York City DOT	The Sustainable Streets Index allows NY City DOT to implement a performance-driven transportation policy, geared toward achieving the sustainability, mobility, infrastructure, and quality of life goals set forth in the City's PlaNYC 2030 initiative. This report reviews transportation performance for the five boroughs of New York City, measured by indicators, including travel usage/volumes by mode, speeds, and economic improvements measured through sales tax data. Measures are reported locally, to allow analysis of individual projects, as well as citywide.	This index provides an example in how to track the performance of transportation improvements post construction to demonstrate programmatic accomplishment. It also provides a framework to communicate accountability to the traveling public.	http://www.nyc.gov/html/dot/html/about/ssi.shtml
Rethinking Streets: An Evidenced-Based Guide to 25 Complete Street Transformations	2013	Schlossberg, M., et al.	The focus of this book is to provide tangible results from the redesign of 25 streets across the United States, including effects on traffic, safety, and economic measures. Each street is unique and the solutions reflect a balance between transportation modes and place differently.	The book provides examples of projects that may be eligible for TAP funds. The examples can be used to create typologies of projects along with performance measures that program managers can use to evaluate projects for funding and track performance over time.	http://www.ssti.us/2014/09/performance-measures-for-nonmotorized-transportation/

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Green Roads Rating System	2013	University of Washington and CH2M Hill	Greenroads is a third-party roadway sustainability rating system. A Greenroad is defined as a roadway project that has been designed and constructed to a level of sustainability that is substantially higher than current common practice. The scorecard includes 11 required activities which must be completed along with voluntary credits.	This tool is similar to the project development scorecard for Greenlites and to FHWA's INVEST tool. The key application could potentially relate to the development of a scoring methodology to evaluate grant applications for projects submitted for consideration.	https://www.greenroads.org/
Transportation Health Impact Assessment Toolkit	2011	Centers for Disease Control and Prevention	This toolkit provides a framework for public health departments, city planners, project managers, and other stakeholders to conduct HIAs on proposed transportation projects, plans, and policies. Strategies and evidence are divided into six categories: reduce VMT, expand public transportation, promote active transportation, incorporate healthy community design features, improve safety for all users, and ensure equitable access to transportation networks.	Health outcomes can be among the important project benefits. The toolkit provides a resource for how to define and measure such outcomes.	http://www.cdc.gov/healthypplaces/transportation/hia_toolkit.htm
Creating Livable Communities	2011	FHWA	This booklet provides strategies on how to effectively consider and incorporate livability objectives in transportation investment decisions. The booklet includes sample livability goals, objectives, and performance metrics.	This resource provides sample metrics that could be used to measure the impacts of programs and projects on the various dimensions of livability.	http://www.fhwa.dot.gov/livability/creating_livable_communities/

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Designing Walkable Urban Thoroughfares: A Context-Sensitive Approach—Phase III Outreach Materials (Task 5), Performance Measures	2011	Institute of Transportation Engineers/ B. Bochner and B. Storey	This memo provides a summary of performance measurement of Context-Sensitive Solutions (CSS) and related approaches to thoroughfare design. It proposes a structure for evaluating urban thoroughfare planning and design processes as well as the designs and outcomes. Examples of performance measures are also included.	The document provides a proposed scope of work to complete a guide for using performance measures to assess the process and outcomes of urban thoroughfares designed using CSS.	http://www.ite.org/css/Task5Memorandum.pdf
Quality of Life: Assessment for Transportation Performance Indicators Focus Group Report	2011	Schroeder, Gustafson and Schneider	This research uses a literature review, survey, and focus groups to better understand how Minnesotans define quality of life. This led to the identification of 11 factors which made up quality of life, and seven interrelated factors within the transportation system that contributed to or detracted from quality of life. Unique priorities were uncovered for different age cohorts and urban versus rural residents.	This research provides interesting ideas for quality of life indicators that may be useful for program performance measures or evaluation criteria.	http://conservancy.umn.edu/handle/11299/167906

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
NCHRP Report 708: A Guidebook for Sustainability Performance Measurement for Transportation Agencies	2011	Transportation Research Board/ Zietsman et al.	This guidebook was developed with the purpose of providing direction to transportation agencies desiring to identify performance measures that can help the agencies better plan, design, construct, operate, and maintain its infrastructure in a way that honors the principles of sustainability. The guidebook presents a six-step process that includes developing goals, objectives, performance measures, and implementing the framework. The guide is supported by a CD ROM which contains a searchable database of performance measures for phases of transportation decisionmaking from planning through to operations and maintenance.	The searchable database has many performance measures that can be reflective of both community improvement and environmental mitigation activities.	HTTP://ONLINEPUBS.TRB.ORG/ONLINEPUBS/NCHRP/NCHRP_RPT_708.PDF
Byway Awareness and Impact on Livability and Economy: Applications, Perspective, and Discussion	2011	Tuck, B.	The presentation included results from a research project that analyzed the quality of life and the local economy impacts of two scenic byways in Minnesota. Questionnaires were completed by residents and travelers on topics, including demographic and travel characteristics, byway awareness, visitation duration, quality of life and byway contributions, expenditures, and byway effects on travel. Economic impacts were evaluated using the IMPLAN model.	This research points up two best practices for potentially measuring performance for scenic byways, including quality of life and economic impact metrics and measurement methods.	Bridget Tuck, University of Minnesota, Conference on Performance Measures for Livable Communities, Austin, Texas. September 2011

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Guide to Sustainable Transportation Performance Measures	2011	U.S. EPA	This guidebook describes 12 performance measures that can readily be applied in transportation decisionmaking. The document focuses on transportation decisionmaking at the regional or metropolitan level, although many of the performance measures described could be used at the State or local level.	This document describes opportunities to incorporate environmental, economic, and social sustainability into transportation decisionmaking through the use of performance measures.	http://www.epa.gov/smartgrowth/guide-sustainable-transportation-performance-measures
Bike, Pedestrian, and Transit, and Planning Performance Measures: Synthesis	2011	Washington State DOT	This document synthesizes published research on bicycle, pedestrian, transit, and planning performance measures at both Federal and State levels. The synthesis is provided in annotated bibliography format.	This provides potential measures pertaining to performance as well as other literature and resources that could be useful.	http://www.wsdot.wa.gov/NR/rdonlyres/8858E151-6060-4B17-9BBF-8DB33F53E35E/0/BrianSSynReportBikeTransitPlanningperformancemeasures2011FINAL2.pdf
Greenlites Sustainability Rating System	2010	New York State DOT	Greenlites (Green Leadership In Transportation Environmental Sustainability) has been implemented by New York DOT as a self-certification environmental sustainability rating program. The rating system started initially with operations scorecard then moved to the development of a project development scorecard and eventually to a planning scorecard	Rating tools are effective at encouraging integration of practices and design choices that incorporate sustainability principles, and can be useful as part of a grant application process. The categories and modules in the project development scorecard all have some applicability to activities that qualify for funding, especially criteria that relate to community improvement and environmental mitigation activities.	https://www.dot.ny.gov/programs/greenlites

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Quantifying the Benefits of Context-Sensitive Solutions	2009	Stamatiadis, N.	This project provides a five-step process and 33 case studies to demonstrate the long-term success of implementing a context-sensitive solutions approach by transportation agencies. The research points out that it is critical to start off with the intent to collect and monitor benefits as part of the project development process, since it is nearly impossible to collect pre-project data after the project is complete.	This guidebook provides benefits and indicators which could inform performance measures for the performance management guide.	http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_642.pdf
Guidelines for Environmental Performance Measurement (NCHRP 25-25 Task 23)	2008	Cambridge Systematics, Inc.	This report establishes guidelines for the development and implementation of environmental performance measurements by State DOTs. The report includes a "library" of examples and possible environmental performance measures. It provides an overall framework and guidance for the selection and implementation of environmental performance measures that can reflect different agency goals, organizational management structures, and data availability.	Many of the eligible project categories include environmental benefits among their objectives. This report provides useful guidance on measuring those benefits.	http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/25-25(23)_FR.pdf

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Moving Communities Forward: How Well-Designed Transportation Projects Make Great Places	2007	American Institute of Architects/ A. Goldberg	This research examined 30 different types of transportation projects around the country, examining measures of economic benefit as well as community impact. Transportation projects were grouped into three categories, including: development (community) scale, building (facility) scale and infrastructure scale. The report also presents ways to measure good design and effective community participation.	All 30 case studies include design attributes that would qualify any of them for funding. This provides another list of projects that can be used to develop typologies of projects for performance management which can be used to develop grant evaluation criteria as well as long-term tracking of actually projects outcomes.	http://www.aia.org/about/initiatives/AIAS075434
Irvine Minnesota Inventory	2005	Day, K., et al.	This inventory tool measures a wide range of built environment features that may affect physical activity, especially walking. It includes 160 items, which cover four domains: accessibility, pleasurability, perceived safety from traffic, and perceived safety from crime. The inventory includes both a paper version and a version in Microsoft Access.	Could provide a basis for detailed evaluation measures for pedestrian improvements.	http://www.activelivingresearch.org/node/10634

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Community and Quality of Life: Data Needs for Informed Decisionmaking	2002	National Academies of Science	This book is a seminal piece of work that provides insight into the complex interlinkages and interdependencies around understanding how transportation affects community quality of life and how to begin to measure this phenomenon. The report provides recommendations on data availability for meaningful evaluation of livability as part of transportation decisionmaking. The report highlights the importance of cross-cutting measures and understanding spatial issues with data management and evaluation.	While this book is somewhat dated, it is probably the most comprehensive resource which combines the philosophy of livability with practical challenges facing practitioners trying to translate livability into tangible metrics for logical, coherent, and systematic decisionmaking. The book also provides numerous case studies which could possible inform the development of project typologies for the performance management guide.	http://www.nap.edu/catalog/10262/community-and-quality-of-life-data-needs-for-informed-decision

Table E.4 State and MPO Examples of Performance Measurement

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Measuring Success	undated	Memphis MPO	The Memphis MPO Long-Range Transportation Plan includes performance measures that revolve around 9 key goals, including: Mobility/Accessibility, Congestion, Environment, Land Use, Safety, Funding, Economic Vitality, Collaboration, and Maintenance.	This plan provides local examples of key performance measures that could be applied for evaluating eligible projects.	http://www.memphismpo.org/resources/trends/performance-measures
Alameda County SR2S Program Annual Reports	2013	Alameda County Transportation Commission	Annual reports summarize SRTS program performance. The report includes data on changes in mode share by planning area, program, and school.	The reports provide an example of data-based evaluation of SRTS programming at the local/county level measuring results at a variety of scales.	http://alamedacountysr2s.org/about-us/annual-reports/
Lee County MPO Bicycle-Pedestrian Prioritization and Funding/Project Selection Process Recommendations and Bicycle-Pedestrian Prioritization and Funding Performance Measures	2013	N. Baier (Jacobs) and B. Davis (Alta Planning and Design) for Lee County MPO	These memoranda recommend refinements to the Lee County MPO process for selecting bicycle and pedestrian projects that use Federal funds. The memoranda include recommendations for performance/selection criteria and a review of other six other MPOs' procedures for using performance criteria to select bicycle and pedestrian projects.	The review of practice and recommendations for Lee County provide useful ideas for applying a performance-based approach to project selection as part of transportation programming.	http://leempo.com/documents/10-29-2013%20BPCC/BPCC03.PrioritizationProcess_000.pdf
Minnesota Performance Measurement	2012	Minnesota DOT	This is an example of an annual report summarizing program performance at a statewide level.	This example of a State level performance-based reporting system which could be applied to performance reporting although the measures would need to be customized.	http://www.dot.state.mn.us/measures/

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
NJ Safe Routes to School Program Strategic Plan	2012	New Jersey DOT	This plan includes goals, objectives, performance measures, and monitoring responsibility to guide the State's SRTS activities and shape the SRTS program through the next 5 years.	This document provides an example of a performance-based framework for program implementation.	http://www.saferoutesnj.org/wp-content/uploads/2012/12/SRTS_strategicPlanUpdate_Final.pdf
Recommendations Memo No. 2—Livability and Quality of Life Indicators	2011	Oregon DOT	This memo is an early component of Oregon DOT's efforts to identify quality of life indicators for its Least Cost Planning Tool (now called MOSAIC). The memo examines definitions of livability and quality of life as well as how transportation affects community quality of life. Examples are provided of different quality-of-life-related indicators. Nine categories are included for evaluation of different plan scenarios: accessibility, vitality, stewardship, equity, funding, land use, mobility, safety and security, and quality of life/livability. The memo discusses how quality of life indicators overlap with other categories of indicators.	The Least Cost Planning Tool provides an example of how a wide range of indicators can guide the evaluation of different plan scenarios (bundles of actions) for transportation investment. These indicators could be useful as measures of performance to evaluate a range of different types of community improvement activities, including reconstructing roadways largely in the right-of-way of former Interstate System routes or other divided highways.	http://www.oregon.gov/ODOT/TD/TP/docs/LCP/Livability.pdf?ga=t

Reference Title	Year	Author/ Source	Description	Relevance to TAP	Web Link/ Bibliographic Info
Smart Transportation Guidebook	2008	New Jersey DOT and Pennsylvania DOT	This guidebook provides information for planners and engineers to use when designing non-limited access roadways in New Jersey and Pennsylvania. Pages 21-22 provide a table of potential measures of success along with unit metric and source of data. An important aspect of the guidebook is identifying roadway types based on context.	This guidebook provides good suggestions on performance measures related to community assets and environmental mitigation. It also provides potential suggestions for the redesign of Interstate and/or divided highways by incorporating land use context into the selection of road types. The classification system could provide program managers with a framework for roadway project applications that serve unique community activities.	http://www.state.nj.us/transportation/community/mobility/pdf/smarttransportationguidebook2008.pdf
Building Projects that Build Communities: Recommended Best Practices	2003	Washington State DOT	This guidebook was developed to provide a process for the key ingredients of developing transportation projects which include both effective community-based design and collaborative decisionmaking. The guidebook contains an example of project decision guidelines (including measures of success), a project team charter, and intermediate and final evaluation templates. Three case studies are provided to showcase how the process can lead to context-sensitive solutions.	While performance measures are not directly discussed in the guidebook, it provides some interesting examples of tracking the performance of project teams. Program managers can modify the templates to create a tracking mechanism for process-related measures. The case studies represent types of projects that fit under the TAP for both community improvement and modification of four-lane highways.	http://contextsensitivesolutions.org/content/reading/building-projects/resources/building-projects-that-build-communities/

Appendix F. Examples of Project Evaluation Criteria

Boston MPO

The Boston MPO's TIP evaluation criteria include six categories: System Preservation, Modernization and Efficiency (36 total points possible), Livability and Economic Benefit (29 total points possible), Mobility (25 total points possible), Environment and Climate Change (25 total points possible), Environmental Justice (10 total points possible), and Safety and Security (29 total points possible). The criteria for Livability and Economic Benefit are shown below, along with criteria for Environmental Justice.¹⁴

Livability and Economic Benefit (29 total points possible)

Design is consistent with complete streets policies (up to 4 points)

- +1 Project is a complete street
- +1 Project provides for transit service
- +1 Project provides for bicycle facilities
- +1 Project provides for pedestrian facilities
- 0 Does not provide any complete streets components

Provides multimodal access to an activity center (up to 3 points)

- +1 Project provides transit access (within a quarter-mile) to an activity center
- +1 Project provides bicycle access to an activity center
- +1 Project provides pedestrian access to an activity center
- 0 Does not provide multimodal access

Reduces auto dependency (up to 8 points)

- +3 Project provides for a new transit service
- +1 Project is identified in MassDOT's Bay State Greenway Priority 100
- +1 Project completes a known gap in the bicycle or pedestrian network
- +1 Project provides for a new bicycle facility
- +1 Project provides for a new pedestrian facility
- +1 Project implements a transportation demand management strategy
- 0 Does not provide for any of the above measures

¹⁴ http://www.ctps.org/Drupal/data/html/plans/TIP/TIP_Evaluation_Scoring.html, accessed 3/4/2015.

Project serves a targeted development site (40R, 43D, 43E, Regionally Significant Priority Development Area, Growth District Initiative, or eligible MBTA transit station areas) (up to 6 points)

- +2 Project provides new transit access to or within site
- +1 Project improves transit access to or within site
- +1 Project provides for bicycle access to or within site
- +1 Project provides for pedestrian access to or within site
- +1 Project provides for improved road access to or within site

Provides for development consistent with the compact growth strategies of MetroFuture (up to 5 points)

- +2 Project mostly serves an existing area of concentrated development
- +1 Project partly serves an existing area of concentrated development
- +1 Project supports local zoning or other regulations that are supportive of smart growth development
- +2 Project complements other local financial or regulatory support that fosters economic revitalization in a manner consistent with smart growth development principles
- 0 Does not provide for any of the above measures

Project improves Quality of Life (up to 3 points)

- +1 Reduces cut through within the project area
- +1 Implements traffic calming measures
- +1 Improves the character of the project area

Environmental Justice (10 points possible)

Improves transit for an EJ population (up to 3 points)

- +3 Project is located within half-mile buffer of or affects an MPO environmental justice area or population zone and will provide new transit access
- +1 Project is located within half-mile buffer of or affects an MPO environmental justice area or population zone and will provide improved access
- 0 Project provides no improvement in transit access or is not in an MPO environmental justice area or population zone

Design is consistent with complete streets policies in an EJ area (up to 4 points)

- +1 Project is located within half-mile buffer of or affects an MPO environmental justice area or population zone and is a complete street
- +1 Project is located within half-mile buffer of or affects an MPO environmental justice area or population zone and provides for transit service

- +1 Project is located within half-mile buffer of or affects an MPO environmental justice area or population zone and provides for bicycle facilities
- +1 Project is located within half-mile buffer of or affects an MPO environmental justice area or population zone and provides for pedestrian facilities
- 0 Does not provide any complete streets components

Addresses an MPO identified EJ transportation issue (up to 3 points)

- +3 Project is located within half-mile buffer of or affects an MPO environmental justice area or population zone and the project will provide for substantial improvement to an MPO identified EJ transportation issue
- +2 Project is located within half-mile buffer of or affects an MPO environmental justice area or population zone and the project will provide for improvement to an MPO identified EJ transportation issue
- 0 Project provides no additional benefit and/or is not in an MPO environmental justice area or population zone
- 10 Creates a burden in an EJ area

Nashville MPO

The Nashville Area MPO’s long-range transportation plan seeks to enhance the livability, sustainability, prosperity, and diversity of the region through 2035. This plan provides a set of examples for data collection and system monitoring, as well as periodic assessment of the effectiveness of implemented strategies. Endorsed in 2010, the project evaluation criteria include scoring for many elements that would be eligible for funding. Sample evaluation criteria applied to all projects are shown in table F.1.

Table F.1 Nashville MPO Sample Evaluation Criteria

Evaluation Criterion	Possible Points
Total Possible Points	100
Multimodal Options	
Project is Located within a Strategic Multimodal Corridor	15
Route Includes Existing Pedestrian/Bicycle Facilities	15
Route Includes Planned Pedestrian/Bicycle Facilities	15
Project Incorporates Multimodal Solutions	15
Project Improves Modal Conflict (e.g., traffic signals, grade separation, dedicated lanes)	15
Project Includes Transit Accommodations (e.g., pullouts, shelters, dedicated lanes, signal priority)	15

Evaluation Criterion	Possible Points
Project Includes Pedestrian Amenities (e.g., benches, bulb outs, pedestrian refuges)	15
Project Includes Sidewalk Improvements (bonus for b+p priority)	15
Project Includes Bicycle Facility Improvements (bonus for b+p priority)	15
Project Makes a Connection to another Modal Facility	15
Safety and Security	
Bicycle or Pedestrian Facility Accommodations	10
Bicycle or Pedestrian Signage or Markings	10
Traffic Calming Techniques Appropriate to Facility Function	10
Project Increases Safe Travel to Nearby School (within 3 Miles)	10
Project Addresses Security/Emergency Responsiveness	10
Congestion Management	
Provides Additional Nonmotorized Mode Capacity	10

Source: Nashville Area Metropolitan Planning Organization (2010), 2035 Regional Transportation Plan: Project Evaluation Criteria.
http://www.nashvillempo.org/docs/lrtp/2035rtp/Docs/MPO_Scoring_031710.pdf.

Vermont Agency of Transportation

The Vermont Agency of Transportation (VTTrans) uses the following evaluation criteria to provide detailed scoring guidance for TAP projects:

1. Will the project address a pedestrian or bicyclist need identified in local or regional planning documents?
 - 5 pts:** Project is specifically called out in a municipal planning document such as Town Plan, Capital Program, or Bicycle/Pedestrian Plan.
 - 3 pts:** Project is generally supported in a municipal or regional plan.
 - 0 pts:** No planning documentation provided to support project.
2. Will the project contribute to a system of pedestrian and/or bicycle facilities?
 - 10 pts:** Proposed project fills in an important missing gap in an existing network of pedestrian and/or bicycle facilities.
 - 8 pts:** Proposed project is the first of its kind in the community.
 - 5 pts:** Proposed project extends the limits of an existing network of pedestrian and/or bicycle facilities.
 - 1 pts:** Proposed project primarily reconstructs existing facilities to meet current standards.

3. Will the proposed project provide access to likely generators of pedestrian and/or bicyclist activity?
10 pts: Project provides direct access to one or more of the following: school, densely developed neighborhood, large employer, downtown or village center.
5 pts: Project provides access to an outlying area.
0 pts: Project is in an isolated area with little or no development or appears to be primarily recreational in purpose.

4. Is the project budget reasonable?
10 pts: Budget addresses all elements of project development and costs are consistent with VTrans Unit Cost Report or based on an engineer's estimate. Backup for construction costs is provided.
5 pts: Budget is incomplete or moderately high or low compared to typical project costs.
0 pts: Budget is missing major elements, contains ineligible costs and/or does not provide any backup data.

5. Is the project located within a Designated Downtown or Village Center recognized by the VT Department of Economic, Housing and Community Development?
5 pts: All or part of proposed project is within the boundary of a designated downtown or village center.
3 pts: Proposed project leads up to, but is not within, a designated downtown or village center.
0 pts: Proposed project is not connected to a designated downtown or village center.

6. Will the project address a known, documented safety concern?
5 pts: Supporting documentation of pedestrian and/or bicycle safety problems provided: VTrans bike/ped crash data, police reports, school reports, a road safety audit report, etc.
3 pts: General documentation of safety concerns provided.
0 pts: Anecdotal evidence or no documentation of safety concerns provided.

7. To what degree has the project advanced to date?
3 pts: Some project design beyond scoping has already been completed (e.g., conceptual or preliminary plans).
2 pts: Project is already an LTF project and is seeking additional funding to bridge a gap.
0 pts: Project has only had the scoping effort completed and is seeking funding for the next step in development.

8. Does the proposed project appear to have potentially significant permitting issues? (e.g., Act 250, stormwater, wetlands, 401 water quality, section 4f).
3 pts: Scoping report does not indicate any permitting issues
1 pts: Project is likely to have some permitting issues.
0 pts: Project is likely to have many permitting issues.

9. Does the proposed project require complex right-of-way acquisition? Make sure to address the issue of whether the applicant will be willing to condemn/use eminent domain to acquire property.

3 pts: Project appears likely to be constructed within existing right-of-way limits of a local road or to not require any right-of-way acquisition.

2 pts: Project appears likely to be constructed within existing right-of-way limits of a State highway.

1 pts: Project requires right-of-way acquisition and applicant is willing to condemn if necessary.

0 pts: Project requires right-of-way acquisition and applicant is not willing to condemn if necessary.

10. Does the proposed project appear to include complex design issues (e.g., extensive retaining walls, bridges, railroad involvement)

3 pts: Project is relatively straight forward with no apparent design issues.

2 pts: Project involves one complex design issue.

1 pts: Project involves multiple complex design issues.