The Transportation Planning Process

Briefing Book

Key Issues for Transportation Decisionmakers, Officials, and Staff

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Federal Highway Administration
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Introduction

Transportation at its core is about *mobility and access*. Patterns of growth and activity for people and goods across America are fundamentally driven by how well the transportation system delivers mobility and access. The performance of the transportation system also affects public policy concerns, such as air quality, environmental resource consumption, social equity, climate change, land use, urban growth, economic development, safety, and security. Transportation planning recognizes the critical links between transportation needs and other societal goals. The planning process involves more than simply tabulating capital projects. It includes nonmotorized strategies for operating, managing, maintaining, and financing the transportation system to advance an area's long-term goals and the regional community's shared vision for the future.

This book provides an overview of transportation planning and will be useful for government officials, transportation decisionmakers, planning board members, transportation service providers, interested stakeholders, and the public. It covers the basics and key concepts of metropolitan and Statewide transportation planning, along with references for additional information.

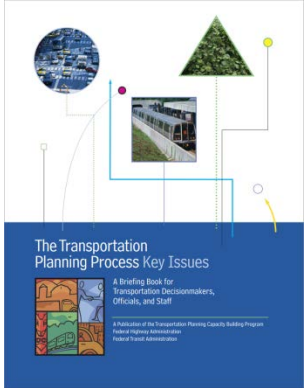
Part I discusses transportation planning and its relationship to decisionmaking. This section is general and provides a broad introduction to the planning process.

Part II presents short descriptions of the key products that are prepared as part of the transportation planning process.

This book has been updated to reflect recent changes in Federal legislation concerning the requirements for transportation planning at the metropolitan, and Statewide and nonmetropolitan levels. It is an informational publication that replaces its predecessor of the same title published in 2007.

This report, along with a collection of related informational resources, is available electronically on the Transportation Planning Capacity Building website at www.planning.dot.gov and is updated periodically to include additional topics or information.

For more information about the topics discussed in this book, contact your local Federal Highway Administration (FHWA) division or Federal Transit Administration (FTA) regional office. For information on how to reach FHWA or FTA staff, visit the FHWA and FTA websites at www.fhwa.dot.gov and www.fta.dot.gov, or the Transportation Planning Capacity Building website at www.planning.dot.gov.



The 2007 Briefing Book for Transportation Decisionmakers, Officials, and Staff.

PART I: OVERVIEW OF TRANSPORTATION PLANNING

Transportation planning plays a critical role in a State's, region's or community's vision for its future. It includes (1) a comprehensive consideration of possible strategies, (2) an evaluation process that encompasses diverse viewpoints, (3) the collaborative participation of relevant transportation-related agencies and organizations, and (4) open, timely, and meaningful public involvement.

What is the Transportation Planning Process?

Transportation planning is a cooperative, performance-driven process by which long and short-range transportation improvement priorities are determined. Metropolitan planning organizations (MPOs), States, and transit operators conduct transportation planning, with active involvement from the traveling public, the business community, community groups, environmental organizations, and freight operators.

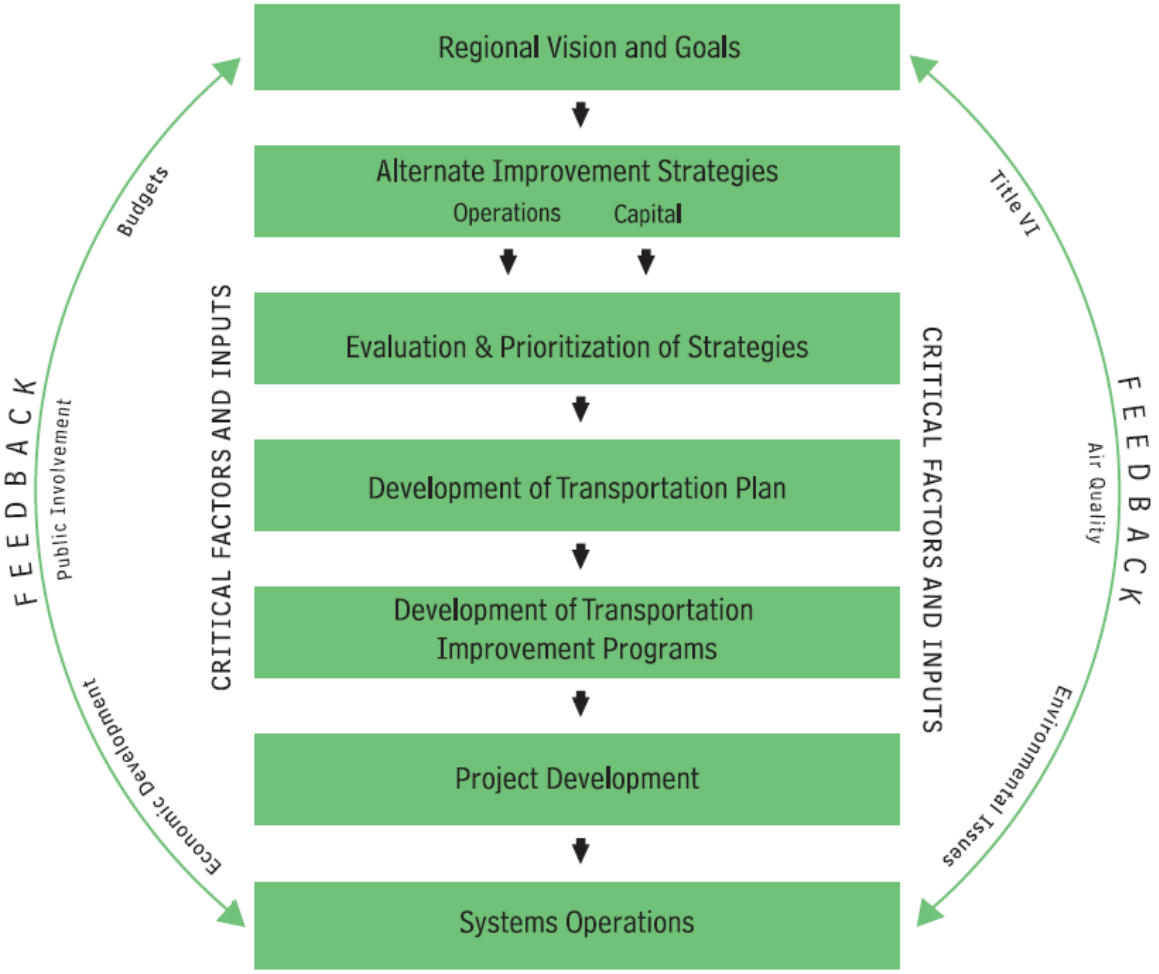


Figure 1. The Transportation Planning Process.

Transportation planning typically follows the following steps:

- Engaging the public and stakeholders to establish shared goals and visions for the community.
- Monitoring existing conditions and comparing them against transportation performance goals.
- Forecasting future population and employment growth, including assessing projected land uses in the region and identifying major corridors of growth or redevelopment.
- Identifying current and projected transportation needs by developing performance measures and targets.
- Analyzing various transportation improvement strategies and their related tradeoffs using detailed planning studies.
- Developing long-range plans and short-range programs of alternative capital improvement, management, and operational strategies for moving people and goods.
- Estimating how recommended improvements to the transportation system will impact achievement of performance goals, as well as impacts on the economy and environmental quality, including air quality.
- Developing a financial plan to secure sufficient revenues that cover the costs of implementing strategies and ensure ongoing maintenance and operation.

What is Performance-Based Planning?

Recent Federal legislation has established a close connection between performance measures and performance target levels. These measures and target levels are connected through transportation plans and programs developed at the metropolitan and Statewide levels. As described in preceding sections, States and MPOs are responsible for setting performance targets for agreed upon performance measures for the Statewide and nonmetropolitan and metropolitan transportation planning processes respectively. In accordance with Federal law, USDOT is responsible for identifying performance measures related to national highway and transit performance goals that States and MPOs use in setting performance targets. With these national goals as a baseline, States and MPOs may identify additional performance measures and targets that address local community visions and goals.

For more on performance-based planning and programming (PBPP), please see *Performance-Based Planning: Programming Measures and Targets*.

What is a Metropolitan Planning Organization?

A Metropolitan Planning Organization (MPO) has authority and responsibility for transportation policy-making in metropolitan planning areas. [1] Federal legislation passed in the early 1970s requires that any urbanized area (UZA)[2] with a population greater than 50,000 have an MPO. MPOs ensure that existing and future expenditures for transportation projects and programs are based on a continuing, cooperative and comprehensive (3-C) planning process. MPOs also cooperate with State and public transportation operators to set spending levels for Federal funds that are meant for transportation projects. Note that some MPOs are found within agencies such as Regional Planning Organizations (RPOs), Councils of Governments (COGs), and others.

Because MPOs typically neither own nor operate the transportation systems they serve, most MPOs will not be involved in implementing the transportation project priorities they establish. Rather, MPOs serve an overall coordination and consensus-building role in planning and programming funds for projects and operations. The MPO must involve local transportation providers in the planning process by including transit agencies, State and local highway departments, airport authorities, maritime operators, rail-freight operators, Amtrak, port operators, private providers of public transportation, and others within the MPO region.

By law, an MPO is defined as a policy board comprised of local elected officials. Representatives from local governments and transportation agencies serve on MPOs and perform the six core functions that follow:

1) Establish a setting for effective decisionmaking

   Establish and manage a fair and impartial setting for effective regional decisionmaking in the metropolitan area.

2) Identify and evaluate transportation improvement options

   Develop transportation improvement options and use data and planning methods to evaluate whether those options support criteria and system performance targets. Planning studies and evaluations are included in the Unified Planning Work Program (UPWP).

3) Prepare and maintain a Metropolitan Transportation Plan

   Develop and update an LRTP for the metropolitan area covering a planning horizon of at least 20 years. MPOs prepare LRTPs using performance measures and targets. These are the planning factors that MPOs and departments of transportation consider to guide their planning processes:

   - Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
   - Increase the safety of the transportation system for motorized and nonmotorized users.
   - Increase the security of the transportation system for motorized and nonmotorized users.
   - Increase accessibility and mobility for people and freight.
   - Protect and enhance the environment.

[1] A metropolitan planning area must include the urbanized area and areas expected to become urbanized over the next 20 years.
[2] An urbanized area is an area that contains a city of 50,000 or more population plus the incorporated surrounding areas meeting size or density criteria as defined by the U.S. Census Bureau.

- Promote energy conservation.
- Improve quality of life for the community.
- Promote consistency between transportation improvements and planned State and local growth and economic development patterns.
- Enhance the integration and connectivity of the transportation system for all modes.
- Promote efficient system management and operation.
- Emphasize the preservation of the existing transportation system.

4) Develop a Transportation Improvement Program (TIP)

   Develop a short-range, four-year program of priority transportation improvements drawn from the long-range transportation plan. The MPO creates the TIP with spending, regulating, operating, management, and financial tools. The TIP represents immediate priority actions to achieve the area's goals and associated system performance targets.

5) Identify performance measure targets and monitor whether implemented projects are achieving targets

   MPOs coordinate with State and public transportation operators to establish performance targets that address performance measures, as set forth in Federal law, related to surface transportation and public transportation. MPOs prepare plans that include performance targets addressing performance measures and standards. When updating the plan, MPOs also prepare a System Performance Report that tracks progress in meeting performance targets. In addition to Federally required performance measures, MPOs may identify additional, locally significant performance indicators that support decisionmaking.

6) Involve the public

   Involve the general public and other affected constituencies related to the essential decisionmaking elements listed above.

In accordance with Federal requirements, MPOs must cooperate with the State and providers of public transportation to create metropolitan transportation plans. The MPO approves the Metropolitan Transportation Plan (MTP), while the governor *and* the MPO approve the TIP.

UZAs with populations exceeding 200,000 typically have more complex transportation systems and associated challenges than smaller regions. Accordingly, these large UZAs have additional planning responsibilities and are designated as Transportation Management Areas (TMAs). MPOs within TMAs must include officials of public agencies that administer or operate major modes of transportation in the metropolitan area and providers of public transportation on their policy boards, as well as appropriate State officials.

There is no required structure for the advisory bodies and staff that provide planning and analysis to MPOs. Technical and Citizen Advisory Committees and a staff of planners led by a director also support the metropolitan transportation planning process.

MPO staff assist the MPO board by preparing documents, fostering interagency coordination, facilitating public input and feedback, and managing the planning process. MPO staff may also provide committees with technical

assessments and evaluations of proposed transportation initiatives, and the MPO staff may engage consultants to produce data.

A technical advisory committee may then recommend specific strategies or projects to the MPO policy board. An advisory committee may also provide technical analysis, specialized knowledge, and citizen input on specific issues. It is common for an MPO to have a Technical Advisory Committee and Citizen Advisory Committee, and to have subcommittees on specific issues such as system performance, environmental justice, bicycle issues, and travel demand modeling.

The metropolitan transportation planning process must engage the public and stakeholders on an ongoing basis in all facets of planning, to spur dialogue on critical issues facing regions and provide opportunities for the public to contribute ideas. This is especially important in the early and middle stages of the process, when the plan and the TIP are developed. Special attention should be paid to groups that are underrepresented in the transportation planning decision making process or have been underserved in terms of the expenditure of transportation dollars (see *Equity*).

What Other Responsibilities do Some MPOs Have?

Areas designated as air quality nonattainment area (NAA) or maintenance area for transportation-related pollutants have additional requirements that affect the transportation planning process. In metropolitan areas, MTPs, TIPs, and FHWA/FTA projects must conform to the purpose of the State's air quality plan, known as the State implementation plan (SIP). In such metropolitan areas, the MPO and FHWA/FTA are responsible for demonstrating transportation conformity requirements are met.

MPOs that are in TMAs, in addition to preparing the documents noted above, must also maintain a congestion management process (CMP) that identifies actions and strategies for reducing congestion and increasing mobility. Projects and strategies from the CMP should be considered for inclusion in the MTP and TIP.

MPOs that are in TMAs consult with the State and affected public transit operators to implement projects from the TIP, except for projects proposed for funding under the National Highway System program. For non-TMA MPOs and in rural areas, States and public transit operators cooperate with the MPO or local governments to select projects to implement from the TIP.

In addition to meeting Federal mandates, MPOs often have extra responsibilities under State law. For example, California's MPOs are responsible for allocating some non-Federal transportation funds in their regions, while other States give MPOs a shared role in growth management and land-use planning.

It is important to note how project selection differs from project prioritization.

Prioritization is the cooperative process among States, MPOs, and transit agencies for identifying projects and strategies from the MTP that are of sufficiently high priority as to be included in the TIP.

Project selection, on the other hand, relates to identifying projects that are already listed in the TIP that are next in line for grant award and funding authorization. In TMAs, MPOs play a lead role in project selection for most program funding categories.

What is a State Department of Transportation?

Each State, Puerto Rico, and the District of Columbia has an agency or department responsible for transportation planning, programming, and project implementation—these agencies are called State DOTs. In addition to transportation planning responsibilities, State DOTs may be responsible for the design, construction, operation, or maintenance of State transportation facilities, including highways, transit, air, and water. State DOTs also work cooperatively with tolling authorities, ports, local agencies, and special districts that own, operate, or maintain different portions of the transportation network or individual facilities.

State DOTs perform the following transportation planning functions:

- Prepare and Maintain a Long-Range Statewide Transportation Plan
  A State DOT creates long-range transportation plans (LRSTPs) using performance measures and targets that advance national goals established in Federal law. In addition to Federally required performance measures, States may identify State-level performance indicators to support their decisionmaking. LRSTPs may be broad, policy-oriented plans that do not cite specific projects, or they may be more detailed plans that include recommendations related to particular transportation improvements or programs. (For more information on LRSTPs see *What are the key products of the transportation planning process?*)

- Develop a Statewide Transportation Improvement Program
  State DOTs create a short-range program of transportation projects, based on long-range transportation plans, called a statewide transportation improvement program (STIP). The State uses spending, regulating, operating, management, and financial tools to estimate progress toward the performance targets noted above that could be achieved by implementing projects and strategies in the STIP. For metropolitan areas of the State, the STIP incorporates the TIP developed by the MPO directly by reference and without change.

- Identify performance measure targets and monitor whether implemented projects are achieving targets
  States coordinate with MPOs and transit operators to establish performance targets that address performance measures, as set forth in Federal law, related to surface transportation and public transportation. Like MPOs, States prepare plans that include performance targets to address performance measures and standards. When updating these plans, States should prepare a System Performance Report that tracks progress toward performance targets.

  In addition to Federally required performance measures, States may identify locally significant performance measures to guide the decisionmaking process. Statewide and nonmetropolitan transportation plans must integrate goals, objectives, national performance measures, and targets identified at the State level. States must also consider performance plans developed by transit operators in non-urbanized areas to guide their decisionmaking.

- Involve the public
  States must involve the general public and all other affected constituencies in the essential functions listed above. MPOs and States engage the public and stakeholder communities as they prepare procedures that outline how the public

will be advised, engaged, and consulted throughout the planning process. MPOs prepare public participation plans (PPPs), which describe how the MPO involves the public and stakeholder communities in transportation planning. The MPO also must periodically evaluate whether its public involvement process (PIP) is still effective. Similarly, States prepare documented public involvement processes that describe the occasions, procedures, and intended outcomes of public engagement in Statewide and nonmetropolitan transportation planning.

What is a Regional Transportation Planning Organization?

A Regional Transportation Planning Organization (RTPO) is a voluntary group of nonmetropolitan area local officials and transportation system operators that States may assemble to assist in the Statewide and nonmetropolitan transportation planning process. RTPOs emphasize nonmetropolitan areas of the State. An RTPO may have additional representatives from the State, private businesses, transportation service providers, economic development practitioners, and the public.

What is a Public Transportation Operator?

Public transportation operators are public agencies and governmentally chartered authorities that deliver transit services to the general public. As such, public transit operators cooperate with States and MPOs to carry out the Federally required transportation planning process in metropolitan areas. MPOs and States must include projects from public transit operators in MTPs and TIPs in order for those projects to receive Federal financial support.

How do Agencies Cooperate?

Transportation planning must be cooperative, because no single agency is responsible for the entire transportation system. Some roads that are part of the Interstate Highway System are subject to certain standards and are usually maintained by a State DOT. Other roads are county arterials or city streets that, along with bicycle and pedestrian facilities, are designed, operated, and maintained by counties or local municipalities. Transit systems are often built, operated, and maintained by an entity or special regional authority that is not an agency of the State or local jurisdiction. There may be more than one public transit operator in a metropolitan area serving a network of separate but interdependent mobility needs.

In metropolitan areas, MPOs are responsible for actively seeking participation during the planning process from the public and all relevant transportation agencies and stakeholders, including the State and public transit operators. Similarly, State DOTs are responsible for these activities outside of metropolitan areas, in cooperation with local transportation officials from nonmetropolitan areas. MPOs must work with the public and stakeholder

The **Federal Government** has a government-to-government relationship with **Indian tribal governments** that is affirmed in treaties, Supreme Court decisions, and executive orders. Federal agencies must consult with Indian tribal governments regarding policy and regulatory matters.

State DOTs consider the needs of Indian tribal governments when carrying out transportation planning, and consult with Indian tribal governments in developing LRSTPs and STIPs.

MPOs may consider the needs of and consult with Indian tribal governments when developing MTPs and TIPs, when the metropolitan planning area includes Indian tribal lands.

Outside of the Statewide, metropolitan, and nonmetropolitan planning processes, State DOTs and MPOs may consult with Indian tribal governments on other issues—for example, when a project may affect Indian tribal archeological resources.

For information on FTA's Tribal Transit Program, see www.fta.dot.gov/grants.html.

For information on FHWA tribal planning, see www.planning.dot.gov/focus_tribal.asp.

communities to prepare public participation plans that describe how the public, interested parties and stakeholders will be provided access to planning documents and information.

Similarly, State DOTs must have a documented process for consulting officials from nonmetropolitan areas when preparing their long-range Statewide transportation plans. Similarly, States must cooperate with local transportation officials in nonmetropolitan areas when preparing their STIPs—and, more broadly, in carrying out the Statewide and nonmetropolitan transportation planning process.

What are the Key Products of the Transportation Planning Process?

As illustrated in Figure 2, Federal requirements call for agencies to deliver several key groups of documents as part of the transportation planning process:

- *Planning Work Programs*, which include UPWPs prepared by MPOs and State Planning and Research Work Programs prepared by States.
- *Transportation Plans*, which include MTPs prepared by MPOs and LRSTPs prepared by States.
- *Transportation Improvement Programs*, which include Metropolitan TIPs prepared by MPOs and Statewide TIPs prepared by States.

	Who Develops?	Who Approves?	Time Horizon	Content	Update Requirements
UPWP	FHWA/FTA/ MPO	MPO	1 or 2 Years	Planning Studies and Tasks	At Least Once Every 2 Years
MTP	MPO	MPO	20 Years	Future Goals, Strategies, and Projects	Every 5 Years 4 years for nonattainment and maintenance areas
TIP	MPO	MPO/ Governor	4 Years	Transportation Investments	Every 4 Years
LRSTP	State DOT	State DOT	20 Years	Future Goals, Strategies, and Projects	Not Specified
STIP	State DOT	FHWA/ FTA	20 Years	Transportation Investments	Every 4 Years
PIP	State DOT	State DOT	Not Specified	Public Engagement Strategies and Goals, Incorporating Input, Responding to Comments	Periodic Review and Update
PPP	MPO	MPO	Not Specified	Public Engagement Strategies and Goals, Incorporating Input, Responding to Comments	Periodic Review and Update

Figure 2. The key transportation planning products.

The Unified Planning Work Program

The UPWP lists the transportation studies and tasks that MPO staff and member agencies will perform to support the metropolitan transportation planning process. It must identify the funding source for each project, the schedule of activities, and the agency or agencies responsible for each task or study. UPWPs reflect issues and strategic priorities unique to each metropolitan area and will differ by MPO.

UPWPs cover a one- to two-year period and typically include the following elements:

- Planning data and analysis tasks, such as data collection and trends monitoring, and studies of a variety of demographic, development, transportation, and environmental factors.
- Public outreach activities conducted in accordance with the PPP, including collaborative development of the PPP and periodic evaluation of its effectiveness.
- Preparing the MTP and TIP, including supporting studies and products that will result from these activities.
- Completing of all Federally funded studies, including all relevant State and local planning activities conducted without Federal funds.

The Metropolitan Transportation Plan

In metropolitan areas, the MTP identifies how the region intends to invest in the transportation system. Federal law requires the plan, "include both long-range and short-range program strategies/actions that lead to the development of an integrated intermodal transportation system that facilitates the efficient movement of people and goods."

The MTP is prepared through active engagement with the public and stakeholders using an approach that considers how roadways, transit, nonmotorized transportation, and intermodal connections are able to improve the operational performance of the multimodal transportation system. Accordingly, the MTP must cover performance measures and targets and include a report evaluating whether the condition and performance of the transportation system is meeting those targets.

The MTP may also describe the results of scenario analyses on transportation system conditions and performance. Other information contained in the MTP could include:

- Regional land use, development, housing, and employment goals and plans.
- Projected demand for transportation services over 20 years.
- Policies, strategies, and projects that the MPO recommends for the future.
- Cost estimates and reasonably available financial sources for operation, maintenance, and capital investments (see *Financial Planning and Programming*).
- Ways to preserve facilities and efficiently use the existing system.

In preparing the MTP, the MPO coordinates with the State and public transit operators and makes particular effort to engage all communities and stakeholders. Finally, in cases where a metropolitan area is designated as a nonattainment or maintenance area for a transportation-related pollutant, the MTP must conform to the SIP for air quality (see *Air Quality*).

MTPs are updated every five years in air quality attainment areas, every four years in nonattainment or maintenance areas, or more frequently in all areas as State and local officials deem necessary.

Transportation Improvement Program

MPOs use a TIP to identify transportation projects and strategies they will pursue over the next four years. These projects reflect the investment priorities detailed in the MTP. TIPs list the immediate program of investments that, once implemented, will go toward achieving the performance targets established by the MPO and documented in the MTP. In short, a TIP is a region's means of allocating its transportation resources among the various capital, management, and operating investment needs of the area, based on a clear set of short-term transportation priorities prepared through a performance-driven process. All projects receiving Federal funding must be in the TIP.

Under Federal law, TIPs must follow these rules:

- Cover at least four years of investment.
- Be updated at least every four years.
- Remain fiscally constrained so that projects are only included if their full funding can reasonably be anticipated.
- In air quality nonattainment and maintenance areas the projects in the first two years of the TIP are limited to those with available or committed funding.
- Conform with the SIP for air quality in nonattainment and maintenance areas.
- Report on anticipated progress in meeting performance targets.
- Include projects for which Federal funds were obligated in the prior year.
- Be approved by the MPO and the governor.
- Be incorporated, directly or by reference and without change, into the STIP.

The Long-Range Statewide Transportation Plan: State DOTs cooperate with non-metropolitan area local officials to develop an LRSTP using a performance-driven process based on an agreed upon set of performance measures and targets. Plans are prepared with active engagement with the public and stakeholders and will vary by State. LRSTPs may be either policy-oriented strategic plans, or project–focused investment plans that include lists of recommended projects.

The Statewide plan also addresses:

- Policies and strategies, or future projects.
- Projected demand for transportation services over 20 or more years.
- A systems-level approach that considers roadways, transit, nonmotorized transportation, and intermodal connections.
- Statewide and regional land use, development, housing, natural environmental resources, freight movement and employment goals and plans.
- Cost estimates and reasonably available financial sources for operation, maintenance, and capital investments (see *Financial Planning*).
- Ways to preserve existing roads and facilities and make more efficient use of the existing system.

The State Planning and Research Work Program

The State Planning and Research Work Program (SPR) is similar to the UPWP. It lists transportation studies, research, and public engagement tasks that a State DOT, affiliated agencies, or consultants perform to support the Statewide and nonmetropolitan transportation planning process. An SPR work program contains several elements:

- Planning tasks, studies and research activities, conducted over a one- to two-year period.
- Funding sources identified for each project.
- A schedule of activities and products for that project work.
- The agency responsible for each task or study.

Statewide Transportation Improvement Program

The STIP is similar to the TIP in that it identifies the immediate short-range priorities for transportation investments Statewide and must be fiscally constrained. Through an established process, State DOTs work with local officials to identify projects across rural areas, small urban areas called urban clusters—with 2,500 to 49,999 people—and urbanized areas. Projects are selected for the STIP based on adopted procedures and criteria. As noted above, TIPs developed by MPOs must be incorporated, directly or by reference and without change, into the STIP.

Under Federal law and regulation, the STIP:

- Must be fiscally constrained and may include a financial plan.
- Must be approved by FHWA and FTA.
- Including an overall determination, called the Planning Finding, which states whether Federal requirements are being met.
- STIP approval must be granted before projects can proceed from the planning stage to the implementation stage.
- Must report anticipated progress in meeting performance targets.

How does Federal Transportation Funding Reach States and Metropolitan Areas?

Funding for transportation projects and strategies comes from a variety of sources including the Federal Government, State governments, special authorities, public or private tolls, local assessment districts, local government general fund contributions, such as local property and sales taxes, and impact fees. However, Federal funding is typically the primary funding source for capital investment projects, such as construction and purchase of vehicles and equipment. (See *Appendix* for the most important Federal-aid transportation programs.) Federal transportation funding is available through the Federal Highway Trust Fund and the Mass Transit Account of the Trust Fund.

It is important to remember that most Federal-aid highway funding programs are administered by State DOTs. The State DOT then allocates money to urban and rural areas, based on State and local priorities and needs. By contrast, most Federal transit funding for large urban areas is sent directly from the FTA to the designated recipient transit operator(s) in each urbanized area. Federal transit funds for transit services in smaller urban areas and outside of urbanized areas are administered by the State DOT.

Federal funds are made available from the Federal budget through the following sequenced process:

- Authorizing legislation
  Congress enacts legislation that establishes or continues the existing operation of a Federal program or agency, including the amount of money it *anticipates* will be available to spend or grant to States, MPOs, and transit operators. Congress generally reauthorizes Federal surface transportation programs over multiple years, in effect authorizing subsequent Congressional action to make annual awards. The amount authorized, however, is not always the amount that ends up *actually* available.
- Appropriations
  Annually, as set forth in authorizing legislation, Congress decides on the Federal budget for the upcoming fiscal year. As a result of the appropriation process, the amount appropriated to a Federal program is often less than the amount authorized for a given year. The appropriation is the actual amount available to Federal agencies to spend or grant.

- Apportionment
  Apportionment describes appropriated funds, which come from selected Federal-aid programs, that are distributed among States and metropolitan areas (for most transit funds) using a formula provided by law. An apportionment is usually made on the first day of the Federal fiscal year, October 1, when funds become available for a State to spend in accordance with an approved STIP. In many cases, the State is the designated recipient for Federal transportation funds; in some cases, transit operators are the recipient.
- Determining eligibility
  Only certain projects and activities are eligible to receive Federal transportation funding. Criteria depend on the funding source. All projects must be listed in the STIP and be consistent with the MTP and the long-range Statewide plan to be eligible for Federal-aid highway and Federal transit funding.
- Match
  Most Federal transportation programs require a non-Federal match. State or local governments must contribute some portion of the project cost at a matching level established by legislation. For many programs, the amount that State or local governments must contribute is 20 percent of the capital cost of most highway and transit projects.

How is Federal Funding Used?

There are many Federal-aid transportation programs that support transportation activities in States and metropolitan areas. Each of these programs has different requirements and characteristics. These are not cash-up-front programs; rather, eligible expenditures are reimbursed. Even though amounts are authorized to States or awarded as grants to transit operators, no cash is actually disbursed at the time of authorization. Instead, States and transit operators are notified that they have Federal funds available. Projects are approved and work is started. Then, the Federal Government reimburses the States and transit operators for costs as they are incurred, reimbursing up to the limit of the Federal share. In some areas, MPOs serve dual roles as planning entities and as public transit operators. Only in those exceptional cases may the MPO receive direct disbursement of Federal funds.

The Federal Government holds State and public transit operator funding recipients accountable for complying with all applicable Federal laws. When local governments directly oversee a Federally-funded project, State DOTs are responsible for monitoring that they comply with Federal laws.

What Are Flexible Funds?

One important provision in Federal transportation legislation allows certain Federal-aid highway funds and limited Federal transit funds to be used for either highway or transit projects. This is referred to as flexible funding. The ability to transfer funds, with some restrictions, between highway and transit programs, as well as to spend certain categories of Federal funding directly on either highway or transit improvements, lets metropolitan areas apply Federal transportation resources to their highest priority transportation projects regardless of mode.

It is important to note that MPOs discuss the need and opportunities for using flex-funds during the metropolitan transportation planning process. As the MPO presides over the preparation of MTP and TIP and associated financial plans, it may play a key role in facilitating a dialogue during which agencies can make the case for receiving flexible funding to augment their traditional formula-based award. Flexible funding is most commonly used through FHWA's Surface Transportation Program (STP) and Congestion Mitigation and Air Quality Improvement (CMAQ) program.

PART II: MAJOR POLICY AND PLANNING ISSUES

Although the transportation planning process is concerned primarily with issues facing a particular metropolitan area or State, there are many issues common to all parts of the country. This section addresses and details transportation topics and issues that many States and MPOs may share.

Each section includes a topic description, MPO and State DOT roles, and an overview of how the transportation planning process addresses the topic. The end of each section includes relevant online resources.

Statutory Requirements

Air Quality

What is the relationship between transportation and air quality?

The transportation system can be an influential factor affecting a region's air quality and estimated emissions of pollutants from motor vehicles are often a key consideration in transportation planning. Areas that have nonattainment or maintenance air quality status must ensure that emissions from Federal transportation investments conform with levels set forth in State air quality plans, and State DOTs and MPOs must understand air quality-related transportation planning requirements.

Nonattainment areas are geographic areas that do not meet the Federal air quality standards. Maintenance areas are areas that once violated but currently meet the Federal air quality standards. If no violations of air quality standards have been found, the area may be determined to be in compliance or attainment with a Federal air quality standard.

An area can be in nonattainment for one pollutant and in attainment for another. Transportation conformity is required in nonattainment and maintenance areas for the transportation-related criteria pollutants - ozone, carbon monoxide, nitrogen dioxide, and particulate matter (PM_{10} and $PM_{2.5}$).

What are the major sources of air pollution?

The air quality of an area is affected by how pollutants interact with sunlight, topography, and weather patterns. Pollutants are emitted by motor vehicle operation and by a variety of other sources, including manufacturing, energy production, burning petroleum-based products, and even by small business activities, such as dry cleaning.

Stationary sources include relatively large, fixed facilities, such as power plants, chemical process industries, and petroleum refineries.

Area sources are small, stationary, non-transportation sources that collectively contribute to air pollution, such as dry cleaners, gas stations, landfills, and wastewater treatment plants.

Mobile sources include on-road vehicles such as cars, trucks, and buses, and off-road sources such as trains, ships, airplanes, boats, lawnmowers, and construction equipment.

The key transportation-related pollutants that interact with sunlight to produce ground-level ozone, also known as smog, are volatile organic compounds (VOCs) and nitrogen oxides (NOx). Particulates are another type of pollution, referred to as PM_{10} or $PM_{2.5}$, for particles that are smaller than 10 microns or less than 2.5 microns in diameter,

respectively. Carbon monoxide and nitrogen dioxide are also pollutants associated with transportation sources. These pollutants cannot exceed certain specified levels in a given region.

In nonattainment and maintenance areas, Federal funding and approval for transportation projects is only available if transportation activities are consistent with air quality goals, as determined during the transportation conformity process. The transportation conformity process includes a number of requirements that MPOs must meet as well as requirements that project sponsors must meet for projects (see *What is transportation conformity and how does it relate to the NAAQS?*).

The Clean Air Act (CAA) requires that each State's environmental agency develop a State Implementation Plan. The SIP shows how the State will implement measures designed to improve air quality and meet National Ambient Air Quality Standards (NAAQS) for each type of air pollutant, according to the schedules included in the CAA. Pollutants are usually measured in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$) of ambient air, and standards vary by type of pollutant.

Sources of pollution can be examined for ways to reduce emissions and improve air quality. As illustrated in Figure 4, for each source category the SIP can generate emission reduction targets for pollutants. During the SIP development process, an emissions limited is established for on-road mobile sources, called a *motor vehicle emissions budget*.

Figure 3. An example SIP showing projected reductions in pollutants by source.

Different strategies can help areas achieve clean air through vehicle emissions reductions efforts—for example, using reformulated gasoline or implementing Inspection and Maintenance [I/M] programs—changes to travel behavior—for example, ride sharing or public transit—and congestion reduction projects—for example, signal synchronization programs. MPOs actively work with the State to set motor vehicle emissions budgets.

How do MPOs help improve air quality?

The Clean Air Act Amendments (CAAA) of 1990 identify the actions States and MPOs must take to reduce emissions from on-road mobile sources in nonattainment and maintenance areas.

The challenge for MPOs, States, and local transportation and air quality agencies in nonattainment or maintenance areas is deciding on a mix of transit, highway, and bicycle-pedestrian investments that, combined with vehicle performance and technology-based strategies, such as I/M programs or reformulated gasoline, will keep emissions

within the allowable limits for motor vehicles. MPOs are encouraged to identify transportation strategies that will help reduce emissions from on-road mobile sources of pollution.

Many MPOs have developed public education and communications campaigns to publicize the connection between transportation and air quality and to encourage the public to make travel choices that benefit air quality.

What is transportation conformity and how does it relate to the NAAQS?

The transportation conformity process, as illustrated in Figure 4, is a way to ensure that MTPs, TIPs, and FHWA/.FTA projects meet air quality goals in order to be eligible for Federal funding and approval. Whenever an MTP or TIP is amended or updated, the MPO must address transportation conformity requirements.

According to the CAA, transportation plans, TIPs, and projects cannot do the following:

- Create new violations of the NAAQS.
- Increase the frequency or severity of existing violations of the standards.
- Delay timely attainment of the standards or any interim milestones.

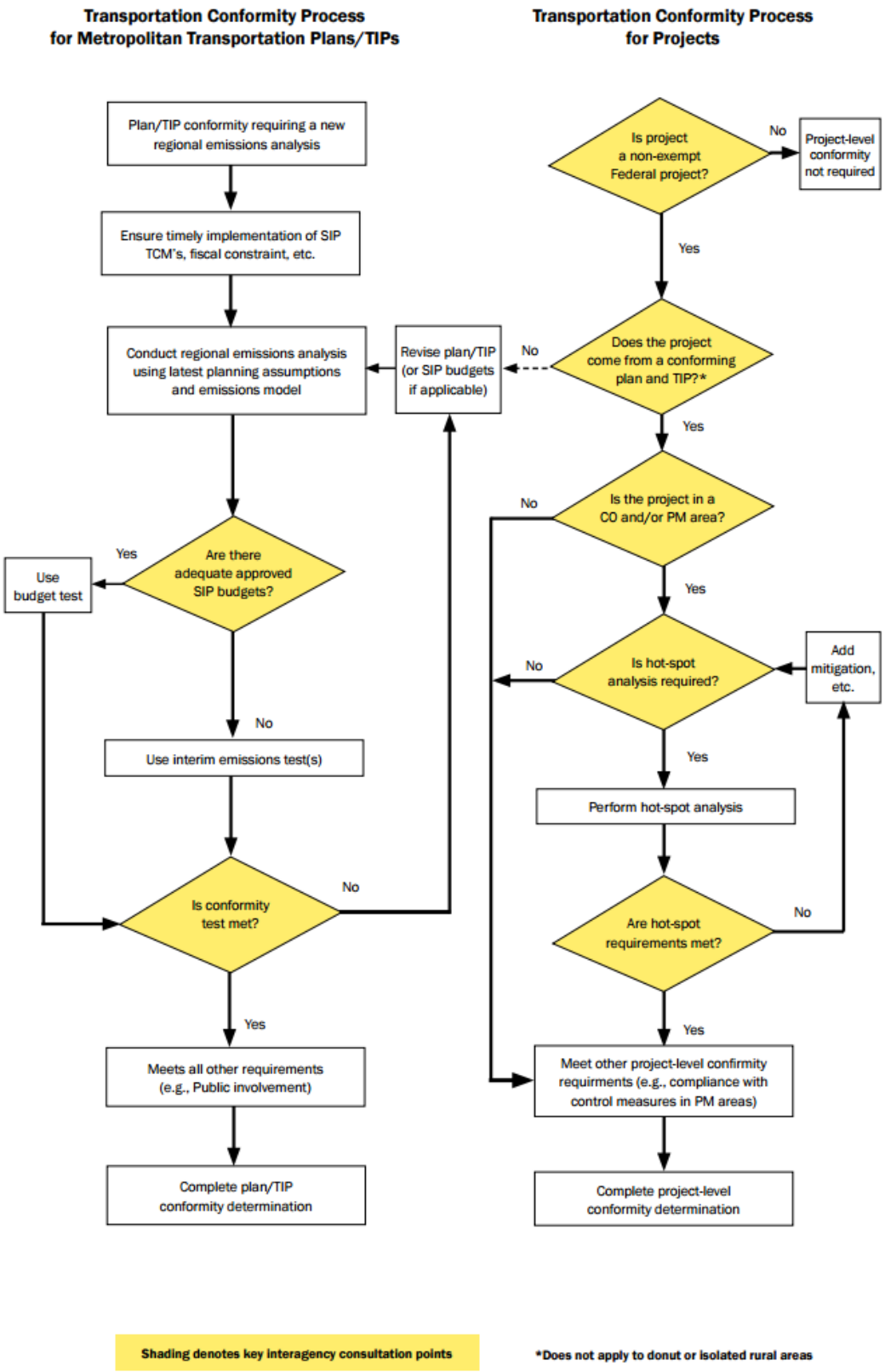


Figure 4. The transportation conformity process.

What is a conformity determination and who is responsible?

Transportation conformity on MTPs and TIPs is demonstrated in part when projected regional emissions for the MTP and TIP do not exceed the region's motor vehicle emissions budgets contained in the SIP, or meet one of the interim emissions tests in areas without a motor vehicle emissions budget. A conformity determination is a finding by the MPO policy board, and subsequently by FHWA and FTA, that the MTP and TIP meet all transportation conformity requirements. While the MPO is responsible for ensuring a conformity determination is made, the conformity process depends on Federal, State, and local transportation and air quality agencies working together to meet the transportation conformity requirements.

Transportation control measures (TCMs) are measures specifically identified and committed to in the SIP. A TCM is one of those listed in CAA section 108 or any other measure for the purpose of reducing emissions or concentrations of air pollutants from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions. If an approved SIP includes any TCMs, each time an MPO updates its MTP and TIP it must assure that the TCMs are being implemented on schedule. Those TCMs must be programmed for timely implementation in the TIP.

A necessary part of the transportation and air quality planning process is consulting with other involved agencies on critical issues and providing opportunities for public participation. MPOs must inform the public that they are going to make a conformity determination, make all relevant documents reasonably available, and give adequate time to review the documents and supporting materials.

What plans, programs, and projects are subject to transportation conformity requirements?

MTPs and TIPs in nonattainment and maintenance areas for the transportation-related NAAQS must meet conformity requirements. This includes all projects that are expected to be funded or that will require approval by FHWA or FTA at any point during the life of the MTP or TIP.

Also, regional emissions analysis of the transportation plan and TIP must include any regionally significant projects—as defined by the conformity rule—even those that are not Federally funded or approved.

Conformity determinations at the project level must be made for Federal highway and transit projects, and it must be demonstrated that the project is part of a conforming MTP and TIP. As part of project-level determinations in carbon monoxide and particulate matter areas, localized analysis requirements apply for projects that are Federally funded or Federally approved in nonattainment and maintenance areas. This localized analysis is called "hot-spot" analysis.

A number of **non-metropolitan areas** also are being included in urban area designations or being designated as standalone entities. Generally, MPOs and State DOTs work cooperatively on regional emissions analysis in areas that are included in an urban area designation. Isolated rural areas, where there is no MPO in the nonattainment or maintenance area, may rely on State DOT staff to address conformity issues.

How frequently must a transportation conformity determination be made on the MTP and TIP?

An MPO must make a conformity determination on the MTP and TIP at least every four years and each time the MPO updates or amends its transportation plan or its TIP (except for administrative modifications and amendments that include only exempt projects). A conformity determination is also required not more than 24 months after EPA approves a SIP budget or finds it adequate. When an area is newly designated as nonattainment, there is a 12-month grace period before transportation conformity applies.

What happens if the MPO cannot make a conformity determination on time?

If an MPO cannot make a conformity determination on time it will have a grace period of 12 months after the deadline is missed before conformity will lapse. During the grace period, transportation projects from the previously conforming and unexpired plan and TIP may continue to be eligible for funding, and the TIP may be amended to add projects from the conforming plan. If conformity has not been re-established after the 12 month grace period the transportation conformity status for the area goes into lapse, whereby FTA and FHWA cannot authorize work on any new transportation projects or phases unless they are Transportation Control Measures (TCMs) from an approved SIP, exempt from conformity, or project phases that were authorized by FHWA and FTA before the lapse. Exempt projects are those that have little or no impact on emissions, such as safety projects and certain public transportation projects. Note that the 12-month lapse grace period does not apply for newly designated metropolitan areas, which must have a conforming plan and TIP in place no later than 12 months after the effective date of designation.

What funding is available for air quality improvement programs and projects?

Part of the Federal-aid highway program, the Congestion Mitigation and Air Quality Improvement (CMAQ) program was created in 1991 specifically to improve air quality. Please see the CMAQ Program Guidance for more information on project eligibility and agency roles and responsibilities.

Additional Resources

For information about transportation conformity, see http://www.fhwa.dot.gov/environment/air_quality/conformity and http://www.epa.gov/otaq/stateresources/transconf.

For information about the CMAQ program including program guidance, see http://www.fhwa.dot.gov/environment/air_quality/cmaq.

Congestion Management Process

What is the Congestion Management Process?

Congestion management is the term for applying strategies that improve transportation system performance and reliability by reducing the adverse impacts of congestion on the movement of people and goods. A congestion management process (CMP) is a systematic approach, defined by region, for managing congestion. The CMP provides accurate, up-to-date information on transportation system performance and assesses alternative strategies for congestion management that meet State and local needs. It works within the transportation planning process to move congestion management strategies into the funding and implementation stages.

What are the requirements for the CMP?

A CMP is required in TMAs—Transportation Management Areas. The CMP is intended to address congestion through a process that provides for effective transportation system management and operations (TSM&O), based on cooperatively developed travel demand reduction and operational management strategies. Even if a metropolitan area is not a TMA, the CMP represents good practice in monitoring, assessing, and resolving congestion issues. The CMP establishes a systematic method to identify and evaluate transportation improvement strategies, including operations and capital projects.

How is the CMP valuable to an MPO?

A well-designed CMP should help an MPO perform the following functions:

- Define congestion in the region and identify congested locations.
- Determine the cause of congestion.
- Evaluate the potential of different strategies to manage congestion.
- Propose alternative strategies that best address causes and impacts of congestion.
- Evaluate impacts and effectiveness of previously implemented strategies.

Benefits of the CMP

A successful CMP offers many benefits to the regional transportation system. Congestion concerns inevitably tie into community choices regarding transit services, livability, and land use. When identifying goals, actions, and investments to address regional congestion, broader planning goals can be considered as well, in order to create one unified and efficient approach to achieve the desired vision of the community. The CMP is not intended to be a standalone process but instead should be integrated into the larger overall planning process.

The CMP provides a framework for responding to transportation system congestion in a consistent, coordinated fashion. The CMP framework addresses congestion through a performance-based process that involves developing congestion management objectives and supportive performance measures, collecting appropriate data, analyzing problems, identifying solutions, and evaluating whether implemented strategies are effective.

The CMP brings more partners and stakeholders into the metropolitan transportation planning process, to build inter-agency collaboration and coordination. These partners and stakeholders often include agencies responsible for transportation system operations—such as State and local transportation agencies, toll authorities, and transit agencies—land use planning agencies, transportation management associations, and the public.

The CMP is a mechanism for identifying short-, medium-, and long-term strategies for addressing congestion on a system-wide, corridor-level, and site-specific basis. It also highlights Transportation Demand Management (TDM) and operations strategies that historically may not have been a focus of metropolitan transportation planning. In addition, the CMP can focus on issues such as transportation system reliability and non-recurring congestion, which are not well-addressed through traditional transportation demand modeling. Highlighting these strategies can help agencies effectively allocate limited transportation funds among projects and programs for operations and capital.

How does Transportation Demand Management relate to the CMP?

Transportation Demand Management (TDM) is any action or set of actions designed to influence the intensity, timing, and distribution of transportation demand, in order to reduce traffic congestion or enhance mobility. The following strategies fall under TDM:

- Offering travelers alternative transportation modes or services, such as transit, ridesharing, or bikesharing.
- Providing incentives to travel on these modes or at non-congested hours.
- Investing in projects that facilitate safer, more convenient travel by foot or bicycle.
- Providing opportunities to link or chain trips together.
- Incorporating growth management or traffic impact policies into local land use and economic development decisions.

TDM strategies are part of the toolbox of actions available to transportation planners for solving transportation problems. As part of the congestion management process, TDM actions can reduce congestion or enhance accessibility to jobs, goods, and services, usually at a cost much less than widening or building new roads, bridges or other significant physical infrastructure.

Additional information

For more in the relationship between the congestion management process and planning, see www.fhwa.dot.gov/planning/congestion_management_process.

For a variety of resources and studies that support integrating TDM and operational strategies into the transportation planning process and resulting transportation plans and programs, see http://www.planning.dot.gov/focus_congestion.asp.

Transportation Equity

Transportation Equity refers to the way in which the needs of all transportation system users, in particular the needs of those traditionally underserved by existing transportation systems, such as low-income and minority households, older adults, and individuals with disabilities, are reflected in the transportation planning and decision making process and its services and products. Transportation Equity means that transportation decisions deliver equitable benefits to a variety of users and that any associated burdens are avoided, minimized, or mitigated so as not to disproportionately impact disadvantaged populations.

USDOT and modal administration regulations and guidance outline specific program requirements as well as best practices for achieving more equitable outcomes.

Considering equity early and often through methods such as public participation and data collection and analysis improves the planning process's ability to adequately respond to the needs of the community it serves. It may also improve project delivery by preventing costly and time-consuming delays that could arise from previously unrecognized conflicts as projects move from planning into implementation.

What is Title VI of the Civil Rights Act of 1964?

Title VI, 42 U.S.C. § 2000d et seq., was enacted as part of the landmark Civil Rights Act of 1964. Federal regulations FHWA (23 CFR part 200) and FTA (49 CFR part 21) state that "no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the recipient receives Federal assistance from the Department of Transportation."

Other nondiscrimination statutes that afford legal protection against discrimination include:

- Section 162 (a) of the Federal-Aid Highway Act of 1973 (23 USC 324), which addresses discrimination based on sex;
- Section 504 of the Rehabilitation Act of 1973, which addresses disability discrimination;
- The Age Discrimination Act of 1975;
- The Civil Rights Restoration Act of 1987; and
- The Americans with Disabilities Act of 1990.

What is Executive Order 12898?

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects, including interrelated social and economic effects, on low-income or minority populations resulting from its programs, policies, and activities. The Executive Order directs the U.S. DOT to take action for:

- Avoiding, minimizing, or mitigating disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority and low-income populations;
- Ensuring the full, fair, and meaningful participation in the transportation decisionmaking process by all potentially affected communities; and

- Preventing the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

What other executive orders affect transportation equity?

Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency" (2000), outlines reasonable steps to ensure meaningful access to benefits, services, information, and other important portions of their programs and activities for individuals who are limited-English proficient (LEP). DOT's LEP guidance provides extensive information as well as US DOJ's guidelines on self-assessment, as well as other materials.

Taken together, these requirements define an over-arching commitment to equity for Federal projects, programs, services and other activities.

What role do State DOTs, MPOs, and public transportation providers play in incorporating nondiscrimination and environmental justice into transportation planning?

As the agency responsible for coordinating the transportation planning process, the State DOT or MPO must ensure that all segments of the population have been included in the planning process regardless of race, national origin, income, age, sex, or disability. State DOTs, MPOs, and public transportation providers must comply with agency-specific Title VI requirements when developing and implementing a Title VI Program.

Environmental Justice considerations are carried out through public participation and complementary benefits and burdens analysis at planning and project development stages to gauge potential impacts of proposed projects on traditionally underserved populations. The presence of disproportionately high and adverse impacts on EJ populations could necessitate mitigation. The results of these analyses are then incorporated into planning products such as the long range plan, (S)TIP, UPWP, and PPP.

The following questions are particularly important when addressing the needs of all segments of the population in transportation planning:

1. How will the public participation process reach all segments of the population, regardless of race, national origin, income, age, sex, or disability?

    - How and where will information be disseminated?
    - What information will be disseminated?
    - How will limited English proficiency communities be identified and included?
    - Where and when will public meetings be held, and, are those locations accessible by all transportation system users?
    - Do meetings take place early in the planning process before decisions have been made?
    - What is the process for seeking out and considering the needs of those traditionally underserved by existing transportation systems, such as low-income and minority populations, who may face challenges accessing employment and other services?
    - Are other avenues being used to reach minority populations and low-income populations—for example, community leaders, community advisory boards, focus groups, surveys, fliers distributed outside shopping malls, schools, places of worship, and other areas where protected populations may be found?

2. How does demographic and other information reflect minority and low-income populations, and how is it used to assess potential inequities? Recommended actions include, but are not limited to:

- Evaluating information that is already collected.
- Identifying other information that can and should be collected.
- Analyzing data to identify potential inequities.
- Developing measures to verify whether the benefits and burdens of transportation services are distributed equitably across the transportation planning area.

3. How is information incorporated into decisionmaking?

- How are Title VI and environmental justice considered in creating the transportation plan?
- How is Title VI and environmental justice information collected by the MPO and communicated to officials?
- Is additional information needed to adequately consider the impacts of transportation decisions on low-income and minority populations?
- How are the specific interests of low-income and minority populations addressed in transportation policies, plans, and projects?
- How should information and data on age and disabilities be used in the planning process?

What are the statutory, regulatory and other authorities for nondiscrimination?

- Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d et. seq., states that, " No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

- FHWA Title VI Program and Related Statutes, 23 CFR Part 200 provides guidelines for implementing FHWA's Title VI compliance program under Title VI of the Civil Rights Act of 1964 and related civil rights laws and regulations.

- FTA Title VI Circular 4702.1B published on October 1, 2012 provides recipients of FTA financial assistance with guidance and instructions necessary to carry out DOT Title VI regulations (49 CFR part 21) and to integrate into their programs and activities considerations expressed in the Department's Policy Guidance Concerning Recipients' Responsibilities to Limited English Proficient Persons. It is derived by the authority outlined in: Title VI of the Civil Rights Act of 1964; Federal Transit Laws, Title 49, USC, Chapter 53; 49 CFR 1.51; 49 CFR part 21; and 28 CFR 42.401 et seq.

- Civil Rights Restoration Act of 1987 clarifies the original intent of Congress, with respect to Title VI and other nondiscrimination requirements (for example, The Age Discrimination Act of 1975, Section 504 of the Rehabilitation Act of 1973, and the Federal-Aid Highway Act of 1973 prohibiting discrimination on

the basis of sex) by restoring the broad, institutional-wide scope and coverage of these nondiscrimination statutes and requirements to include all programs and activities of the recipient of Federal funding.

- The National Environmental Policy Act (NEPA) and 23 USC 109(h) require agencies to consider social, economic, and environmental consequences when contemplating any action that has Federal support.

- Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on low-income or minority populations resulting from its programs, policies, and activities. USDOT issued an order on environmental justice, DOT Order 5610.2, to support EO 12898. FHWA issued an order on environmental justice, FHWA Order 6640.23. The updated USDOT order 5610.2(a) was issued on May 2, 2012, and the FHWA order was updated on June 14, 2012. FTA issued an updated EJ Circular 4703.1 on August 15, 2012.

- Executive Order 13166, *Improving Access to Services for Persons with Limited English Proficiency* requires that Federal agencies identify services needed for those with limited English proficiency (LEP), and develop and implement a system to provide those services so that LEP persons have meaningful access to them. It is expected that agency plans will provide for such meaningful access consistent with, and without unduly burdening, the fundamental mission of the agency. Executive Order 13166 also requires that Federal agencies work to ensure that recipients of Federal financial assistance provide meaningful access to their LEP applicants and beneficiaries.

- The Age Discrimination Act of 1975 prohibits discrimination on the basis of age in programs or activities receiving Federal financial assistance.

- The Americans with Disabilities Act of 1990 (ADA) prohibits discrimination and ensures equal opportunity for persons with disabilities in employment, State and local government services, public accommodations, commercial facilities, and transportation. It also mandates the establishment of TDD/telephone relay services.

Financial Planning and Programming

Where do transportation funds come from?

Governments generate transportation funds from a number of sources, including income tax, sales tax, tolls, bonds, and State, local, and Federal excise taxes on various fuels, State infrastructure banks (SIBs), and credit assistance sources. Each State decides which mix of funds is best suited to carry out particular projects.

As described earlier, Federal funds are authorized and appropriated by Congress for the Federal-aid highway and Federal transit programs. Primary examples of funding programs on the highway side include the National Highway System (NHS), the National Highway Performance Program (NHPP), The Transportation Alternatives Program (TAP), the Highway Safety Improvement Program (HSIP), the Surface Transportation Program (STP), and the Congestion Mitigation and Air Quality Improvement (CMAQ) program. Federal transit funds are authorized and appropriated into various formula-based and discretionary programs. FTA administers the urban and non-urban area formula programs, as well as transit capital investment grants that are discretionary, as determined by DOT and based on a series of evaluation criteria. Each of these programs has specific eligibility requirements, although there is some flexibility in the legislation that allows funds to be shifted among selected programs. Similarly, some programs will fund operating costs on a continuing, or temporary, basis.

States and MPOs also receive Federal funds, established by formula, to support planning studies and report preparation for the transportation planning process, through FHWA's State Planning and Research Funds (SPR) and Metropolitan Planning Funds (PL), and through FTA's Sections 5305(d) and 5305(e) programs, which respectively correspond to the metropolitan planning program and Statewide planning and research program. These planning program funds typically make up a large portion of the State or MPO budget for carrying out planning activities and studies, and for developing transportation plans, STIPs, TIPs and other planning documents. Planning is also eligible under various capital programs, such as STP, CMAQ, and FTA's urban and non-urban area formula programs.

What is financial planning?

Agencies use financial planning to take a long-range look at how transportation investments are funded and at the possible sources of funds. State DOTs, MPOs and public transportation operators must consider funding needs over the 20-year period of the transportation plan and the 4-year period of TIPs and STIPs. In the long-range Statewide transportation plan and the MTP, MPOs must, and State DOTs may, develop a financial plan that identifies funding sources for needed investments. The financial plan must also demonstrate a reasonably reliable means to maintain and operate the existing and future Federally-funded transportation system, as well as recommended new or improved facilities and services.

> **Fiscal constraint** is defined as a demonstration of sufficient funds, from Federal, state, local, and private sources, that will be used to implement proposed transportation system improvements, as well as to operate and maintain the entire system. This demonstration is carried out by comparing revenues and costs.

What is financial programming?

Financial programming is different from financial planning. Financial programming involves identifying available or expected funds and scheduling specific projects listed in the Statewide Transportation Improvement Program (STIP), metropolitan Transportation Improvement Program (TIP) and Metropolitan Long Range Transportation Plan (MTP).

How does financial planning support preparation of transportation plans?

Financial planning establishes the reasonableness and credibility of the MTP. The MTP, which has a 20-year planning horizon, must include a financial plan that estimates how much funding will be needed to implement recommended improvements, as well as operate and maintain the system as a whole, over the life of the plan. This includes information on how the MPO reasonably expects to fund the projects included in the plan, including anticipated revenues from FHWA and FTA, State government, regional or local sources, the private sector, and user charges. An MTP must demonstrate that there is a balance between the expected revenue sources for transportation investments and the estimated costs of the projects and programs described in the plan. In other words, an MTP must be fiscally (or financially) constrained. Without financial planning and fiscal constraint, the MTP could be viewed as nothing more than a "wish-list" of good ideas.

Since the long-range Statewide plan, under Federal law, is defined in part as a, "strategic plan, that may, or may not, contain a listing of recommended projects," a financial plan is optional, though strongly encouraged. The long-range Statewide transportation plan may include some or all of the financial elements commonly found in a typical metropolitan transportation financial plan, as the State DOT finds appropriate or necessary. It does not need to demonstrate fiscal constraint.

How do State DOTs, MPOs and public transportation operators know how much money is going to be available?

Federal surface transportation legislation requires that MPOs, State DOTs, and public transit agencies cooperatively develop revenue forecasts for each metropolitan region. These forecasts let agencies determine how much funding is likely to be available for transportation projects and services in their respective region. Forecasts are based on trends from existing and proposed funding sources, such as the gas tax or bond measures, as well as proceeds from proposed new sources of funding. Financial revenue forecasting, while tailored to each region, must be consistent and compatible with other revenue forecasting within a State.

> Proposed funding sources must be reasonably expected to be available. For example, if voters approved a sales tax increase three times in a row, anticipated funding from a future vote may be reasonable.

A financial plan could assume that the amount of available Federal funding will remain constant over the first five years of the transportation plan, and then escalate at a rate equal to the historic or recent growth of Federal transportation revenues. Or, the plan could assume declining revenues associated with reductions in fuel sales in future years. It could also assume that State gasoline taxes dedicated to transportation will be increased every five years by a certain amount based on past trends, or that no new taxes will be enacted, resulting in further erosion of the revenue base. In some cases, a decrease in the amount of certain revenues may be the prudent forecast, particularly those based on vehicle fuel sales.

The transportation plan could also assume a new revenue source, such as a local sales tax in an MPO region. In such a case, the MPO or other proposing agency must demonstrate that there is reason to believe such a new source will be available, and should identify strategies to help achieve that goal. For planning purposes, it would be easier to accept a new revenue source in the out-years (years 15-20) of the MTP since the region would have many years to implement the new revenue source and several MTP updates to revisit their progress.

Similarly, financial planning requires consideration of future changes to the capital and operating costs of transportation projects and systems. The rate of inflation in capital costs may be tied to one or more of a series of construction and materials cost indices, while inflation in operations and maintenance may be assumed to be tied to labor wage rates. And, financial plans may include strategies for containing costs, such as deferring capital facility replacement or ongoing maintenance, in order to accommodate revenue limits.

Regardless of how financial assumptions and forecasts are developed, all project cost and revenue estimates in the financial plan must be shown in *year of expenditure* dollars based on reasonable growth and inflation factors applied to various elements to the project costs. To make it easier to determine the balance between revenues and costs, as well as longer-term funding and cost uncertainties, the outer years of the financial plan for a MTP or a long-range Statewide transportation plan may consist of ranges for both revenues and project costs. As always, the high and low end of the ranges must be based on reasonable assumptions. To minimize risk, it is advisable to use the upper end of the project cost range when demonstrating fiscal constraint.

How are funds programmed?

At least every four years, each State must submit a STIP for FHWA and FTA for review and approval. The STIP covers a four-year period and includes all of the projects planned for implementation and the funds expected from FHWA and FTA , including all regionally significant projects, as defined by regulation, regardless of funding source. The STIP also incorporates, directly or by reference, the TIP for each MPO in the State, so that all projects included in the first four years of a TIP are part of the STIP. The STIP and the TIP must be fiscally constrained.

It is common for agencies to revise their STIPs and TIPs. Many factors that can lead to adjustments in transportation project schedules and budgets, such as changes in engineering practices, environmental issues, contracting issues, and project readiness. A major revision is called an **amendment** while a minor revision is called an **administrative modification**. If an MPO wants to amend a project in its TIP, it must also amend the STIP. Amendments require public review and comment, demonstration of fiscal constraint—except for long-range Statewide transportation plans—and a conformity determination for MTPs and TIPs in nonattainment and maintenance areas. Administrative modifications do not require such actions.

Programming a project for funding in the TIP

Agencies programming a project that will seek Federal funds will follow these guidelines to include the project in the TIP:

- The TIP must be consistent with the relevant MTP.
- The STIP and TIP must list new projects that will be initiated and the ongoing projects that will be advanced each year during the timeframe of the STIP.
- The STIP and TIP must identify which combination of funding sources—Federal, State, local, or others—will be used for each project or group of projects, and must show that there will be sufficient funds to advance a project each year.
- In air quality non-attainment or maintenance areas, projects included in the first two years of a TIP must have funds—Federal and non-Federal matching funds—available or committed to the projects as defined in regulation. In areas that are in attainment of air quality standards, funding to support projects listed in the STIP and TIP must be reasonably expected to be available. Most projects involve expenditure of funds over a multi-year period, which will be indicated in the STIP and TIP.
- Changes that do not add capacity may be made administratively to the TIP via administrative modification. These are essentially document edits that do not require that fiscal constraint or transportation conformity be re-determined.
- A project, or an identified phase of a project, will be included in a STIP only if it is reasonable to expect that full funding will be available to complete the entire project within the expected timeframe for project implementation.

After the TIP is approved by the MPO and the State's governor, it is submitted to the State DOT for inclusion in the STIP, which is then submitted to FHWA and FTA for approval. In air quality nonattainment and maintenance areas, the TIP must also meet transportation conformity requirements.

Programming a project for funding in the STIP

Agencies programming a project that will seek Federal funds will follow this roadmap to include the project in the STIP:

- Through an established process, the State solicits or identifies projects from rural, small urban, and urbanized areas of the State.
- In urbanized areas, the State, MPOs, and transit agencies develop a cooperative framework to prepare a metropolitan TIP which will be incorporated into the STIP.
- The State selects projects for inclusion in the STIP, in varying degrees of collaboration with other agencies, based on law and adopted procedures and criteria.
- The STIP must demonstrate fiscal constraint.
- FHWA and FTA must approve the STIP before STIP projects can proceed to implementation.
- Amendments to the STIP can be common given the frequent changes in engineering practices, environmental issues, contracting issues, project readiness, and other factors that can require adjustments to project schedules and budgets.

As with the TIP, changes unrelated to capacity may be made administratively to the STIP via administrative modification.

Additional information

For an overview of the FHWA's activities, including a guide to the agency's programs, core business units, and service business units, see www.fhwa.dot.gov/programs.

For links and information about all of FTA's funding programs and activities, see www.fta.dot.gov/12309.html.

For a complete list of Federally-aided transportation programs, see www.fhwa.dot.gov/Federalaid/projects.cfm.

For a complete list of FHWA discretionary programs, see www.fhwa.dot.gov/discretionary/proginfo.cfm.

For FHWA and FTA flexible funding guidance, see http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm.

For resources on financial planning and fiscal constraints, see http://www.planning.dot.gov/focus_fiscal.asp.

Performance-Based Planning: Programming Measures and Targets

What are performance measures?

In accordance with provisions enacted in MAP-21—the current legislation that funds national transportation efforts—performance measures are used to indicate how well the transportation system is meeting agency goals and the public's expectations. Performance measures should be closely tied to the development of agency goals and objectives. Many States and metropolitan areas use performance measures to monitor their achievement of specific regional access and mobility goals, such as accessibility to key regional population, employment, cultural, and recreational centers, the mobility of disadvantaged populations, levels of air quality, and the health of the economy.

Performance measures are central to implementing a performance-based planning process that guides decisionmaking. How performance is defined and measured can significantly affect the types of projects and strategies that are advanced by decisionmakers. Moreover, performance results inform agencies whether the types of projects and strategies they are implementing are in fact helping them achieve their goals. Performance measures aim to answer questions about whether the performance of the transportation system (or the economy, improving air quality, and so on) is getting better or worse over time. Performance measures also aim to demonstrate whether transportation investments are correlated or linked to stated goals and whether they produce desired outcomes.

Performance-based planning refers to specific performance measures and targets that are introduced to existing transportation planning and programming processes. Transportation agencies are increasingly applying **performance management**—a strategic, structured approach that emphasizes performance data to reach decisions that fulfills performance outcomes. Introducing a performance management approach to planning is intended to improve project and program delivery, inform investment decisionmaking, focus staff on leadership priorities, and provide greater transparency and accountability to the public.

Legislation emphasizes performance management within the Federal-aid highway program and transit programs, and requires that State, metropolitan, and non-metropolitan transportation planners use performance-based approaches. This approach is often called **performance-based planning and programming** (PBPP). PBPP describes performance management that is applied to transportation agencies' planning and programming for the multimodal transportation system. Transportation agencies, other agencies, stakeholders, and the public use the range of activities that PBPP covers as part of a 3C—cooperative, continuing, and comprehensive—process.

> The PBPP process helps agencies develop long range transportation plans (LRTPs), other plans and processes, including those required by the Federal Government, and programming documents, including State and metropolitan Transportation Improvement Programs (STIPs and TIPs).
>
> With PBPP, decisions are made based on data and evidence so that transportation investments remain realistic and achievable.

What roles do State DOTs and MPOs have in defining and using performance measures?

As noted previously, States and MPOs work with their planning partners through Statewide, metropolitan, and nonmetropolitan transportation planning processes to set targets for the national performance measures that USDOT is establishing. For other measures, through their respective transportation planning processes, State DOTs and MPOs can each take a leadership role in creating performance measures that provide information critical to regional and local decisionmakers.

MPO leadership can begin by addressing the performance measures requirements set as a result of Federal legislation. MPO leadership will then identify additional measures by interacting with stakeholders and the public to

identify community visions, and translate those visions into goals and measurable objectives. Finally, the MPO will set performance targets to track progress toward those goals.

Because performance measures are derived from, and are strongly influenced by the goals and objectives of the planning process, their development and ongoing support must be an integral part of ongoing planning activities. Development of transportation system performance measures and performance targets should be coordinated with, and informed by, a public involvement program.

Figure 5 below outlines the framework of planning stages for performance-based planning and programming (PBPP). This diagram shows how performance measures, goals, and targets can drive the planning process and ensure it is aligned with national and community-based goals and objectives.

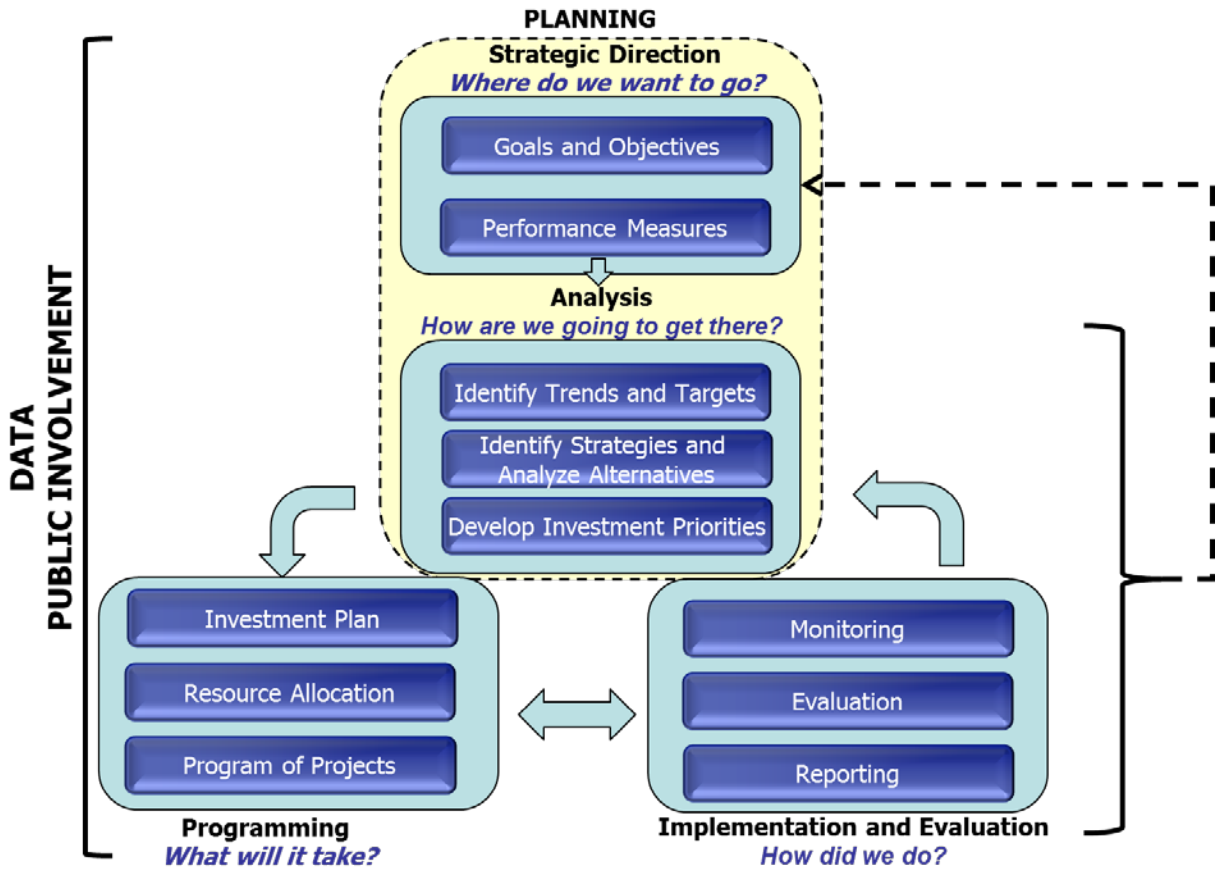


Figure 5. The framework for PBPP.

The following elements form the core of PBPP:

Strategic Direction: *Where do we want to go?*
In the transportation planning process, the public and other stakeholders articulate a strategic direction that is based on a shared vision for the future.

- Goals and Objectives stem from a State or region's vision and goals, and they address key desired outcomes. Agencies create objectives—which are specific, measurable statements—that shape planning priorities.

- Performance Measures support objectives and are the basis for comparing alternative improvement strategies, investment and policy strategies, and tracking results.

Planning Analysis: *How are we going to get there?*
Driven by data on performance, along with public involvement and policy considerations, agencies conduct analyses that inform investment and policy priorities.

- Identify Trends and Targets – Preferred *trends*—a general direction of where results should go—or *targets*—specific performance levels to be met within a timeframe—are established for each measure. Trends and targets let agencies compare alternative strategies. This step relies on baseline data from past trends, tools to forecast future performance, and information on possible strategies, available funding, and other constraints.
- Identify Strategies and Analyze Alternatives –Scenario analysis may also be used to compare alternative strategies and funding levels, or to explore funding levels required to achieve certain performance goals.
- Develop Investment Priorities – To reach investment targets, agencies create long-range transportation plans (LRTPs) that consider policy priorities and tradeoffs.

Programming: *What will it take?*
Programming involves selecting specific investments to include in an agency capital plan, a TIP, or a STIP. In a PBPP approach, agencies make programming decisions based on whether those decisions support performance targets or contribute to desired trends, and whether they account for a range of factors.

- Investment Plan – In order to connect the LRTP, which has an outlook of at least 20 years, to projects in a TIP/STIP, some areas develop a mid-range investment plan that, for example, may cover 10 years.
- Resource Allocation / Program of Projects – 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 based on performance, and whether they show a clear link to meeting performance objectives.

Implementation and Evaluation: *How did we do?*
PBPP is founded on evidence that the process leads agencies to their goals. The following evaluation activities happen throughout implementation and when needed throughout performance-based planning.

- Monitoring – Gathering information on actual conditions.
- Evaluation – Conducting analysis to understand whether implemented strategies have been effective.
- Reporting – Communicating information about system performance and whether policymakers, stakeholders, and the public think plans and programs are effective.

In a PBPP approach, each step in the process is clearly connected to the next so that goals translate into specific measures. Those measures then become the basis for selecting and analyzing strategies for the long range plan. Ultimately, project selection decisions are influenced by expected performance returns. Keeping the next step in the process in mind is critical to each step along the way.

Public involvement and data are critical throughout the process. The public's vision for their transportation system plays a central role in determining goals, performance measures, and investment priorities. Agencies also decide on priorities using data and information on how potential strategies performed in the past, are performing now, and how they are projected to perform.

Like all planning, the PBPP process is cyclical. As planning cycles evolve, goals and objectives may be adjusted and performance measures and targets may be refined. Making adjustments during PBPP ensures that agencies focus on the most important priorities and that those priorities remain achievable.

The following examples are the kinds of additional performance measures States and MPOs may wish to include in their planning processes, in addition to those that are Federally required:

- Accessibility
  Accessibility may include the percent of the population within X minutes of Y percent of employment sites, whether special populations, such as the elderly, are able to use transportation, whether transportation services provide access for underserved populations to employment sites, and whether services are ADA compliant.
- Mobility
  Mobility may include average travel time from origin to destination, change in average travel time for specific origin-destination points, average trip length, the percentage of trips per mode, time lost to congestion, transfer time between modes, and the percent of on-time transit performance.
- Economic development
  Economic development may include jobs created and new housing starts in an area as a result of new transportation facilities, new businesses opening along major routes, percent of the region's unemployed who cite lack of transportation as the principal barrier to employment, and the economic cost of time lost to congestion.
- Quality of life
  Quality of life may include environmental and resource depletion or consumption, tons of pollution generated, fuel consumption per vehicle mile traveled, decrease in wetlands, and changes in air quality and land use.
- Safety
  Safety data may include the number of traffic fatalities and serious injuries or economic costs of crashes.

Additional information

For the *Performance Based Planning and Programming Guidebook*, see www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook.

For the *Model Long Range Transportation Plans Guidebook*, see www.fhwa.dot.gov/planning/performance_based_planning/mlrtp_guidebook.

For *Small Metropolitan Areas: Performance-Based Planning*, see www.fhwa.dot.gov/planning/performance_based_planning/small_mpo_report.

For the FHWA PBPP Webpage, see www.fhwa.dot.gov/planning/performance_based_planning.

For the Transportation Research Board report on using targets and data management to support performance-based resource allocation, see onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_666.pdf.

Planning Data and Tools: Models, GIS, and Visualization

Better planning tools are increasingly available to help MPOs understand the potential impact their decisions have on the transportation network and the natural and human environment, as well as the range of possible impacts associated with alternative land development and transportation improvement options.

There are a number of decision support tools available to help communities consider these variables and address land use, community development, economic development, environmental protection, and transportation challenges. Examples of planning tools include transportation models, land use models, Geographic Information Systems (GIS), GIS-based decision support tools, scenario planning models, and remote sensing.

What are transportation models?

Transportation models are simulations of the real world that are used to show how the transportation system is affected by changes in a metropolitan area. Impacts might include how a new road or transit line would be affected by increases in population or employment. Transportation models may be used to test the travel impacts of changes in land use, economic development, fuel and parking costs, and new highway or transit system capacity.

The following characteristics are the three keys to any model used for transportation analysis:

- Key base, or current-year characteristics of travelers and the transportation system, described in terms of quantifiable variables—for example, the number of highway travel lanes, transit service headways, household size and income, number of vehicles per household, and employment patterns by type and job classification. These data are collected through a variety of sources, including roadway inventories, the Census, and the American Community Survey.
- The mathematical relationship between key base variables and how individuals travel—for example, the more automobiles there are per household, the greater the number of automobile trips there will be per household. This relationship is based on data collected through the National Household Travel Survey or similar sources.
- Future-year forecasts of key traveler and transportation system characteristics. This relationship is the same for all individuals and is constant over time. Future year forecasts should reflect consistent and reasonable assumptions about future growth and development.

Challenges to environmental documents, such as the Environmental Impact Statement, or conformity findings are often based on deficiencies in one of these areas.

What is a Travel Forecasting Model?

A Travel Forecasting Model (TFM) is a series of analytical techniques—see Figure 6 below— that agencies use to predict future demand for transportation facilities and services. Planners, decisionmakers, and the public use these predictions. A TFM lets agencies estimate how policies and programs will affect behavior and travel demand.

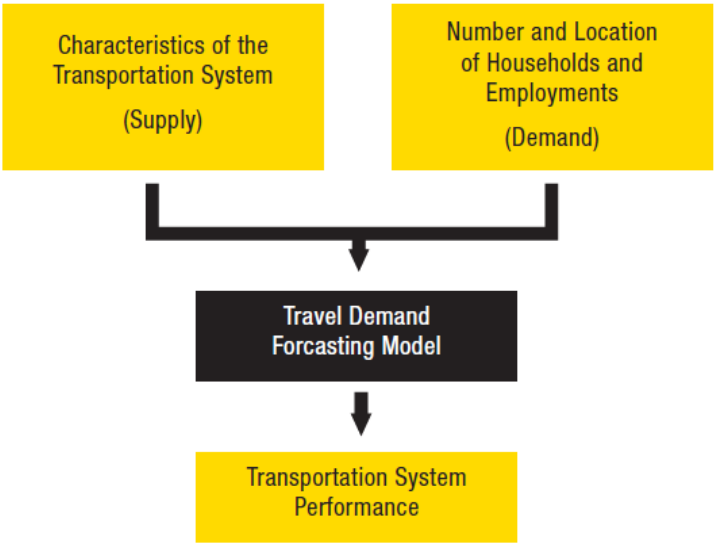


Figure 6. Travel Forecasting Model analytical techniques.

After an understanding has been established regarding the land use, population, and employment in a study area, transportation professionals will create a TFM using the following modeling steps:

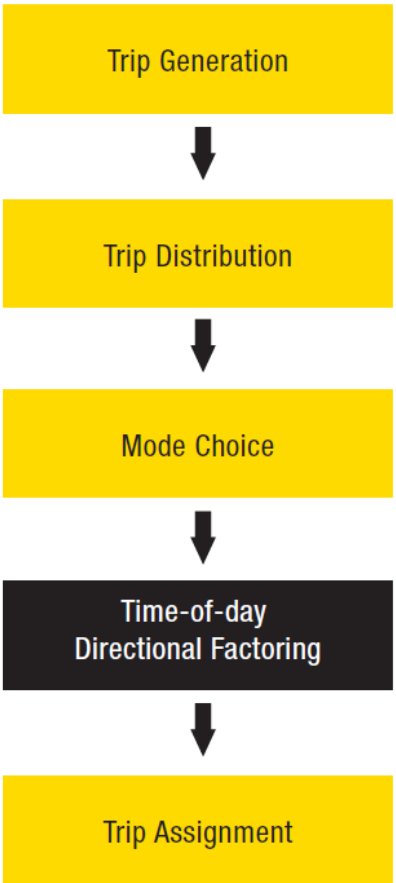


Figure 7. The Four-Step Travel Modeling Process.

These four steps are the basis for assessing the performance of the transportation system.

- Trip generation
  During the trip generation step agencies estimate the number of trips generated in a small geographic area, called a zone, or at a particular location, that end in another zone or particular location, based on the assumed relationship among socioeconomic factors, land use characteristics, and the number of trips.
- Trip distribution
  During the trip distribution step agencies estimate the number of trips that originate in every zone in the study area, with destinations to every other zone.
- Mode choice
  During the mode choice step agencies estimate the number of trips predicted between each origin and destination, the number of trips made by each type of mode that is available for that trip. This step produces results such as, "X percent are likely to drive alone, Y percent are likely to take transit, and Z percent are likely to ride-share."
- Trip assignment
  During the trip assignment step agencies estimate the number of trips via a particular mode that will take specific paths through a road or transit network. The end result, when all trips are assigned to a network, is an estimate of the total number of trips that will use each link in the network. When compared to the capacity of each link, planners can forecast the level of congestion that will occur at that location.

What other types of models are there?

The four-step model described above are commonly used for trip-based models. Several metropolitan areas, such as New York, San Francisco, and Columbus, Ohio have implemented advanced-tour or activity-based models, which model travel differently from trip-based models. Tour-based models, for instance, keep track of travel activity throughout the day and can assemble multiple trip legs into tours, called chained trips. For example, a parent may leave work, pick up the children at day care, and stop at the grocery store on the way home. These separate trips would be linked together into a tour and, when taken as a whole, the modeled travel behavior of this parent may be more consistent than if all of these trips were considered separately.

Land use models are used to forecast future development patterns, as well as the potential that proposed transportation improvements will induce new or accelerated land development in particular areas. The output of land use models can be used to evaluate the reasonableness of future forecasts or to provide input to the trip generation step of the travel forecasting model.

Agencies use air quality emissions models, such as EPA's Motor Vehicle Emissions Simulator, to project the tons of key pollutants emitted from vehicular trips.

What should decisionmakers consider when reviewing model results?

Results of a model are only estimates or indicators; they cannot provide a definitive picture of what will happen in the future. Much like economic projections, transportation forecasts are greatly affected by the long-term economic health and attractiveness of a region, by population changes, and by the individual behavior of each person using the transportation system. Planning decisions should be based on sound analytic methods and quality data applied in an objective and rational planning process.

Model results are only as good as the data that go into the model. MPOs must use the most current socioeconomic and census data available, especially if a region is growing rapidly. MPOs should make every effort to explain the information and assumptions that went into creating the model in plain, understandable terms. Finally, it is important that the models are periodically validated against observed conditions. State, MPO, and transit operators should have a schedule to re-survey the usage and performance patterns of their systems using, for example, transit onboard and roadside origin-destination surveys.

What are visualization techniques, and how are they used in transportation planning?

Data visualization is an evolving field. Agencies that apply data visualizations can improve how the public and elected officials understand transportation planning issues and promote more informed decisionmaking.

Visualizations should inform the public, elected and appointed officials, and other stakeholders in a clear and easily accessible format that promotes understanding of existing or proposed transportation plans, policies, and programs. There are a broad range of visualization tools, including maps, pictures, and displays.

Visualizations, especially map-based visualizations, can help organize data and make it easier to analyze information on a technical level. Some visualizations are more schematic in their representations of data patterns, or they blend schematic representations with map-based formats. Much of the data collected for transportation planning is geographically-based and tied to an area, corridor, or a spot location, which makes mapping especially important for practitioners at an MPO and outside partner agencies.

Mapping can be done on paper, through Geographic Information System (GIS) software, or through an online mapping service, depending on the data and an MPO's capabilities. Graphs and photographs can also be effective in helping practitioners analyze and apply the large volumes of data that are often collected or gathered as part of the transportation planning process. If kept relatively simple and easy to read, maps of technical data with concise annotations can also be effective for reaching the general public.

Visualization techniques can be used throughout the transportation project process, including in developing planning documents, on websites, and at public outreach and information sessions. Through visual imagery, the complex nature of proposed transportation plans, policies and programs can be portrayed at appropriate scales and from different points of view, providing the public and decisionmakers with a clear sense of the proposals and their likely impacts on the human and natural environment.

Visualization techniques are also increasingly used to improve decisionmaking for context-sensitive solutions. Context-sensitive solutions involve proposing improvements that harmonize with local settings, and visualizations can superimpose prospective transportation structures, strategies, or services on the existing environment. (See *Land Use* for more on context-sensitive solutions.)

What is a Geographic Information System and how can State DOTs, MPOs and public transportation providers use GIS during transportation planning?

A GIS is a collection of computer software, hardware, and data, used to store, manipulate, analyze, and present geographically referenced information. GIS can be used for analysis and as the basis for many of the visualization techniques described above. In transportation planning, GIS is typically used to compile and overlay multiple sets of data linked to particular geographic locations. With GIS transportation professionals can holistically and efficiently view multiple items of interest about a particular geographic area including transportation facilities, operations, demographics, environmental and cultural resources, public lands, and others. As an aid to environmental analysis, GIS also is used to identify sensitive areas by comparing key features of the human and natural environment.

Additional information

For the FHWA GIS in Transportation Website, see www.gis.fhwa.dot.gov.

For the National Highway Planning Network geospatial network database, see www.fhwa.dot.gov/planning/processes/tools/nhpn.

Public Involvement

Who is the public?

The public includes any individual or group who resides, is employed, has an interest, or does business in an area potentially affected by transportation decisions. It is also important for all private and public providers of transportation services, including, but not limited to, the trucking and rail freight industries, the intercity rail passenger industry, taxicab operators, and all transit and paratransit service operators to have an opportunity to participate. Finally, extra efforts may be needed to engage persons traditionally underserved by existing transportation systems, such as low-income populations or minority populations, the disabled and the elderly (see *Equity*).

Federal, State, and local agencies that have an interest in transportation issues play a particularly important role in developing transportation projects. Many of those agencies have a statutory responsibility to review environmental documents or issue permits for transportation projects. FHWA and FTA encourage MPOs and State DOTs to aggressively pursue improved communication and collaboration with these partners, beginning early in the transportation planning process, to identify and address their concerns.

Paratransit includes a variety of flexibly scheduled and routed transportation services that use low-capacity vehicles, such as vans. These vehicles operate within normal urban transit corridors or rural areas. Typical paratransit patrons include people who are underserved or not served at all by standard mass transit. Patrons often include the elderly and people with disabilities.

What is the role of public involvement in developing transportation policies, programs, and projects?

Public involvement ensures that transportation decisions consider public needs and preferences. The fundamental objective of public involvement programs is to ensure that the concerns and issues of people with a stake in transportation decisions are identified and addressed. Early and ongoing public involvement brings diverse viewpoints into the decisionmaking process. Public involvement lets agencies make better-informed decisions and builds mutual understanding and trust between agencies and the public they serve. Successful public participation is a continuous process that obtains input from and informs the public.

What role do MPOs have in implementing public involvement processes?

MPOs are responsible for actively involving all affected parties in an open, cooperative, and collaborative process that provides meaningful opportunities to influence transportation decisions. Decisionmakers must consider fully the social, economic, and environmental consequences of their actions, and assure the public that transportation programs support adopted land use plans and community values.

MPOs must consult with interested parties to develop and document a public participation plan that details strategies for incorporating visualization techniques, using electronic media, holding public meetings, and responding to public input, among other things. MPOs also must evaluate the effectiveness of the public participation plan in informing and engaging the public and stakeholder communities.

What role do State DOTs have in the public participation process?

Similar to the role of MPOs in metropolitan areas, State DOTs must have a documented process for the Statewide engagement of the public and stakeholder interests outside of metropolitan areas. Where appropriate, States may carry out their public involvement processes through, or in coordination with, Regional Transportation Planning Organizations. State DOTs should coordinate with MPOs to achieve effective public involvement across metropolitan, Statewide, and nonmetropolitan transportation planning processes, as well as for project-level planning for State projects in metropolitan areas.

What is the role of transit operators in the public participation process?

Transit operators have a dual role in public involvement. They need to work closely with MPOs to advocate for system improvement needs while representing the interests of their traveling customers. As appropriate, and with proper public notice, transit operators may rely on an MPO's public involvement process to complement or satisfy their own public meeting requirements associated with changes in service or fare structure.

What are the characteristics of an effective public participation process?

A well-informed public and stakeholder base has the best chance to contribute meaningful input into transportation decisions through a broad array of involvement opportunities at all stages of decisionmaking. Useful elements of an effective public involvement program include:

- A clearly defined purpose and objectives for initiating a public dialogue on transportation issues.
- Identifying the public and other stakeholder groups that will be affected by the plans and programs being developed.
- Identifying techniques for engaging the public in the planning process.
- A concerted effort to identify how future visions and goals of the community will affect transportation.
- Effective procedures for notifying affected groups of meetings, project progress, and other benchmarks.
- Methods and measures for evaluating whether the public involvement program is effective.
- Education and assistance techniques that lead to an accurate and full public understanding of transportation issues.
- Follow through by the MPO to demonstrate that decisionmakers seriously considered public input.
- Feedback from the public and stakeholders on whether the public involvement process is effective.

Additional information

For MPOs seeking guidance on involving the public, see www.fhwa.dot.gov/planning/public_involvement/publications/techniques.

For the State DOT Public Involvement Reference Tool, see http://www.fhwa.dot.gov/planning/public_involvement/reference_tool.

For the Transportation Research Board's Public Involvement Committee website, see www.trbpi.com.

For more Transportation Planning Capacity Building Program (TPCB) Technical Public Involvement Resources, see planning.dot.gov/focus_publicEngage.asp.

For TPCB Peer program reports on current practices and issues in public involvement, see www.planning.dot.gov/peer.asp.

Safety

Why is safety an important component of transportation planning?

Over the past three decades, transportation fatality rates have declined, due in large part to safer cars, tougher police enforcement, and improved roadway safety through engineering, enforcement, education, and emergency medical service.

But there is still work to do. More than 32,000 people lost their lives and an estimated 2,217,000 people were injured on the Nation's roadways in 2011. In addition to injuries and lives lost, there are large economic costs associated with crashes, incurred by those directly involved, by travelers affected by delays caused by crashes, and by the greater community which experiences lost productivity and the need for emergency and medical services. Maintaining high performance in transportation safety requires seamless coordination of activities and funding among multiple partners. This begins with a data-driven, coordinated, and system-wide transportation planning process that identifies safety priorities and enables States to make strategic safety investment decisions.

In addition, MAP-21 identified safety on both highway and transit facilities as a national goal area, requiring the development of safety-related performance measures, targets, and plans. States must prepare Strategic Highway Safety Plans and a State Highway Safety Improvement Program, while public transportation operators must prepare Public Agency Safety Plans, all which are intended to support safety-related performance targets that align with the safety performance measures prepared by USDOT. As with the performance topics associated with the other national goal areas, States and MPOs are responsible for developing performance targets for use in the Statewide and nonmetropolitan and metropolitan transportation planning processes respectively.

What roles do State DOTs and MPOs have in transportation safety?

Transportation planners incorporate safety considerations by identifying high incident locations and the most effective strategies for reducing crashes at these locations. These strategies typically fall into the areas of engineering, enforcement, education, and emergency medical services. Crash data helps identify which focus areas should receive funding priority for improving safety in the region.

As noted above, a key role of State DOTs and MPO planners is to coordinate any planned safety-related transportation efforts with their safety partners. Much of this coordination occurs during the State Strategic Highway Safety Plan (SHSP) process, which is led by the State DOT in a cooperative process with local, State, Federal, tribal, and private sector safety stakeholders. Other safety-related transportation planning efforts include the Public Transportation Agency Safety Plan and the State Safety Oversight Program. Input from these partners improves the safety elements of planning processes and ensure strong collaboration.

Finally, many State DOTs and local transportation agencies have developed safety data management systems that monitor accident locations in their jurisdictions. MPOs can participate in data collection for these systems and can help coordinate the development of regional safety plans that address regional safety concerns.

What are the planning requirements for incorporating safety into transportation planning?

Improving the safety of the transportation system is one of the planning factors that Federal legislation explicitly requires to be considered in the transportation planning process. Short and long-range plans should have a safety element as part of the plan. When projects and strategies are evaluated for possible inclusion in the MTP and the TIP, safety should be a factor in their selection and prioritization criteria.

As part of its landmark provisions for converting transportation planning into performance-driven processes, MAP-21 identified that data-driven decisionmaking should underpin safety performance measures for highway and public transportation systems. USDOT prepares performance measures for safety on highway and public transportation systems. Then, MPOs and States make concerted efforts to identify and meet appropriate targets and implement their plans and programs. In selecting these safety-related performance targets, MPOs must coordinate with States and transit operators to ensure consistency across metropolitan and nonmetropolitan areas.

MPOs and States should engage the public and stakeholder communities when setting safety performance targets, using their public participation plans, and they should document the public involvement processes. In their UPWPs, MPOs should program the analytical work involved in collecting and analyzing data associated with the adopted measures, as well as tracking progress toward achieving the targets. Similarly, States should identify supportive work activities for inclusion in the State Planning Work Programs.

Transportation planners, whether at the State or regional level, address safety as a key consideration in the transportation planning and programming process. Federal transportation planning requirements provide for consideration and implementation of projects, strategies and services that will increase the safety of the transportation system for motorized and nonmotorized users.

A **Strategic Highway Safety Plan** (SHSP) is a major component and requirement of the FHWA Highway Safety Improvement Program (HSIP). State DOTs must develop, implement, and evaluate an SHSP in a cooperative process with local, State, Federal, tribal and private sector stakeholders. An SHSP determines the State's critical highway safety problems and provides a comprehensive and multidisciplinary framework for addressing safety on all public roadways. It also guides investment decisions toward strategies and countermeasures that have the most potential to save lives. State DOTs and MPOs should integrate the goals, objectives, performance measures, targets, and strategies from the SHSP into their respective transportation planning processes.

State DOTs are responsible for developing a Strategic Highway Safety Plan that focuses and coordinates efforts on the key safety issues at the State level. MPOs contribute to the development of the SHSP and also undertake efforts to identify and address safety issues in their region. Some of these regional safety issues may be distinct from the areas emphasized in the SHSP. Coordination and collaboration among agencies to bring together expertise and resources to address safety issues is a productive strategy for improving safety.

The transportation planning process typically includes goals, objectives and performance measures related to safety issues. Based on safety data analyses, planners collaborating with safety professionals and the public can identify goals and strategies for safety improvement toward reducing motor vehicle fatalities and serious injuries due to vehicle crashes, including efforts related to transit, pedestrian and bicycle safety. Safety data and analysis methods are fundamental tools for advancing safety improvements.

In addition to using safety data to identify issues and needs, planners use crash data to evaluate alternative strategies, or expected safety benefits of proposed improvements. These impacts are evaluated along with other impacts, such as congestion relief and costs, as projects are selected for the long range transportation plan and the transportation improvement program. Establishing safety as an important factor in decisionmaking leads to improvements in safety.

Safety improvement can be monitored by tracking key measures, such as total motor vehicle fatalities, serious injuries, pedestrian fatalities, and other key indicators that are meaningful to quality of life in a community.

Additional information

For information from the FHWA Office of Safety on ways to improve roadway safety, see safety.fhwa.dot.gov.

For information from FTA on safety and security of public transportation systems, see www.fta.dot.gov/13248.html.

For Bureau of Transportation Statistics (BTS) annual statistical reports on crash statistics, see www.rita.dot.gov/bts.

For the transportation safety planning website created by FHWA, FTA, the Transportation Research Board, and other organizations, see tsp.trb.org.

For the FHWA Office of Planning website on transportation safety planning, see www.fhwa.dot.gov/planning/transportation_safety_planning.

Security

What is transportation security?

Transportation security can be defined as freedom from harm, tampering, natural disasters, and extreme weather events that would affect motorized and nonmotorized travelers. Security goes beyond safety to include planning that prevents, manages, or responds to threats to a region and its transportation system and users.

Why should States and MPOs consider security in the transportation planning process?

The events of September 11, 2001, Hurricanes Katrina and Rita, and Superstorm Sandy have increased awareness of man-made and natural security concerns among transportation professionals and the public. The vulnerability of the transportation system and its role in emergency evacuations are paramount to ensuring public safety. Federal law requires that transportation planners consider security during transportation planning and programming.

What role do State DOTs and MPOs have in transportation security?

State DOTs and MPOs, sometimes in conjunction with Regional Transportation Planning Organizations, are often in a unique position to foster coordination between agencies representing different transportation modes, other government agencies, and groups focused on security. State DOTs and regional transportation agencies have created homeland security plans for emergency evacuation, contingency measures, and communications interoperability. Additionally, State DOTs and MPOs can support programs and fund projects that enhance secure travel for all transportation system users. As the entities that plan and select projects for implementation, State DOTs and MPOs can ensure that the criteria used to select and advance projects recognizes, highlights, and promotes projects that address transportation security.

How do agency staff demonstrate that security was considered during transportation planning?

Consideration of security in the planning process may be documented in key planning documents such as the UPWP, the State Planning and Research Program, the long-range transportation plans of States and MPOs, the STIP, TIP, or part of a stand-alone study. Federally-funded or regionally significant transportation security should be

included in the metropolitan long-range plan, STIP or TIP. Other activities might include documenting conversations and coordination with groups focused on security or including transportation security as a project selection criterion.

Additional information

For FHWA's Emergency Transportation Operations website, see ops.fhwa.dot.gov/eto_tim_pse/index.htm.

For *The Role of the Metropolitan Organization (MPO) in Preparing for Security Incidents and Transportation System Response,* see www.planning.dot.gov/Documents/Securitypaper.htm.

For *Incorporating Security into the Transportation Planning Process*, see onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_525v3.pdf.

For *Homeland Security: Effective Regional Coordination Can Enhance Emergency Preparedness*, see www.gao.gov/new.items/d041009.pdf.

For *The Public Transportation System Security and Emergency Preparedness Planning Guide (2003)*, see transit-safety.volpe.dot.gov/Publications/Default.asp.

For *Incorporating Security into the Transportation Planning Process*, see trb.org/news/blurb_detail.asp?id=5028.

For *The Role of the Metropolitan Planning Organization In Preparing for Security Incidents and Transportation System Response*, see www.planning.dot.gov/Documents/Securitypaper.htm.

For *Security Considerations in Transportation Planning*, see www.cutr.usf.edu/pubs/Security%20paper%200402.doc.

Transportation Asset Management

What is transportation asset management?

Asset management is a strategic and systematic process of operating, maintaining, and improving physical assets. The asset management process is based on engineering and economic analyses performed with quality information.

Agencies use asset management to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that achieve and sustain a desired State of good repair over the lifecycle of the assets at minimum practicable cost.

A high-performing asset management program incorporates detailed asset inventories, operation and maintenance tasks, and long-range financial planning. At its fullest, asset management also applies performance principles to the long-term cost-effective preservation of physical assets, including pavements, bridges, tunnels, transit vehicles, rail facilities, and roadside features. Asset management can enhance the value of these physical infrastructure at the lowest reasonable lifecycle cost while providing service levels needed to meet mobility, safety, environmental and economic objectives.

What is the role of the MPO in transportation asset management?

Each State is required to develop a risk-based asset management plan for the National Highway System (NHS) to improve or preserve the condition of the assets and the performance of the system. In situations where NHS routes are owned and managed by an MPO, State DOTs should coordinate with MPOs to develop an asset management

plan that improves or preserves the condition of the assets and the performance of the system. A transportation asset management plan for the National Highway System will include:

- Pavement and bridge inventory and conditions on the NHS.
- Objectives and measures.
- Performance gap identification.
- Lifecycle cost and risk management analysis.
- Financial plans.
- Investment strategies and prioritization.

Additionally, as a result of MAP-21, providers of public transportation are required to develop a Transit Asset Management (TAM) plan that includes at a minimum, capital asset inventories and condition assessments, decision support tools, and investment prioritization. TAM plans developed by transit providers must be coordinated with States and MPOs. MPOs should also know the content of a transportation asset management plan and consider this information throughout the planning process.

Transportation asset management has been a critical yet underrepresented element of the transportation planning process. But the field of asset management has grown based on the simple and powerful premise that agencies should consider the whole life-cycle cost of managing their assets.

In addition to the objectives listed above, MPOs should account for the following when developing their transportation plans:

- That their MTP is comprehensive and incorporates the transportation assets of all modes.
- That the transportation network is managed to meet both current and future demands.
- That expenditures are optimized for value.
- That the value of their assets are sustained over the long-term.

Generally, an MPO can achieve a successful transportation asset management program by managing public investment through the transportation plan and TIP, defining performance measures for assets through public involvement, encouraging or sponsoring data collection, serving as a repository for asset data, and promoting standard data collection and technology applications. MPOs can also educate the public and decisionmakers and work cooperatively with stakeholders across transportation modes.

Typically, the MPO does not, on its own, develop or operate a transportation asset management decisionmaking framework; this is usually the responsibility of State and local operating agencies.

Pavement, bridge, and public transportation assets are among the infrastructure elements for which performance measures are prepared by USDOT. Subsequently, MPOs and States identify appropriate target values for those measures to set achievement goals for their plans and programs. MPOs should use their public participation plans to engage the public and stakeholder communities in setting performance targets. And, the UPWPs that MPOs create should include the analytical work involved in collecting and analyzing data associated with the adopted measures, as well as methods to track progress toward achieving the targets.

How does the Transportation Asset Management process inform decisionmakers?

Transportation Asset Management focuses on State DOTs establishing and following a set of processes to identify the investment strategies included in the transportation asset management plan. These processes relate to performing analyses at the program level, including performance gap analysis, life-cycle cost analysis, and risk analysis. All State DOTs can use transportation asset management to undertake a strategic and systematic process of effectively operating, maintaining, upgrading, and expanding physical assets throughout their life cycles in order to achieve and sustain a desired state of good repair. The goal is better decisionmaking that is based upon quality information and well-defined objectives, and considers risks to the assets and system performance as part of the decision-making process.

What questions should transportation decisionmakers ask as part of the transportation asset management process?

Typically, transportation decisionmakers should ask the following questions as part of the transportation asset management process:

- What is the current state of my assets?
  What do I own?
  Where is it?
  What condition is it in?
  What is its remaining useful life?
  What is its remaining economic value?
- What is my required level of service/ performance level?
  What is the demand for services by stakeholders?
  Are there regulatory requirements?
  What is my actual performance?
- Which assets are critical to sustained performance?
  How does it fail? How can it fail?
  What is the likelihood of failure?
  What does it cost to repair?
  What are the consequences of failure?
- What are my best Operations and Maintenance and Capital Improvement investment strategies?
  What alternative management options exist?
  Which are the most feasible for my organization?
- What is my best long-term funding strategy?

Additional information

For FHWA's *Generic Work Plan for Developing a TAMP*, March 2013, see www.fhwa.dot.gov/asset/tamp/workplan.pdf.

For FTA's *Asset Management Guide*, 2012, see www.fta.dot.gov/documents/FTA_Asset_Management_Guide_-_FINAL.pdf.

For FTA's *Transit Asset Inventory Development and Integration, September 2012*, see www.fta.dot.gov/documents/FTA_Report_No._0023.pdf.

For FHWA's *Transportation Planning and Asset Management, 2006*, see www.fhwa.dot.gov/infrastructure/asstmgmt/tpamb.cfm.

For the Asset Sustainability Index, Report Number FHWA-HEP-12-046, see www.fhwa.dot.gov/planning/processes/Statewide/practices/asset_sustainability_index.

For FHWA's *Asset Management: Advancing the State of the Art into the 21st Century Through Public-Private Dialogue*, Report No. FHWA-RD-97-046, see www.fhwa.dot.gov/pubstats.html.

For FHWA's *Asset Management Primer*, December 1999, see www.fhwa.dot.gov/infrastructure/asstmgmt/amprimer.pdf.

For more about the mission of FHWA's Office of Asset Management, and other useful links, see www.fhwa.dot.gov/asset.

For more information on FTA State of Good Repair & Asset Management, and other useful links, see www.fta.dot.gov/13248.html.

Transportation System Management and Operations

What is transportation system management and operations?

Agencies use a transportation system management and operations (TSM&O) program to analyze regional transportation as an interconnected set of services and systems and to improve traveler and system performance through better management and use of the multimodal transportation network.

TSM&O is an integrated program that gives agencies the tools to optimize the performance of existing infrastructure through the implementation of multimodal, intermodal and often cross-jurisdictional systems, services and projects designed to preserve capacity and improve security, safety, and reliability. This framework directs regional operations to collaborate with and coordinate activities and plans between transportation and public safety agencies. TSM&O strategies aim to improve service efficiency, enhance public safety and security, reduce traveler delays, and improve access to information for travelers.

As agencies use TSM&O to identify improvements, it is important that they understand the performance that travelers expect from their transportation systems. Some examples of user-oriented performance measures are average trip travel time, length of delay, and reliability of trip making. These are important indicators of how well the transportation system is operating.

Reliability of trip making asks whether the time it takes for a specific trip is reliable. A specific trip might include, one's daily commute, or the time it takes for goods to move between shipper and receiver.

What are the requirements for considering management and operations in the transportation planning process?

Federal requirements call for agencies to consider TSM&O in the metropolitan and Statewide and nonmetropolitan transportation planning processes. Examples of planning factors required by Federal legislation include, "promote efficient system management and operation," and, "emphasize the preservation of the existing transportation."

Legislation also states that transportation plans shall include operations and management strategies to improve the performance of the existing transportation system by relieving vehicular congestion and maximizing the mobility of people and goods.

What are some examples of TSM&O tools?

Intelligent transportation systems (ITS) are technological tools that can help to facilitate better TSM&O. For example, roadway video surveillance allows better responses to changes in network conditions, such as clearing an accident quickly to keep traffic moving. ITS technologies also can be used to collect real-time data, like travel speeds, which can be used to monitor system performance over time.

Other examples of TSM&O tools include the following:

- Regional traffic management centers.
- Regional traffic signal coordination.
- Integrated corridor management.
- Active transportation and demand management.
- Traffic incident management.
- Preferential treatment for transit and rideshares.
- Special event traffic management.
- Emergency preparedness and security.
- Pricing of transportation services.
- Customer information services.
- ITS applications for transit.
- Traveler information systems.
- Freight management and commercial vehicle programs.

These TSM&O strategies and tools focus on optimizing the performance of the transportation system. It is essential to mention that TSM&O does not include traditional maintenance activities, such as lawn cutting, pothole repair, or resurfacing.

What role do MPOs have in enhancing transportation system management and operations?

MPOs can enhance TSM&O in the following ways:

- Identify strategies and benefits
  When developing its transportation plan, an MPO should consider using TSM&O strategies as one method for improving mobility. Programs and projects that incorporate TSM&O strategies should then be given higher priority in the TIP. In TMAs, MPOs should consider including TSM&O strategies in their CMPs.

- Coordinate with all agencies involved
  Numerous agencies are responsible for managing and operating the transportation system in a typical metropolitan area. An MPO can provide regional leadership by facilitating collaboration and coordination among these agencies to improve safety, reliability, and performance of the strategies and services that are developed and delivered. The MPO establishes and sustains a decisionmaking framework by bringing parties together, helping to determine how TSM&O decisions will be made in an area, and by asking for input on TSM&O issues as part of the planning process. An engaged MPO helps agencies develop and coordinate TSM&O strategies, which will make for a better regional approach to planning and programming projects. For example,

many MPOs provide leadership by coordinating regional operations groups or committees made up of State and local agencies in the metro area.

- Advance TSM&O with a planning for operations approach
  MPOs need to establish a joint effort between planners and operators to integrate TSM&O strategies into the planning process. This effort uses an objectives-driven, performance-based approach toward multi-modal, cross-jurisdictional services and projects. This approach emphasizes desired system performance outcomes, rather than simply responding to problems with specific projects, and it includes the following elements:

  - Development and use of operations objectives, which are specific, measurable statements that are included in the MTP.
  - Performance measures and data to analyze the effectiveness of M&O strategies and track progress toward meeting operations objectives.
  - Selection and funding of M&O strategies.
  - Interagency collaboration.

- Develop performance measures
  MPOs should develop system performance measures that account for operations objectives and other regionally agreed upon outcomes and expectations for the management and operation of the transportation system. Performance measures can be used to evaluate the success of projects, communicate with the public about current, past and future conditions, and help decide how investment decisions are made and how funds can be effectively spent. Through this process, MPOs can then work with their partners to improve the system through future plan development and project prioritization for TIPs.

What role do State DOTs have in transportation systems management and operation?

State DOTs are responsible for operations and systems management of significant portions of the transportation network, and they have a major role integrating TSM&O strategies into the transportation planning process. State DOTs also support coordination between operations and planning functions inside and outside metropolitan areas.

Additional information

For the FHWA and FTA Planning for Transportation Systems Management and Operation website, see http://plan4operations.dot.gov/reg_trans_sys.htm.

For the FHWA's Office of Operations website and information on emergency management, travel management, transportation operations, freight management, and ITS, see www.ops.fhwa.dot.gov.

For the U.S. Department of Transportation's official ITS site, see www.its.dot.gov.

For FHWA Congestion & Transportation Demand Management Resources, see planning.dot.gov/focus_congestion.asp.

For FHWA's *Advancing Metropolitan Planning for Operations: An Objectives-Driven, Performance-Based Approach*, see www.ops.fhwa.dot.gov/publications/fhwahop10026/index.htm.

For *Creating an Effective Program to Advance Transportation System Management and Operations*, see www.ops.fhwa.dot.gov/publications/fhwahop12003/index.htm.

For *The Role of Transportation Management Systems Operations in Supporting Livability & Sustainability*, see ops.fhwa.dot.gov/publications/fhwahop12004/index.htm.

For the Institute of Transportation Engineers' *A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility*, see www.fhwa.dot.gov/publications/research/operations/its/98436.

For *Managing Our Congested Streets and Highways*, see ntl.bts.gov/lib/jpodocs/repts_te/13443.html.

Other Policy and Planning Considerations

Climate Change

The effects of climate change are complex. There is no one-size-fits-all approach to addressing climate change. FHWA recognizes the nuances of climate change and supports transportation and climate change research and disseminates the results. FHWA also offers technical assistance to stakeholders and coordinates activities within USDOT and with other Federal agencies in the following areas:

- Mitigation
  Strategies to reduce transportation greenhouse gas (GHG) emissions are organized into four major groups. System and operational efficiencies can be improved by optimizing the design, construction, operation, and use of transportation networks. Travel activity can be curtailed by reducing growth in vehicle-miles traveled. Low-carbon fuels can be introduced by developing alternative fuels that have lower carbon content and generate fewer transportation GHG emissions. Fuel efficiency can be increased by advancing and bringing to market advanced engine and transmission designs, lighter-weight materials, improved aerodynamics, and reduced rolling resistance.

- Adaptation
  Climate change adaptation refers to planning, designing, constructing, operating, or maintaining transportation infrastructure while incorporating climate change concerns. Current efforts to reduce greenhouse gas (GHG) emissions in the atmosphere, while important for reducing the long-term effects of global climate change (GCC), will likely have little effect on GCC over the next twenty or thirty years. Policymakers, transportation planners, and system managers must proactively and cooperatively adapt to GCC in order to continue to deliver safe, reliable, effective, and sustainable transportation systems.

- Sustainability
  Sustainable transportation systems should satisfy the functional requirements of societal development and economic growth while striving to enhance the natural environment and reduce consumption of natural resources. The economic goals that transportation policies and projects support are determined by local priorities. Priorities are specific to the sustainability needs identified by local decisionmakers. Needs may include job creation, business creation, increases in gross domestic or regional product, and increases in property values and tax bases.

- Energy
  There are significant economic, national security, and environmental costs of the fuel our transportation system uses. Most US transportation sector carbon dioxide emissions—98 percent—come from petroleum fuels, and motor gasoline is responsible for about 60 percent of carbon dioxide emissions over the last twenty years. Reducing the use of single-occupant vehicles through increased reliance upon public transportation, ride-sharing, and nonmotorized

alternatives is an important way to reduce energy consumption. Also, advances have been made recently to improve the overall efficiency of motor vehicle operation, particularly through increased fuel economy. The traveling public and providers of public transit transportation are increasingly investing in alternative fuels, plug-in hybrid and other electric vehicle technologies. Increasing use of these fuels and technologies will yield numerous benefits, including reducing our reliance on foreign sources of oil, lowering localized and regional on-road emissions, and reducing energy consumption for the transportation sector. States and localities in the U.S. are beginning to build the necessary infrastructure to support these fuels and vehicle technologies.

Additional information

For more on economic and societal sustainability, see www.fhwa.dot.gov/planning/economic_development.

For more on FHWA's Sustainable Highways Initiative, see www.sustainablehighways.dot.gov.

For FHWA's Sustainable Highways Self-Evaluation Tool, see www.sustainablehighways.dot.gov.

For FTA's Climate Change Adaptation Initiative, see www.fta.dot.gov/12347_14013.html.

Freight Movement

What role does freight movement have in transportation systems?

Industry, retail, agriculture, international trade, and terminal operators rely on freight that moves efficiently within and through a region. Metropolitan areas and ports in particular, with their air cargo airports, intermodal freight yards, large trucking terminals, and shipyards, are affected by freight movement issues.

Examples of intermodal freight projects include bridge replacements, road widening, port and rail access improvements, terminal facility enhancements, grade separations for highway and rail, and connections to air cargo and new infrastructure.

What roles do MPOs and State DOTs have in freight transportation planning?

State DOTs and MPOs are responsible for making sure that freight movement is considered in the transportation planning process. Federal legislation calls for the metropolitan and Statewide and nonmetropolitan planning processes to provide reasonable opportunity for the public and interested parties, including, specifically, "freight shippers," and "providers of freight transportation services," to participate in developing plans and programs.

The following examples explain how State DOTs and MPOs have systematically incorporated freight movement issues into their planning activities:

- Defining elements of a metropolitan area's transportation system that are critical for the efficient movement of freight.
- Identifying ways to measure system performance in terms of freight movement.
- Developing freight-oriented data collection and modeling to identify problems and potential solution.

- Creating freight movement advisory committees to identify important bottlenecks in the freight network.

Recent Federal law encourages States to establish freight advisory committees composed of a broad contingent of public and private sector freight stakeholders. States are also encouraged to develop comprehensive plans to accommodate their immediate and long-range freight-related planning and investment needs.

As part of the planning process, States must set performance targets related to freight transport measures set by USDOT, and integrate those targets in their planning processes. States must also report periodically on their progress in meeting the targets and on how they are addressing congestion at freight bottlenecks.

Similarly, MPOs must set performance targets related to freight measures set by USDOT, integrate those targets into their planning processes, and report periodically on their progress in meeting their targets.

What funding is available for freight planning and project implementation?

State DOTs and MPOs can use planning funds for freight planning, and can dedicate funds for specific projects. Specific freight projects must meet eligibility requirements for the specific funding source used. Agencies can include projects that improve access to terminals or ports in their Federally funded transportation improvement programs.

Please see the Congestion Mitigation and Air Quality Improvement (CMAQ) program guidance for more information on the types of freight projects that can be funded under the CMAQ program to aid in pollutant emissions reductions.

What are some freight-transport tactics that transportation decisionmakers might consider?

- Truck restrictions, such as peak period bans, route diversions, noise ordinances, and hazardous materials route restrictions.
- Road design and construction changes, such as improved entry and exit ramps and merges, and capacity or safety improvements.
- Road pricing changes, such as peak period permits, freeway permits, and peak period tolls.
- Fleet management changes , such as automatic vehicle location and routing, voluntary off-peak operations, and driver training and management.
- Traffic engineering improvements, such as lane design restrictions, wider lanes, variable message signs, and speed restrictions.
- Shipper and receiver actions, such as voluntary and mandatory off-peak operations.
- Incident management changes, such as automated detection and site surveillance and communications.
- Inspection and enforcement changes, such as automated surveillance and urban truck inspections and enforcement.
- Information management improvements, such as highway advisory radio, and traffic information.

Additional information

For FHWA's guide to freight planning, including guidelines, case studies, and other information, see www.fhwa.dot.gov/planning/freight_planning.

For FHWA's guide to financing freight transportation improvements, see www.ops.fhwa.dot.gov/freight/pol_plng_finance/financing/index.htm.

For the FHWA Offices of Planning and Freight Management and Operations' *Talking Freight* seminars, see www.ops.fhwa.dot.gov/freight/fpd/talking_freight/index.htm. *Talking Freight* seminars are part of FHWA's Freight Professional Development Program, which aims to provide technical assistance, training, tools, and information to help the freight and planning workforce meet the transportation challenges of tomorrow. Seminars are held monthly via web conference and are open at no cost to all interested parties, public and private.

Land Use and Transportation

What is the relationship between land use and transportation?

Transportation moves people and goods from one place to another, but transportation systems also affect community character, the natural and human environment, and economic development patterns. A transportation system can improve the economy, shape development patterns, and influence quality of life and the natural environment.

Land use and transportation are symbiotic. Development density, land use characteristics, and location all influence regional travel patterns, as well as the ability of the public to access opportunities through a range of transportation alternatives, including nonmotorized travel. In turn, the degree of access provided by the transportation system to various land uses will influence current and evolving land use and development trends. On a more local level, community and site design can facilitate travel by multiple travel modes, including transit and nonmotorized travel. For example, a connected system of streets with higher residential densities and a mix of land uses can allow and encourage travel by foot, bicycle, and public transportation, as well as by automobile.

What is the role of the State DOT and the MPO in land use and transportation?

Metropolitan, Statewide, and nonmetropolitan transportation planning processes promote compatibility between transportation improvements and growth and economic development plans.

The State DOT and MPO role and level of involvement in land use decisionmaking varies by State and local legislation and policies. No matter where they are, State DOTs and MPOs promote consistency between transportation improvements, planned growth, and economic development patterns.

What are the requirements for considering land use and economic development in the transportation planning process?

When updating transportation plans, responsible agencies must review long-range Statewide transportation plans and MTPs for validity and consistency with current and forecasted demographic, transportation, and land use conditions and trends. The plan updates need to be based on the latest available projections and assumptions for a variety of data, including population, land use and development, travel, employment, congestion, and economic activity. It is essential that agencies promote the highest level of consistency between land use, transportation, and other planning activities, using a robust public involvement process that includes public workshops and open houses, draft documents that are readily available for review and comment, specific outreach strategies for key stakeholders and communities, and social media.

Activities intended to stimulate economic development can affect the transportation network, and the transportation network can affect economic development opportunities. Transportation decisionmakers can support economic vitality by appropriately planning for and accommodating the many different demands on the transportation system.

Decisionmakers should evaluate proposed investments for economic development and future transportation needs by asking the following questions:

- How can the transportation system accommodate increased population and economic growth that may be brought on by proposed developments?
- How can transportation investments support economic growth while balancing other transportation and community priorities?
- Can land development and transportation investment programs be better coordinated to mitigate or prevent congestion?

How do Federal transportation planning programs and initiatives recognize the links between transportation and land use?

Federal programs are designed with an understanding that transportation decisionmaking affects existing and planned land use development and that the reverse is also true. For example, transportation planning processes must consider bicyclists and pedestrians, but nonmotorized travel modes are typically accommodated more successfully in higher density, mixed use communities. Similarly, carefully considered development allows planners to provide safer, more convenient, and more attractive travel experiences for a broader range of modes. Communities that lack areas of integrated and well-connected land use patterns can retrofit existing development or use new transportation investments, such as improved transit services or enhanced pedestrian amenities, to encourage connections between land uses. Examples of areas and efforts that are integrated and well-connected include town or community centers, walkable neighborhoods, and public facilities—such as libraries, businesses, hospitals, and banks—that are clustered.

Other initiatives that consider the relationship between land and transportation include the following:

- Livability
  Communities benefit when decisions about transportation and land use are made at the same time. Deciding to build houses, schools, grocery stores, employment centers, and transit stations close to one another, while providing a well-connected, multimodal street network provides more transportation choices and convenient access to daily activities, often at a lower cost to the traveler. Livability is also about using the quality, location, and type of transportation facilities and services available to help achieve broader community goals such as access to employment, housing, and schools.
- Health
  Communities that facilitate safe and easy travel for pedestrians, bicyclists, and transit riders can generate a number of health benefits, including reduced obesity, asthma, type 2 diabetes, heart disease, and cancer. In addition to transportation facilities, land use development patterns and site designs that facilitate the use of walking, bicycling, and transit are key to promoting active transportation and its beneficial outcomes.
- Sustainability
  Environmental quality is affected by how we plan communities and how we travel within them. Providing more travel options in more compact, connected communities leads to fewer car trips. In turn, this reduces automobile emissions, lessens the demand for energy resources, and improves air and water quality. Developing land more efficiently and reusing existing properties can preserve rural lands and protect natural resources.

What are some examples of innovative approaches for better integrating land use and transportation?

New approaches in planning are emerging as agencies are increasingly recognizing that it is important it integrate land use and transportation. Scenario planning is an approach that has been used by many planning agencies to better consider the interaction between transportation, land use, the environment, economic development and other issues in a single planning process (see *Scenario Planning*). Context-sensitive solutions and Transit-Oriented Development are two commonly used integrated planning processes.

What is a context-sensitive solution?

A context-sensitive solution (CSS) is a collaborative, interdisciplinary approach to transportation planning that accounts for a transportation facility's physical setting and preserves or enhances valued scenic, aesthetic, historic, cultural, environmental, and other resources while maintaining or improving safety and mobility for users. A CSS approach considers the entire context within which a proposed transportation project will be implemented.

CSS requires planners to think beyond the right of way or physical borders of a transportation project or corridor. Proposed projects are developed and designed appropriately for the conditions of the immediate environment while meeting the community's transportation needs. This approach is intended to create a project that is acceptable to a variety of interested parties, in recognition of their needs, perspectives, and setting.

What is Transit-Oriented Development and Joint Development?

Transit-Oriented Development (TOD) is compact, mixed-use development that encourages the public to use transit by linking pedestrian pathways to transit centers, stations, and stops. Typically, agencies use TOD to leverage transit infrastructure to promote economic development and other neighborhood and community goals. By enhancing the attractiveness and serviceability of transportation alternatives, TOD can lead to more transit ridership and less traffic congestion while creating a sense of community and place.

Joint development refers to a public transportation project that integrally relates to, and is often co-located with commercial, residential, mixed-use, or other non-transit development. Joint development may include partnerships for public or private development- associated with any mode of transit system that is being improved through new construction, renovation, or extension. Joint development may also include intermodal facilities, intercity bus and rail facilities, transit malls, or historic transportation facilities

To be eligible for Federal funding, joint development projects must create economic and public transportation benefits, with commercial ventures dedicating a fair share of revenue to support public transportation. The joint development must be physically or functionally related to a transit project and must ensure that occupants of space built with Federal funds pay a fair share of the cost.

The capital project and development aspects of TOD and joint development projects may be planned, designed and implemented by partnerships among local government, transit operators, MPOs and States. Because MPOs do not have land use or capital program authority they are usually involved in planning and facilitating the formation and operation of public, private, and intergovernmental partnerships.

What is an MPO's role in Transit-Oriented Development and Joint Development?

An MPO must approve all joint development and transit-oriented development projects that use Federal funds, and include those projects in MTPs, TIPs, and STIPs. Beyond including TOD and joint development capital projects in plans and TIPs, MPOs do much work during the planning process, including the following:

- Fostering understanding and support for TOD and joint development programs by conducting planning studies and performing outreach programmed in the UPWP.
- Facilitating community dialogue on the benefits of TOD and on strategies for implementing TOD studies and joint development market opportunities across the region.
- Preparing a TOD Strategic Plan for the region.
- Playing lead roles in developing and promoting land use policies that support TOD through various means, including criteria used to set investment priorities.
- Assembling and disseminating information on potential TOD and other land use practices to stakeholder communities in the public and private sector.
- Providing on-staff experts on TOD to provide assistance to local member governments on the relationship between land use and transportation, and including TOD efforts in their UPWPs.

Additional information

For FTA's full range of information on Transit-Oriented Development and joint development, including research and training resources, see www.fta.dot.gov/12347_6932.html.

For FHWA's overview of coordinating land use and transportation, see www.fhwa.dot.gov/planning/processes/land_use.

Planning and Environment Linkages

Sustainability and transportation

Sustainability means accommodating the needs of the present without compromising the ability of future generations to meet their needs. As applied to the transportation sector, planning for sustainability can incorporate a variety of strategies to conserve natural resources, encourage modes other than single-occupant vehicles, and promote travel reduction strategies.

Past trends in transportation have contributed to unsustainable conditions, including greenhouse gas emissions, energy insecurity, congestion, and ecological impacts, and development patterns that public services and infrastructure cannot effectively support. Transportation officials and stakeholders are now recognizing that their decisions have long-term implications and impacts, and are working on how to prepare metropolitan and Statewide transportation plans and programs accordingly. Attaining a sustainable transportation system requires ongoing attention and action by the public sector, private companies, and individual citizens.

Why link transportation planning to environmental processes?

There are significant public benefits when State and local agencies incorporate environmental and community values into transportation decisions early in the planning process, and carry those considerations through to project development and delivery. Benefits to the riding public include the following:

- Relationship building
  Transportation planning agencies can establish positive working relationships with resource agencies and the public by enhancing inter-agency participation, coordination efforts, and procedures. Better relationships can go a long way

toward reaching local consensus on decisions. To foster relationship building, State DOTs and MPOs consult with State and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation. State DOTs must also consult with tribal agencies.

- Identifying areas with environmental issues
  Decisionmakers can fully evaluate costs and impacts by considering environmental issues early in the planning process. By identifying environmental concerns early, agencies can save time and costs associated with having to avoid, minimize, or mitigate the effects of a project. Federal law mandates that long-range transportation plans include a discussion of types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the plan. The resulting discussions are developed in consultation with Federal, State, and tribal wildlife, land management, and regulatory agencies
- Process efficiencies
  Good inter-agency relationships may help resolve differences on key issues as transportation programs and projects advance from planning to design and implementation. Conducting some analysis at the planning stage can help agencies avoid duplicate work, reduce cost and time requirements, and move projects through the project development process with fewer issues.
- On-the-ground outcomes
  Agencies can better conceive transportation programs and projects that effectively serve their community's needs when they begin planning equipped with information about resource considerations and when they coordinate with resource agencies and the public. Achieving on-the-ground outcomes that fit community needs can reduce negative impacts and lead to more effective environmental stewardship.

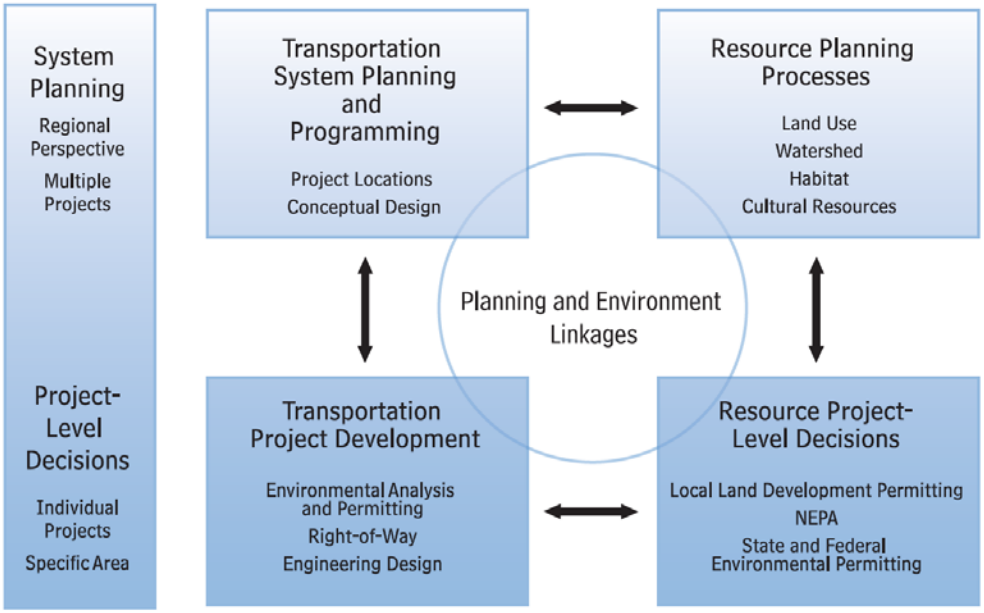


Figure 8. The relationship between transportation planning and environmental planning, and between systems planning and project-level decisions.

How is the National Environmental Policy Act related to the transportation planning process?

NEPA established a national policy to promote the environmental protection in the actions and programs of Federal agencies. FHWA and FTA act as lead Federal agencies and are responsible for implementing the NEPA process and working with State and local project sponsors during transportation project development.

FHWA and FTA apply the NEPA process to transportation decisionmaking by assisting transportation officials in making project decisions that balance engineering and transportation needs with social, economic, and environmental factors. This process relies heavily on input from the public, interest groups, resource agencies and local governments. FHWA and FTA apply the NEPA process as an umbrella for compliance, with more than 40 environmental laws, regulations, and executive orders that provide an integrated approach to addressing impacts that transportation projects produce on the human and natural environment.

A coordinated approach between planning and project development can lead to transportation investments that reflect community needs, were developed from an active public involvement process, and are sensitive to the environment. The first stages of the NEPA process—development of project purpose and need—should build upon the transportation needs identified during planning. These needs will inform the final selection of an alternative for design and construction.

Another direct link between NEPA and transportation planning is the requirement that a project must be included in a conforming plan and TIP before it can advance, because major changes late in the planning process can trigger conformity and other planning reassessments that can lead to delays. Data collection related to environmental features, analyses of projected transportation system usage, and attendant impacts on environmental quality can provide important information as agencies commence the NEPA process.

How are transportation planning studies integrated into NEPA analyses?

Federal law and supporting guidance describe approaches for integrating transportation planning and NEPA processes. FHWA and FTA must be able to stand behind the overall soundness and credibility of analyses, outreach, consultations, and the decisions made during the transportation planning process, if those decisions are incorporated into a NEPA document either directly or by reference. Transportation planning processes and their products are greatly improved when implemented through a comprehensive, cooperative, and continuous approach—the 3-C planning principles. Transportation study results should be:

- Based on transportation planning factors established by Federal law.
- Reflective of a credible and clearly articulated planning rationale.
- Founded in reliable data.
- Reflective of dialogue and consultation with the public, stakeholders, and Federal and State environmental resource agencies.
- Developed through planning processes that meet Federal requirements.

A robust scoping and early coordination process is critical to FHWA and FTA reaching informed transportation decisions on the suitability of transportation planning information, analyses, documents, and decisions for use in the NEPA process. Early coordination provides Federal and State environmental, regulatory, and resource agencies, and the public, with information that explains the analyses used to develop the planning products. Planning analyses need to be current and should adequately support improvements in Statewide and metropolitan long-range plans. Results from planning processes must be documented in a form that can be appended to the NEPA document or incorporated by reference to materials that are readily available. This same rationale should provide a clear connection between the decisions made in planning and project development, since those decisions must be explained to the public and other participants involved in scoping. Planning studies should include broad

multidisciplinary consideration of systems-level or corridor-wide transportation needs and potential effects, including effects on the human and natural environment.

The Federal lead agency can determine the appropriate geographic scale for effectively addressing potential effects of a transportation improvement. Programmatic mitigation plans address potential impacts of projects at a larger geographic scale than the project study area.

What NEPA documentation is required?

NEPA documentation discloses benefits and impacts of transportation projects on the human and natural environments, gathers input from the public and other stakeholders, and provides information for decisionmakers.

Transportation projects have different degrees of complexity and effects on the environment. Under NEPA, the environmental document that is required depends on the degree of impact of a project. FHWA and FTA, in coordination with project sponsors, prepare one or more of the following documents for a proposed project:

- Categorical Exclusion documents apply to projects that do not have a significant impact on the human and natural environment.
- An Environmental Assessment (EA) is prepared for projects where it is unclear whether there will be significant environmental impacts. If the analysis in the EA indicates the proposed project will have significant environmental impacts, then an Environmental Impact Statement (EIS) is prepared.
- A Finding of No Significant Impact is a separate decision document prepared when there are no significant impacts.
- A Notice of Intent is a notice that an Environmental Impact Statement will be prepared and considered.
- Environmental Impact Statement documents are prepared for projects that have a significant impact on the human and natural environment. Draft EIS and Final EIS documents include a description of the proposed project, the existing environment, and analysis of the beneficial and adverse impacts of all reasonable alternatives.
- A Record of Decision presents the selected transportation decision analyzed in an EIS, the basis for that decision, and the environmental commitments, if any, to mitigate for project impacts on the human and natural environment.

Regardless of the type of NEPA document prepared, final selection or approval of a proposed project alternative by FHWA and FTA makes the project eligible for Federal funding of project activities, such as final design, right-of-way acquisition, and construction.

Additional information

For more information on linking planning and environmental concerns, see www.environment.fhwa.dot.gov/integ/index.asp.

For links to laws, regulations, and guidance that affect environmental analysis and the public transportation review process, see www.fta.dot.gov/about_FTA_5222.html.

For information onpi shortening project delivery related to NEPA requirements, see *Guidance on Using Corridor and Subarea Planning to Inform NEPA*: environment.fhwa.dot.gov/integ/corridor_nepa_guidance.asp.

To contribute thoughts and ideas in an open forum on NEPA and related topics, see collaboration.fhwa.dot.gov/dot/fhwa/ReNepa/default.aspx.

Scenario Planning

What is scenario planning?

Scenario planning provides a framework for examining how alternative policies, plans, and programs will affect a community or region. The objective of scenario planning is to provide information to decisionmakers on the implications of proposed options as they develop transportation plans. This approach can provide insight to decisionmakers on how preferred plan scenarios could improve the condition and performance of the transportation system and how changes in local policies and investments could affect the costs of reaching performance targets.

MAP-21 includes an optional provision for MPOs to develop multiple scenarios and analyze how the preferred scenario may improve the condition and performance of the transportation system. MPOs may consider scenarios that track with strategic policy options such as regional investment strategies, future distribution of housing, population and employment, strategies for maintaining baseline performance conditions, strategies for improving baseline performance conditions for as many of the performance measures as possible, revenue-constrained scenarios, and the estimated costs and potential revenues available to support each scenario.

Instead of concentrating on one aspect of planning, scenario planning considers several impacts of planning decisions on land use, transportation systems, and environmental quality as well as the interconnections between them. Scenario planning is then used to compare different perspectives and evaluate overall system performance.

Additional information

For FHWA's Scenario Planning website, see www.fhwa.dot.gov/planning/scenario_and_visualization/scenario_planning.

For the FHWA-FTA TPCB Scenario Planning Program website, see www.planning.dot.gov/scenario.asp.

Travel Model Improvement Program

The Travel Model Improvement Program (TMIP) has conducted research, provided technical assistance, and delivered training to local, regional and State transportation planning professionals since 1994. Much has changed over this period, with shifts in transport policy, advances in modeling theories, and progressions in practical lessons. Throughout, TMIP has worked to advance modeling capabilities and support transportation professionals as they respond to current and future challenges. Today, TMIP continues its mission of improving analysis practices to ensure that transportation professionals are well-equipped to inform and support strategic transportation decisions.

TMIP supports effective use of analytic methods and tools in transportation decisionmaking by getting research into practice and supporting innovation and planning analysis improvements. The ultimate goal is to help transportation planning agencies provide better information in supporting transportation planning decisions. To this end, TMIP provides a variety of services and products to academics and professionals in the fields of analysis, modeling and simulation. For more information, please visit www.fhwa.dot.gov/planning/tmip.

Additional information

For the National Highway Institute's *Introduction to Urban Travel Demand Forecasting*, see www.nhi.fhwa.dot.gov/training/course_search.aspx?tab=0&key=152054152054&course_no=152054&res=1.

For *Modelling Transport, 4th Edition*, see www.wiley.com/WileyCDA/WileyTitle/productCd-0470760397.html.

For *Multimodal Corridor and Capacity Analysis Manual: National Cooperative Highway Research Program Report 399*, see onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_399.pdf.

For *Effective Visualization Techniques for The Public Presentation of Transportation Projects*, see www.netc.uconn.edu/pdf/netcr48_00-6.pdf.

For more on TRB's work on visualization in transportation, see www.trbvis.org.

For AASHTO's *Visualization in Transportation: A Guide for Transportation Agencies*, see design.transportation.org/Documents/VisualizationGuideJuly2003.pdf.

For TRB's Visualization Symposium Proceedings, see www.teachamerica.com/viz/viz2006.html.

For NCHRP's Visualization in Project Development see onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_361.pdf.

For FHWA's Office of Planning, Environment, and Realty Executive Geographic Information System, see hepgis.fhwa.dot.gov.

For FHWA's *Showcasing Visualization Tools in Congestion Management*, see www.fhwa.dot.gov/planning/congestion_management_process/cmp_visualization_tools.

For FHWA's Scenario Planning website and Scenario Planning guidebook, see www.fhwa.dot.gov/planning/scenario_and_visualization/scenario_planning.

APPENDIX

Recent Highway Reauthorizations	
Date signed into law	*Title of Bill*
1991	The Intermodal Surface Transportation Efficiency Act (ISTEA)
1995	National Highway System Designation Act
1998	The Transportation Equity Act for the 21st Century (TEA-21)
2005	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)
2012	Moving Ahead for Progress in the 21st Century Act (MAP-21)

Acronyms

3-C	Continuing, Cooperative and Comprehensive Planning Process	EA	Environmental Assessment
AASHTO	American Association of State Highway and Transportation Officials	EIS	Environmental Impact Statement
BTS	Bureau of Transportation Statistics	EJ	Environmental Justice
CAAA	Clean Air Act as amended in 1990	EPA	Environmental Protection Agency
CE	Categorical Exclusions	FAA	Federal Aviation Administration
CMAQ	Congestion Mitigation and Air Quality Improvement Program	FEIS	Final Environmental Impact Statement
CMP	Congestion Management Process	FHWA	Federal Highway Administration
CO	Carbon Monoxide	FONSI	Finding of No Significant Impact
COG	Council of Governments	FTA	Federal Transit Administration
DEIS	Draft Environmental Impact Statement	FY	Fiscal Year
DOT	Department of Transportation	HC	Hydrocarbons

HOV	High-Occupancy Vehicle
I/M	Inspection and Maintenance
IHS	Interstate Highway System
IM	Interstate Maintenance
ISTEA	Intermodal Surface Transportation Efficiency Act
ITS	Intelligent Transportation Systems
LRSTP	Long-Range Statewide Transportation Plan
LRTP	Long-Range Transportation Plan
M&O	Management and Operations
MAP-21	Moving Ahead for Progress in the 21st Century Act
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NADO	National Association of Development Organizations
NHS	National Highway System
NOx	Nitrogen Oxide
PBPP	Performance-based Planning and Programming
PL	FHWA Planning Funds
PM	Particulate Matter
PPP	Public Participation Plan
PPM	Parts Per Million
ROD	Record of Decision
RPO	Regional Planning Organization
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SDOT	State DOT
SIB	State Infrastructure Bank
SIP	State Implementation Plan
SOV	Single-Occupancy Vehicle
SPR	State Planning and Research Funds
STIP	Statewide Transportation Improvement Program

NEPA	National Environmental Policy Act of 1969	STP	Surface Transportation Program
TCM	Transportation Control Measure	TOD	Transit-Oriented Development
TDM	Transportation Demand Management	TRB	Transportation Research Board
TEA-21	Transportation Equity Act for the 21st Century	TSM&O	Transportation Systems Management & Operations
TIFIA	Transportation Infrastructure Finance and Innovation Act of 1998	UA	Urbanized Area
TIP	Transportation Improvement Program	UPWP	Unified Planning Work Program
TMA	Transportation Management Area	VOC	Volatile Organic Compound
TMIP	Travel Model Improvement Program		

Glossary

A

Administrative Modification
A revision to a long-range Statewide transportation or MTP, TIP, or STIP that includes minor changes to project/project phase costs, minor changes to funding sources of previously included projects, and minor changes to project/project phase initiation dates. An administrative modification is a revision that does not require public review and comment, demonstration of fiscal constraint, or a conformity determination (in nonattainment and maintenance areas).

Amendment
A revision to a long-range plan, Statewide plan, MTP, TIP, or STIP, that involves major changes to a project, including the addition or deletion of a project feature or a major change in project cost, project/project phase initiation dates, or a major change in design concept or design scope (for example, changing project termini or the number of through traffic lanes). Changes to projects that are included only for illustrative purposes do not require an amendment. An amendment requires public review and comment, demonstration of fiscal constraint, or a conformity determination (for MTPs and TIPs involving "non-exempt" projects in nonattainment and maintenance areas). In the context of a long-range Statewide transportation plan, an amendment is a revision approved by the State in accordance with its public involvement process.

Area Sources
Small stationary and non-transportation pollution sources that are too small and/or numerous to be included as point sources but may collectively contribute significantly to air pollution (for example, dry cleaning services).

Attainment Area
Any geographic area in which levels of a given criteria air pollutant (for example, ozone, carbon monoxide, PM10, PM2.5, and nitrogen oxide) meet the health-based National Ambient Air Quality Standards for that pollutant. An area may be an attainment area for one pollutant and a nonattainment area for others. A maintenance area (see definition below) is not considered an attainment area for transportation planning purposes.

C

Capacity
A transportation facility's ability to accommodate a moving stream of people or vehicles in a given time period.

Capital Program Funds
Financial assistance from the major transit capital programs of 49 U.S.C. Section 5309. This program enables the Secretary of Transportation to make discretionary capital grants and loans to finance public transportation projects divided among fixed guideway (rail) modernization, construction of new fixed guideway systems and extensions to fixed guideway systems, and replacement, rehabilitation, and purchase of buses and rented equipment, as well as construction of bus-related facilities.

Carbon Monoxide
A colorless, odorless, tasteless gas formed in large part by incomplete combustion of fuel.

Clean Air Act
The original *Clean Air Act* was passed in 1963, but the national air pollution control program is actually based on the 1970 revision of the law. The *Clean Air Act* as amended in 1990 made major changes and contains the most far-reaching revisions of the 1970 law.

Conformity (Air Quality)
A CAA (42 U.S.C. 7506[c]) requirement that ensures that Federal funding and approval are given to metropolitan transportation plans, metropolitan transportation improvement programs and FHWA/FTA projects in nonattainment and maintenance areas for the transportation-related pollutants that are consistent with the air quality goals established by a State Implementation Plan (SIP). Conformity, in the context of the SIP, refers to transportation activities that will not cause new air quality violations, worsen existing violations, or delay timely attainment of the National Ambient Air Quality Standards or any interim milestone. The transportation conformity rule (40 CRF part 93) sets forth policy, criteria, and procedures for demonstrating and assuring conformity of transportation activities.

Congestion Management Process
A systematic approach required in transportation management areas that provides for effective management and operation, based on a cooperatively developed and implemented metropolitan-wide strategy of new and existing transportation facilities eligible for funding under title 23 U.S.C. and title 49 U.S.C. through the use of operational management strategies. Provides information on transportation system performance and finds alternative ways to alleviate congestion and enhance the mobility of people and goods, to levels that meet State and local needs.

Congestion Mitigation and Air Quality Improvement Program
A Federal-aid funding program created under ISTEA. Directs funding to projects that contribute to meeting national air quality standards. CMAQ funds generally may not be used for projects that result in the construction of new capacity available to single-occupancy vehicles.

Coordinated Public Transit-Human Services Transportation Plan (Coordinated Plan)
A comprehensive listing of public transportation services supported by FTA's 5310 formula grant program for the enhanced mobility of seniors and individuals with disabilities, as well as by other Federal departments and agencies, including any transportation activities carried out by a recipient of a grant from the Department of Health and Human Services. The Coordinated Plan is developed and approved through a process that includes participation by seniors, individuals with disabilities, representatives of public, private, and nonprofit transportation and human services providers, and other members of the public.

D

Department of Transportation
When used alone, indicates the U.S. Department of Transportation. In conjunction with a place name, indicates State, city, or county transportation agency (for example, Illinois DOT, Los Angeles DOT).

E

Environmental Justice
Environmental justice assures that services and benefits allow for meaningful participation and are fairly distributed to avoid discrimination. (See also *Title VI*)

Environmental Mitigation Activities
Strategies, policies, programs, actions, and activities that, over time, will help avoid, minimize, or compensate—by replacing or providing substitute resources—for the impacts to the human and natural environments associated with a long-range Statewide transportation plan or MTP. The human and natural environment includes, for example, neighborhoods and communities, homes and businesses, cultural resources, parks and recreation areas, wetlands and water sources, forested and other natural areas, agricultural areas, endangered and threatened species, and the ambient air. Environmental mitigation activities are intended to be regional in scope, and may not necessarily address potential project-level impacts.

Environmental Protection Agency
The Federal regulatory agency responsible for administering and enforcing Federal environmental laws, including the *Clean Air Act*, the *Clean Water Act*, the *Endangered Species Act*, and others.

F

Federal Highway Administration
A branch of the U.S. Department of Transportation that administers the Federal-aid highway program, providing financial assistance to States to construct and improve highways, urban and rural roads, and bridges. The FHWA also administers the Federal Lands Highway Program, including survey, design, and construction of forest highway system roads, parkways and park roads, Indian reservation roads, defense access roads, and other Federal Lands roads.

Federal Transit Administration
A branch of the U.S. Department of Transportation that administers Federal funding to transportation authorities, local governments, and States to support a variety of locally planned, constructed, and operated public transportation systems,

including buses, subways, light rail, commuter rail, streetcars, monorail, passenger ferry boats, inclined railways, and people movers.

Financial Plan
Documentation that must be included in a Metropolitan Transportation Plan and Transportation Improvement Program (and is optional for the long-range Statewide transportation plan and Statewide Transportation Improvement Program) that demonstrates the consistency between reasonably available and projected sources of Federal, State, local, and private revenues and the costs of implementing proposed transportation system improvements.

Financial Programming
A short-term commitment of funds to specific projects identified in both the regional and the Statewide Transportation Improvement Program.

Fiscal Constraint
Making sure that a given program or project can reasonably expect to receive funding within the time allotted for its implementation. The Metropolitan Transportation Plan, Transportation Improvement Program, and the Statewide Transportation Improvement Program must include sufficient financial information for demonstrating that projects in those documents can be implemented using committed, available, or reasonably available revenue sources, with reasonable assurance that that the Federally supported transportation system is being adequately operated and maintained. For the Transportation Improvement Program and the Statewide Transportation Improvement Program, financial constraint/fiscal constraint applies to each program year. Additionally, projects in air quality nonattainment and maintenance areas can be included in the first two years of the Transportation Improvement Program and Statewide Transportation Improvement Program only if funds are available or committed.

Formula Capital Grants
Federal transit funds for transit operators, allocated by FTA, and used to purchase rolling stock, for example, buses and trains, as well as to design and construct facilities, for example, shelters and transfer centers.

G
Geographic Information System
Computerized data management system designed to capture, store, retrieve, analyze, and display geographically referenced information.

H
High-Occupancy Vehicle
Vehicles carrying two or more people. The number that constitutes an HOV for the purposes of HOV highway lanes may be designated differently by different transportation agencies.

I
Inspection and Maintenance Programs
State programs that require vehicles to be inspected and repaired to comply with specific Clean Air Act requirements.

Intelligent Transportation Systems
Electronics, photonics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system. The National ITS architecture is a blueprint for the coordinated development of ITS technologies in the U.S., providing a systems framework to guide the planning and deployment of ITS infrastructure.

Intermodal
The ability to connect, and connections between, differing modes of transportation.

Intermodal Surface Transportation Efficiency Act of 1991
Legislative initiative by the U.S. Congress that restructured and authorized Federal funding for transportation programs, provided for an increased role for regional planning commissions and MPOs in funding decisions, and required comprehensive regional and Statewide long-term transportation plans.

Interstate Highway System
The specially-designated system of highways, begun in 1956, which connects the principal metropolitan areas, cities, and industrial centers of the United States. Also connects the U.S. to internationally significant routes in Canada and Mexico.

L

Land Use
Refers to the manner in which portions of land or the structures on them are used or designated for use in a plan, for example commercial, residential, retail, or industrial.

Long-Range Statewide Transportation Plan
The official, Statewide, multimodal transportation plan covering no less than 20 years developed through the Statewide transportation planning processes.

Long-Range Transportation Plan
A document resulting from regional or Statewide collaboration and consensus on a region's or State's transportation system, and serving as the defining vision for the region's or State's transportation systems and services. In metropolitan areas, this is the official multi-modal transportation plan addressing no less than a 20-year planning horizon that is developed, adopted, and updated by the MPO through the metropolitan transportation planning process.

M

Maintenance Area
Any geographic region of the United States that the EPA previously designated as a nonattainment area for one or more pollutants pursuant to the CAA Amendments of 1990, and subsequently re-designated as an attainment area subject to the requirement to develop a maintenance plan under section 175A of the CAA, as amended.

MAP-21
Law signed on July 6, 2012 fund surface transportation programs at over $105 billion for fiscal years 2013 and 2014. MAP-21 creates a streamlined and performance-based surface transportation program and builds on the highway, transit, bike, and pedestrian programs and policies established in 1991.

Metropolitan Planning Area
The geographic area determined by agreement between the metropolitan planning organization (MPO) for the area and the Governor, in which the metropolitan transportation planning process if carried out.

Metropolitan Planning Organization
The policy board of an organization created and designed to carry out the metropolitan transportation planning process for urbanized areas with populations greater than 50,000, and designated by local officials and the Governor of the State.

Metropolitan Transportation Plan
The official multimodal transportation plan addressing no less than a 20-year planning horizon that is developed, adopted and updated by the MPO through the metropolitan transportation planning process.

Mode
A specific form of transportation, such as automobile, subway, bus, rail, air, bicycle, or foot.

Motor Vehicle Emissions Budget
That portion of the total allowable emissions defined in the submitted or approved control strategy implementation plan revision or maintenance plan for a certain date for the purpose of meeting reasonable further progress milestones or demonstrating attainment or maintenance of the NAAQS, for any criteria pollutant or its precursor, allocated to highway and transit vehicle use and emissions.

N

National Ambient Air Quality Standards
Federal standards that set allowable concentrations and exposure limits for various pollutants. The EPA established these standards pursuant to section 109 of the CAA. Air quality standards have been established for the following six criteria pollutants: ozone (or smog), carbon monoxide, particulate matter, nitrogen dioxide, lead, and sulfur dioxide.

National Environmental Policy Act of 1969
Requires that any project using Federal funding or requiring Federal approval, including transportation projects, examine the effects of proposed and alternative choices on the environment before a Federal decision is made.

Nonattainment Area
A geographic region of the United States that has been designated by EPA as a nonattainment area under section 107 of the CAA for any pollutants for which an NAAQS exists, meaning that Federal air quality standards are not being met.

O

Operational and Management Strategies
Actions and strategies aimed at improving the performance of existing and planned transportation facilities to relieve congestion and maximize the safety and mobility of people and goods.

Ozone
Ozone is a colorless gas with a sweet odor. It is a secondary pollutant formed when VOCs and NOx combine in the presence of sunlight. Ozone is associated with smog or haze conditions. Although the ozone in the upper atmosphere protects from harmful ultraviolet rays, ground-level ozone—resulting from human and natural sources—produces an unhealthy environment.

P

Particulate Matter (PM-10 and PM 2.5)
Particulate matter consists of airborne solid particles and liquid droplets. Particulate matter may be in the form of fly ash, soot, dust, fog, or fumes. These particles are classified as coarse if they are smaller than 10 microns, or fine if they are smaller than 2.5 microns. Coarse airborne particles are produced during grinding operations or from the physical disturbance of dust by natural air turbulence processes, such as wind. Fine particles can be a by-product of fossil fuel combustion, such as diesel and bus engines. Fine particles can easily reach remote lung areas, and their presence in the lungs is linked to serious respiratory ailments such as asthma, chronic bronchitis, and aggravated coughing. Exposure to these particles may aggravate other medical conditions such as heart disease and emphysema and may cause premature death. In the environment, particulate matter contributes to diminished visibility and particle deposition.

Performance Measures
Indicators of how well the transportation system is performing with regard to such measures as average speed, reliability of travel, and accident rates. Used as feedback in the decisionmaking process.

Planning Funds
Primary source of funding for metropolitan planning administered by the FHWA.

Public Participation / Public Involvement
The active and meaningful involvement of the public in the development of transportation plans and programs.

R

Regional Councils of Government
Regional councils of government are multipurpose, multijurisdictional, public organizations. Created by local governments to respond to Federal and State programs, regional councils bring together participants at multiple levels of government to foster regional cooperation, planning and service delivery. They may also be called planning commissions, development districts, or other names, and may or may not include the structure and functions of Metropolitan Planning Organizations.

Reformulated gasoline
Gasoline blended to burn more completely and evaporate less easily. Reformulated gasoline releases fewer volatile organic compounds into the air when it is burned, and ozone is reduced.

S

SAFETEA-LU
The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). SAFETEA-LU authorized the Federal surface transportation programs for highways, highway safety, and transit for the 5-year period 2005-2009

Scenario Planning
Scenario planning refers to a set of planning procedures that evaluates the effects of alternative policies, plans and/or programs on the future a community or region. Scenario planning should provide information to decisionmakers as they develop the transportation plan.

Sources (Pollution)
Refers here to the origin of air contaminants. Stationary sources include relatively large, fixed facilities such as power plants, chemical process industries, and petroleum refineries. Area sources are small, stationary, non-transportation sources that collectively contribute to air pollution, and include such sources as dry cleaners and bakeries, surface coating operations, home furnaces, and crop burning. On-road mobile sources include on-road vehicles such as cars, trucks, and buses; and off-road sources include trains, ships, airplanes, boats, lawnmowers, and construction equipment. Mobile source-related criteria pollutants are carbon monoxide, ozone, nitrogen dioxides, and particulate matter.

Stakeholders
Individuals and organizations involved in or affected by the transportation planning process. Stakeholders include Federal, State, and local officials, Metropolitan Planning Organizations, transit operators, freight companies, shippers, users of the transportation infrastructure, and the general public.

State Implementation Plan
The portion or portions of the implementation plan (as defined in section 302[q] of the CAA), or most recent revision thereof, which has been approved under section 110 of the CAA, or promulgated or approved under section 301(d) of the CAA and which implements the relevant requirements of the CAA.

The State Implementation Plan is produced by the State environmental agency.

State Infrastructure Bank
A revolving fund mechanism for financing a wide variety of highway and transit projects through loans and credit enhancement. SIBs are designed to complement traditional Federal-aid highway and transit grants by providing States increased flexibility for financing infrastructure investments.

State Planning and Research Funds
Primary source of funding for Statewide long-range planning, administered by the FHWA.

State Planning Work Program
The SPR Work Program is a State DOT's work program that describes what Statewide planning and research work activities the State will perform during the grant period.

Statewide Transportation Improvement Program
A Statewide prioritized listing of transportation projects covering a period of four years that is consistent with the long-range Statewide transportation plan, metropolitan transportation plans, and transportation improvement plans, and is required for projects to be eligible for funding under title 23 U.S.C. and title 49 U.S.C. Chapter 53.

Surface Transportation Program
Federal-aid highway funding program that supports a broad range of surface transportation capital needs, including many roads, transit, sea and airport access, vanpool, bike, and pedestrian facilities.

T

Telecommuting
Employment via electronic communication from a physical office, either at home or at another site, instead of a traditional office.

Title VI
Title VI of the *Civil Rights Act* of 1964 prohibits discrimination in any program receiving Federal assistance (See *Environmental Justice*).

Transportation Control Measure
Any measure that is specifically committed to in a State Implementation Plan that is either one of the types of listed in section 108 of the CAA or any other measure for the purpose of reducing emissions or concentrations of air pollutants from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions. Notwithstanding the above, vehicle technology-based, fuel-based, and maintenance-based measures that control the emissions from vehicles under fixed traffic conditions are not TCMs.

Transportation Demand Management (TDM)
Programs designed to reduce demand for transportation through various means, such as the use of public transit and of alternative work hours.

Transportation Equity Act for the 21st Century
Legislated in 1998, TEA-21 authorized approximately $217 billion in Federal funding for transportation investment for FYs 1998-2003 used for highway, transit, and other surface transportation programs.

Transportation Improvement Program
A prioritized listing of transportation projects covering a period of four years that is developed by a Metropolitan Planning Organization as part of the metropolitan transportation planning process, consistent with the Metropolitan Transportation Plan, and required for projects to be eligible for funding under title 23 U.S.C. and title 49 U.S.C. Chapter 53.

Transportation Infrastructure Finance and Innovation Act of 1998
A Federal credit program under which USDOT may provide three forms of credit assistance—secured (direct) loans, loan guarantees, and standby lines of credit—for surface transportation projects of national or regional significance. The fundamental goal is to leverage Federal funds by attracting substantial private and non-Federal co-investment in critical improvements to the Nation's surface transportation system.

Transportation Management Area
An urbanized area with a population of 200,000 or more, as defined by the U.S. Bureau of the Census and designated by the Secretary of Transportation, or any additional area where Transportation Management Area designation is requested by the Governor and the Metropolitan Planning Organization and designated by the U.S. Secretary of Transportation.

Transportation Systems Management & Operations
An integrated program to optimize the performance of existing infrastructure through the implementation of systems, services, and projects designed to preserve capacity and improve security, safety, and reliability. The term includes improvements to the transportation system such as traffic detection and surveillance, arterial management, freeway management, demand management, work zone management, emergency management, electronic toll collection, automated enforcement, traffic incident management, roadway weather management, traveler information services, commercial vehicle operations, traffic control, freight management, and coordination of highway, rail, transit, bicycle, and pedestrian operations

Trust Fund
A fund credited with receipts that are held in trust by the government and earmarked by law for use in carrying out specific purposes and programs in accordance with an agreement or a statute.

U

Unified Planning Work Program

A Statement of work identifying the planning priorities and activities to be carried out within a metropolitan planning area. At a minimum, a Unified Planning Work Program includes a description of the planning work and resulting products, who will perform the work, time frames for completing the work, the cost of the work, and the sources of funds.

Urbanized Area

A geographic area with a population of 50,000 or more, as designated by the U.S. Bureau of the Census.

V

Visualization Techniques

Used by States and Metropolitan Planning Organizations to convey information in a clear and easily accessible format, such as maps and pictures, and to promote improved understanding of existing or proposed transportation plans and programs.

Federal Aid Transportation Programs

There is a modified version of the following tables in *Financing the Statewide Plan: A Guidebook*, Federal Highway Administration, November 1999, https://www.fhwa.dot.gov/planning/processes/statewide/financing/04703r04.pdf.

Federal Transportation Programs and Revenue Sources

Mode	Major Transportation Programs	Federal Revenue Sources
Administered by FHWA	• Interstate Maintenance. • National Highway System. • Bridge Replacement and Rehabilitation • Congestion Mitigation and Air Quality Improvement • Surface Transportation Program (including transportation enhancements and planning funds). • National Corridor Planning and Development and Coordinated Border Infrastructure. • High Priority (Demonstration) Projects. • Intelligent Transportation Systems. • Minimum Guarantee. • Federal Lands Highway Program. • National Scenic Byways Program (discretionary for use on nationally designated routes only). • Recreational Trails.	• Highway Trust Fund with funds from the Federal Motor Fuel Tax (15.44 cents/gallon; varies for other fuel types). • Truck and Trailer Tax. • Tire Tax. • Heavy Vehicle Use Tax. • Tire Tax Quality Improvement.
Administered by FTA	• Planning Programs (Section 5305). • Urbanized Area Formula (Section 5307). • Fixed Guideway Capital Investment Grants (Section 5309). • Enhanced Mobility of Seniors and Individuals with Disabilities (Section 5310). • Formula Grants for Rural Areas (Section 5311). • CMAQ (only when funds are flexed from FHWA). • Public Transportation Emergency Relief Program (Section 5324). • Public Transportation Safety Program (Section 5329). • State of Good Repair Grants (Section 5337). • Bus and Bus Facilities Formula Grants (Section 5339).	• Mass Transit Account of the Highway Trust Fund, with funds from motor fuel tax (2 cents/gallon). • General Fund. • Interest.

Mode	Major Transportation Programs	Federal Revenue Sources
Administered by FAA	• Federal Airport and Airway Trust Fund, the source for airport development grants and airport planning grants.	• Aviation Fuel Tax. • Air Freight Tax. • Passenger Ticket Tax. • International Departure Tax.
Administered by FHWA, FRA	• FRA grants for planning, rail service continuation, rehabilitation, and provision of substitute service.	• General Fund.
Administered by FRA	• Magnetic levitation transportation technology deployment. • High-speed rail. • Amtrak.	• Highway Trust Fund. • General Fund, which relies on specific capital appropriations. • Passenger fares. • Food and beverage revenue.
Administered by MARAD & FHWA	• Army Corps of Engineers for construction, operation, and maintenance of waterways, locks and harbors. • Construction of ferry boats and terminal facilities.	• Fuel taxes paid by inland water carriers. • Ad valorem taxes paid by users of ports. • Highway Trust Fund.

Major Federal-Aid Highway Programs Under MAP-21

Program	Eligible Uses	Federal Share of Funded Projects
Bridge Replacement and Rehabilitation	Replacement and rehabilitation of any public bridge.	80 percent.
Congestion Mitigation and Air Quality	Up to 50 percent of CMAQ apportionments may be transferred to other Federal-aid highway programs. For those states with PM2.5 set aside funds, the portion of the CMAQ they wish to transfer to another Federal-aid program may not come from their PM2.5 set-aside.	80 percent.
Interstate Maintenance (IM)	Resurfacing, restoring, and rehabilitating routes on the IHS, but no new capacity except HOV or auxiliary lanes in non-attainment areas.	90 percent; 80 percent for added capacity in attainment areas.
Metropolitan Planning Funds (PL)	All planning activities are eligible (for example, modeling, air quality analysis, public outreach, environmental analysis).	Federal participation is 80 percent unless the Secretary determines that changing this contribution level is warranted.

National Highway System (NHS)	Interstate routes, major urban and rural arterials, connectors to major intermodal facilities, national defense network. Fifty percent of NHS funds can be freely flexed to STP; 100 percent with USDOT approval.	80 percent.
Surface Transportation Program (STP)	Broad range of surface transportation capital needs, including many roads, transit, sea, and airport access, vanpool, bike, and pedestrian facilities.	80 percent.

Federal Transit Administration Grant Programs Under MAP-21

For details on the programs below, see http://www.fta.dot.gov/about/15035.html.

Program	Eligible Uses Federal Share of Funded	Projects/ Services
Planning Programs Section 5305	Funding for multimodal transportation planning in metropolitan areas and states that is cooperative, continuous, and comprehensive, resulting in long-range plans and short-range programs of transportation investment priorities.	80 percent.
Urbanized Area Formula Grants Section 5307	Grants to Urbanized Areas (UZA) for public transportation capital, planning, job access and reverse commute projects, as well as operating expenses in certain circumstances. These funds constitute a core investment in the enhancement and revitalization of public transportation systems in the Nation's urbanized areas, which depend on public transportation to improve mobility and reduce congestion.	Federal share is 80 percent for capital assistance, 50 percent for operating assistance (in selected areas), and 80 percent for Americans with Disabilities Act (ADA) non-fixed-route paratransit service, using up to 10 percent of a recipient's apportionment.
Fixed Guideway Capital Investment Grants Section 5309	Grants for new and expanded rail, bus rapid transit, and ferry systems that reflect local priorities to improve transportation options in key corridors. This program defines a new category of eligible projects, known as core capacity projects, which expand capacity by at least 10 percent in existing fixed-guideway transit corridors that are already at or above capacity today, or are expected to be at or above capacity within five years. The program also includes provisions for streamlining aspects of the New Starts process to increase efficiency and reduce the time required to meet milestones.	Maximum share is 80 percent, but awards typically involve a lower share
Enhanced Mobility of Seniors & Individuals with Disabilities Section 5310	Funds for programs to serve the special needs of transit-dependent populations beyond traditional public transportation services and Americans with Disabilities Act (ADA) complementary paratransit services. Recipients must certify that projects selected are	80 percent.

	included in a locally developed, coordinated public transit-human services transportation plan (Coordinated Plan).	
Formula Grants for Rural Areas Section 5311	Capital, planning, and operating funding assistance to states to support public transportation in rural areas with populations less than 50,000, where many residents often rely on public transit to reach their destinations.	Federal share is 80 percent for capital projects, 50 percent for operating assistance, and 80 percent for Americans with Disabilities Act (ADA) non-fixed-route paratransit service, using up to 10 percent of a recipient's apportionment.
Public Transportation Emergency Relief Program Section 5324	Funds the protection, repair, and/or replacement of equipment and facilities that may suffer or have suffered serious damage as a result of an emergency, including natural disasters such as floods, hurricanes, and tornadoes. The program also improves coordination between DOT and the Department of Homeland Security to expedite assistance to public transit providers in times of disasters and emergencies.	80 percent, although FTA may waive the local match. Funds will be appropriated by Congress as necessary.

Funding Transferability Under MAP-21

Program	Transferability
Bridge Replacement and Rehabilitation	• Up to 50 percent of Bridge Program apportionments may be transferred to NHS, IM, STP, and/or CMAQ. Funds set aside for bridges not on Federal-aid highways (off-system bridges) may not be transferred unless a determination is made that the State has inadequate needs to justify expenditure of the full amount of the set aside funds.
Congestion Mitigation and Air Quality (CMAQ)	• States may transfer up to 50 percent of the amount by which the CMAQ apportionment for the fiscal year exceeds the amount that would have been apportioned for that fiscal year if the CMAQ program had been funded at $1.35 billion annually to STP, NHS, IM and/or Bridge Replacement/ Rehabilitation. Transferred funds may only be used in nonattainment and maintenance areas.
Interstate Construction (IC)	• States, except Massachusetts, may transfer an amount equivalent to the Federal share of the cost to complete open-to-traffic Interstate segments included in the latest Interstate Cost Estimate (ICE) from IC funds to NHS and/or interstate maintenance. Work on which the transfer is based will be removed from the ICE and will lose IC fund eligibility. • States may transfer remaining IC funds after all work included in the ICE is fully financed to the NHS. • States with remaining work on Interstate gaps or open-to-traffic segments may relinquish IC fund eligibility and transfer to the NHS amounts equivalent to the Federal share of the cost of such work in the most recent ICE.

Interstate Maintenance (IM)	• States may transfer up to 50 percent of IM apportionments to NHS, STP, CMAQ, and/or Bridge Replacement/Rehabilitation.
National Highway System (NHS)	• States may freely transfer up to 50 percent of NHS apportionments to IM, STP, NHS, CMAQ, and/or Bridge Replacement and Rehabilitation. • States may transfer up to 100 percent of NHS apportionments to STP, if approved by the Secretary of Transportation and if sufficient notice and opportunity for public comment is given.
Surface Transportation Program (STP)	• Transportation Enhancement (TE). Set aside States may transfer up to 25 percent of the difference between the amount set aside for TE for the fiscal year and the amount set aside for TE for FY 1997 to IM, CMAQ, NHS, and/or Bridge Replacement and Rehabilitation. • Safety. Set aside funds equivalent to the funds made available for FY 1991 for the Hazard Elimination and Railway-Highway Crossing Programs may not be transferred. Up to 25 percent of the difference between the remainder of the safety set aside for the fiscal year—the optional safety funds—and the comparable amount for FY 2007 may be transferred to IM, CMAQ, NHS, and/or Bridge Replacement and Rehabilitation. • Suballocation to areas. STP funds allocated to sub-State areas (rural, urbanized areas with populations over 200,000) may not be transferred. • Transfers to STP from IM, NHS, CMAQ, and Bridge Programs will not be subject to further STP set asides or suballocations.

Innovative Highway Financing Strategies and Tools

Cash Flow Approaches

Tool	Approach
Advance Construction	Allows States to independently raise upfront capital required for a project and preserve eligibility for future Federal funding for the project. Projects must be designated as advance construction projects to be eligible.
Bond Cost Reimbursement: Grant Anticipation Revenue Vehicle (GARVEE)	State-issued short-term note or long-term bond that uses future Federal funds to support payment of principal and interest. Issuance and insurance costs are also eligible. This is generally used in combination with advance construction.
Flexible: Federal Land Management Agency Funds	Funds from other Federal agencies may count toward the non-Federal matching share for recreational trails and transportation enhancement projects.
Flexible: Federal Lands	Funds from DOT's Federal Lands Highway Program may count toward non-Federal match for projects within or providing access to Federal or Indian lands.

Flexible: Publicly Owned Land	Permits donations of publicly owned property to count toward non-Federal match on all Federal-aid highway projects.
Partial Conversion of Advance Construction	Form of advance construction; State only converts, obligates, or receives reimbursement for part of its funding for an eligible project in a given year. States no longer have to wait until the full amount of obligation authority is available.
Program Level	For STP projects, allows Federal share for funds to be matched across the full program, not on a project-by-project basis.
Tailored (Variable) Match	Allows non-Federal share to vary over project life, so long as the ultimate matching share is preserved over time.

Tolls and Other Income-Generating Tools

Right-of-Way Income	This allows income from right-of-way sales and leases to be used for Title 23 (highway) purposes, as currently allowed for airspace income. ISTEA Section 1044 Toll allows States to receive investment credit for certain toll revenue Investment Credits expenditures, which can be applied toward the non-Federal matching share of all ISTEA programs.

Leveraging Tools

Bonds and Debt Costs, Issuance	Allows States to use Federal funds for bond principal, interest Instrument Financing costs, and insurance on eligible projects.
Federal Share on Toll Projects	Expanded use of Federal funds for toll projects to include construction of new facilities, resurfacing, restoration, and rehabilitation of existing facilities and conversion of free facilities. Private facilities are now also eligible.
Flexible Match	Allows States to apply private donations of materials, labor, or assets and private funds toward the State or local match for Federal-aid projects.
ISTEA Section 1012 Loans	Removes the limitation that Federal funds can be used only once. Allows States to loan Federal funds to leverage any eligible investment; the State can use the funds again once they have been paid back.

Credit Tools

Rail Credit Pilot	Provides direct Federal loans and loan guarantees for rail and intermodal projects.
State Infrastructure Bank	States can allocate up to 10 percent of their ISTEA/TEA-21 apportionment to capitalize the State bank. The bank can provide loans for projects and can be structured as a revolving loan fund, with loans recycled for new projects.

	State infrastructure banks can provide third-party guarantees to projects to ensure that there is sufficient revenue to pay project costs or debt service.
Surface Transportation Credit Program	This provides direct Federal loans, loan guarantees, and lines of credit for large surface transportation programs of national significance.
Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA)	A Federal credit program under which the USDOT may provide three forms of credit assistance — secured (direct) loans, loan guarantees, and standby lines of credit — for surface transportation projects of national or regional significance. The fundamental goal is to leverage Federal funds by attracting substantial private and non-Federal co-investment in critical improvements to the Nation's surface transportation system.

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Federal Highway Administration
Federal Transit Administration

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