SECTION 2-15: OPERATIONS & MANAGEMENT OF THE SURFACE TRANSPORTATION SYSTEM

Traffic congestion is linked to a growing population and affects the movements of people and goods within the U.S. as part of the global economy. If current projections of U.S. population and vehicle-miles-traveled (VMT) trends continue upward, we can expect that the extent and duration of congestion will increase and affect more freight and passenger movements on our Nation's transportation system. State DOT and metropolitan planning organizations (MPO) must have the planning and technical capabilities, training, and resources in order to better monitor and track the operations and management (O&M) of the surface transportation system network. The State DOT, MPOs, regional transit authorities, cities, and counties must work together cooperatively in order to manage and implement a vast array of cost-effective congestion and demand management tools to provide for the safe, effective, and efficient movement of people and goods on our Nation's transportation system.

Regulatory Basis

The SAFETEA–LU defined ''Operational and Management Strategies'' and its relationship to metropolitan long-range transportation plans as follows:

> *Operational and management strategies means actions and strategies aimed at improving the performance of existing and planned transportation facilities to relieve vehicular congestion and maximizing the safety and mobility of people and goods* (Ref: 23 U.S.C. 34(i)(2)(D) and 49 U.S.C. 5303(i)(2)(D)).

Section 6001 (revising title 23 U.S.C., §134- Metropolitan transportation planning provisions) of SAFETEA-LU states the following with regard to systems operation and management:

> ***§ 134. Metropolitan transportation planning-***
>
> > *(a) POLICY.—It is in the national interest to—*
> > *(1) encourage and promote the safe and* ***efficient management, operation, and development of surface transportation systems*** *that will serve the mobility needs of people and freight and foster economic growth and development within and between States and urbanized areas, while minimizing transportation-related fuel consumption and air pollution through metropolitan and statewide transportation planning processes identified in this chapter; and*

(2) encourage the continued improvement and evolution of the metropolitan and statewide transportation planning processes by metropolitan planning organizations, State departments of transportation, and public transit operators as guided by the planning factors identified in subsection (h) and section 135(d).

Under SAFETEA-LU several of the eight planning factors address the need for improved safety and efficient systems performance in particularly terms of operations and management of the transportation system and have been codified under title 23 U.S.C. 134(h) as follows:[1]

- (A) support the *economic vitality* of the metropolitan area, especially by enabling global competitiveness, *productivity, and efficiency*;
- (B) increase the safety of the transportation system for motorized and non-motorized users;
- (C) increase the security of the transportation system for motorized and non-motorized users;
- (D) increase the *accessibility and mobility* of people and for freight;
- (E) protect and enhance the environment, *promote energy conservation*, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and *economic development patterns*;
- (F) enhance the *integration and connectivity* of the transportation system, across and between modes, for people and freight;
- (G) promote *efficient system management and operation*; and
- (H) emphasize the *preservation of the existing transportation* system.

Consideration of the eight planning factors shown above shall be reflected, as appropriate, in the metropolitan transportation planning process under 23 CFR 450.306(c). As part of SAFETEA-LU, the Transportation Research Board (TRB) was also commissioned by the U.S. Congress to begin a research study to the assess the current and future capabilities for conducting system-wide real-time performance data collection and analysis, traffic

[1] See SAFETEA-LU enacted legislation on-line at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ059.109.pdf

monitoring, and transportation systems operations and management of the transportation system.[2]

Under Section 5211 of the SAFETEA-LU highway Act, title 23, Chapter 5 of the U.S. Code was amended by addressing multi-state ***corridor operations and management*** by development of cooperative agreements, coalitions, and other arrangements to promote regional cooperation, planning, and shared project implementation for programs and projects to improve transportation system management and operations.

With the passage of SAFETEA-LU, Congress authorized $550 million, or $110 million per year, for the ITS program over five fiscal years (2005-2009). SAFETEA-LU also contains a number of other provisions intended to further mainstream ITS into the transportation planning and deployment process and to increase general awareness of ***improved operations*.**

While the goals and purposes of the ITS program remain largely unchanged from TEA-21, overall SAFETEA-LU increases the U.S. DOT focus on integrating systems, technologies, devices, and agencies, shifting from TEA-21's emphasis on demonstration projects. SAFETEA-LU reaffirmed the Department's commitment to major research initiatives, continued the requirement for establishing a cooperative process with State and local governments, and emphasized private-sector participation in the ITS program to ensure successful transfer of new technologies and strategies to the commercial market. SAFETEA-LU also provided resources to deployment support programs in order to meet State and local needs.[3]

ITS Program Under SAFETEA-LU

- Focuses on fewer "major initiatives"
  - Larger, higher risk, higher payoff
  - Nine major initiatives approved
- Allows for the completion of ongoing efforts and exploratory studies
- Funds deployment support activities — architecture, standards, professional capacity building, assessment, and outreach

The ITS provisions in SAFETEA-LU designate three new priority research activities:

- A rural interstate corridor communications study;
- A road weather research and development program;
- A multi-state corridor ***operations and management program*** that specifically continues funding of the I-95 Corridor Coalition.

[2] Ref: 119 STAT. 1474 Public Law 109–59, August 10, 2005.
[3] Source: U.S. DOT/RITA website at: http://www.itsdocs.fhwa.dot.gov/jpodocs/repts_te/14289/toc.htm

SAFETEA-LU also directed the U.S. DOT to establish two new stakeholder processes:

- An ITS Advisory Committee to systematically, comprehensively, and objectively assess the ITS program's progress and needs and make recommendations for improvement, if necessary.

- An ITS Standards Experts Panel to "expedite and streamline the process of developing standards."[5]

The SAFETEA-LU also called for the development of a **National ITS program plan** under Section 5301 which amended Chapter 5 of title 23, United States Code that said no later than one year after the date of enactment of the SAFETEA–LU, the Secretary, in consultation with interested stakeholders (including State transportation departments) shall develop a 5-year National Intelligent Transportation System (in this section referred to as an 'ITS') program plan. The purpose of the **National ITS program plan** under SAFETEA-LU shall specify the goals, objectives, and milestones for the research and deployment of intelligent transportation systems in the contexts of: (i) major metropolitan areas;
(ii) smaller metropolitan and rural areas; and (iii) commercial vehicle operations.

As part of the **National ITS program plan** the period of development was established within a five-year timeframe of SAFETEA-LU for various goals and objectives including the development, testing, and necessary revision of ITS standards and protocols to promote and ensure interoperability in the implementation of ITS technologies. Actions taken to establish ITS standards and also included a cooperative process for State and local governments to determine surface transportation system performance measures; and for the acceleration of specific ITS capabilities into surface transportation systems. The **National ITS program plan** was required by Congress to be updated biennially and submitted as part of the transportation research and development strategic plan developed under SAFETEA-LU.

To meet the O&M system planning regulations under SAFETEA-LU, each MPO as part of the development and content of the metropolitan transportation plan is required to perform a systems-level analysis of O&M strategies to improve the performance of the existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods.[4] The systems-level O&M financial analysis should document the costs and revenue sources expected to be available to adequately operate and maintain Federal-aid highways (as defined by 23 U.S.C. 101(a)(5)) and public transportation (as defined by title 49 U.S.C. Chapter 53) as part of the fiscally constrained financial plan associated with the transportation improvement program (TIP) and long-range metropolitan transportation plan (MTP).[5]

In addition, 23 CFR 450.306(f) requires the consistency of the metropolitan planning process (to the maximum extent practicable) with the development of applicable regional

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[4] Ref: 23 CFR 450.322(f)(3).
[5] Ref: 23 CFR 450.324(h) and 23 CFR 450.322(i).

intelligent transportation systems (ITS) architectures, as defined under 23 CFR part 940. It should also be noted that all ITS projects funded with highway trust funds shall use applicable ITS standards and interoperability tests that have been officially adopted by the U.S. DOT, and prior to the authorization of federal-aid highway trust funds for construction or implementation of ITS projects, compliance with 23 CFR 940.11 must be demonstrated.[6]

SAFETEA-LU also provided new operational and management-related programs, funding sources, developed in order to alleviate recurring congestion problems found on our Nation's transportation system. The following SAFETEA-LU programs serve to mitigate the impacts of highway congestion through improved operations and management of our Nation's highway and transit systems. [7]

Real-Time System Management Information Program [Section 1201]

Establishes a new program aimed at providing in all States the ability to monitor, in real time, the traffic and travel conditions on major highways and to share that information to mitigate congestion and improve the operation of the highway system.

HOV Facilities [Section 1121]

Enhances States' ability to manage congestion by increasing flexibility to allow certain single occupant vehicles, such as deadheading public transportation vehicles, tolled vehicles, and low emission/energy efficient vehicles to use excess capacity in HOV facilities. This section also includes provision to ensure that the operational performance of the facility does not become seriously degraded.

Congestion Mitigation and Air Quality Improvement Program [Section 1808]

Continues and expands eligibility for activities designed to improve traffic flow and air quality, including projects to establish or operate a traffic monitoring, management, and control facility or program; programs or projects that improve traffic flow, including projects to improve signalization, construct high occupancy vehicle lanes, improve intersections, and implement ITS strategies; and programs or projects that improve transportation systems management and operations.

Coordinated Border Improvement Program [Section 1101(a)(11), 1303]

The CBI program serves to improve the safe, effective, and efficient movement of motor vehicles at or across the land borders between the U.S. and Canada, and the land borders

[6] Ref: 23 CFR 940.13, compliance with this part will be monitored as part of the Federal-aid oversight procedures as provided under 23 U.S.C. 106 and 133.

[7] Source: SAFETEA-LU Fact Sheets "Congestion Mitigation", see website at: http://www.fhwa.dot.gov/safetealu/factsheets/congestion.htm

between the U.S. and Mexico. This program replaces the TEA-21 Coordinated Border Infrastructure discretionary program which ended after 2005.

Future Strategic Highway Research Program [Section 5210]

Establishes new program, to be carried out through the National Academy of Sciences, funded at a total of $205 million for 2006-2009, to focus on research in four high priority areas, including reduction of non-recurring highway congestion.

Intelligent Transportation System (ITS) Research [Section 5306]

Provides $550 million in funding and establishes specific priority areas and goals for ITS research, including reduction of congestion.

National Corridor Infrastructure Improvement Program [Section(s): 1101(a)(10), 1302, 1935, 1936, 1953; 1102]

This program provides funding for construction of highway projects in corridors of national significance to promote economic growth and international or interregional trade. This program replaces TEA-21 section 1118, National Corridor Planning and Development program.

Surface Transportation Congestion Relief Solutions Research [Section 5502]

This research program provides a total of $36 million in funding for research and $3 million for training and technical assistance activities focused on congestion measurement and reporting, and development and implementation of effective congestion relief strategies.

Tolling [Section 1604]

The Value Pricing Pilot Program was continued under this section with funding at a total of $59 million through FY 2009. Establishes a new Express Lanes Demonstration Program focused on managing congestion and reducing emissions through up to 15 projects by using tolls to support construction and management of new capacity or management of existing HOV or toll facility capacity.

Transportation Systems Management and Operations [Section(s): 1201, 1808, 5101(a)(5), 5211, 5305, 5306, 5310(8)]

These provisions provide for the safe and efficient management and operation of integrated, inter-modal surface transportation systems in order to serve the mobility needs of people and freight and foster economic growth and development.

National Strategies to Improve System Performance

The U.S. Department of Transportation released its "National Strategy to Reduce Congestion on America's Transportation Network" plan was issued in May 2006.[8] This plan provides a clear blueprint for Federal, State, and local officials to follow in addressing critical operational and performance issues. The "National Strategy" plan itself calls upon the leadership of the U.S. Department of Transportation to establish Urban Partnership Agreements with selected communities and encourages states to pass legislation giving the private sector a broader role in investing in transportation. The plan calls for more widespread deployment of new intelligent transportation study (ITS) technologies and practices that reduce traffic congestion, designates and funds new "Corridors of the Future" projects, and takes on port and border congestion, and expands aviation capacity.

As part of the U.S. DOT "National Strategy to Reduce Congestion on America's Transportation Network" (also commonly referred to as the "Congestion Initiative") the U.S. DOT Research and Innovative Technology Administration (RITA) has led an effort to implement Intelligent Transportation Systems (ITS) Operational Testing in order to mitigate congestion (also know as the ITS-OTMC program). This program provides for the advanced technology foundation for the U.S. DOT "Congestion Initiative" as part of the U.S. DOT's National Strategic plan. ITS technologies will support congestion pricing, improved system operations and performance, regional efforts to expand provision of real-time traveler information, improved traffic incident response, improved arterial signal timing and reduced obtrusiveness of highway construction work zones. The overall objective of the ITS-OTMC Program is to facilitate the operational testing and evaluation of innovative and aggressive congestion reduction strategies incorporating ITS technologies that can demonstrate measurable reductions in congestion levels in the deployment areas.

The Research and Innovative Technology Administration released the ITS-OTMC Federal Register notice on December 18, 2006 and released a companion Request for Applications on www.grants.gov, soliciting proposals from metropolitan areas seeking to participate in the ITS-OTMC Program. Applications were due on April 30, 2007. Following identification of nine sites identified as "preliminary urban partners" in the spring of 2007, USDOT selected five finalists for "Urban Partnership Agreements." In August 2007, Secretary Peters designated New York, San Francisco, Seattle, Minneapolis, and Miami as Urban Partners. The Urban Partners have agreed to demonstrate the impact of implementing the 4 T's (tolling, transit, technology, and telecommuting) to address congestion. The ITS program is contributing $100 million to the program.
For more information on each of the solicitations, please visit USDOT's Congestion Initiative website at www.fightgridlocknow.gov or the ITS program's website at www.its.dot.gov.

[8] For a copy of the U.S. DOT "National Strategy to Reduce Congestion on America's Transportation Network", please see: http://www.dot.gov/affairs/dot5706.htm

In March 2007, the Secretary of the U.S. Department of Transportation (U.S. DOT) affirmed the department's commitment to a national initiative to manage highway, freight and aviation congestion, calling congestion one of the greatest threats to the nation's economy.[9] The U.S. DOT Secretary noted that businesses lose an estimated $200 billion per year due to freight bottlenecks; and drivers waste nearly 4 billion hours of time, and more than 2 billion gallons of fuel, in traffic jams each year. As announced in the U.S. DOT press release, the greatest concentration of congestion is often along critical transportation corridors that link residential areas with business centers, sports arenas and shopping areas. New road construction alone will not solve the growing problem of congestion—travel demand on our nation's roadways is outpacing new freeway capacity by a factor of five.[10]

Examples of MPO Goals and Objectives that Acknowledge the Role of Management & Operations[11]

Following are examples of performance measure goals taken from long-range metropolitan transportation plans that set out to achieve system performance based improvements through management and operations:

Wilmington, DE (MPO)

"To efficiently move people and goods, improve system performance, promote mobility, and accessibility."

Dallas/Fort Worth, TX (MPO)

"Support management strategies that optimize transportation system performance through technology and innovation."

New Orleans, LA (MPO)

"We recognize today that resources are limited and improved management of existing systems can effectively add capacity to transportation networks."

San Francisco-Bay Area (MPO)

In its 2001 Regional Transportation Plan, the San Francisco Bay Area Metropolitan Transportation Commission (MTC) included a system management alternative. This alternative sought to address corridor mobility issues through a set of projects that were

[9] http://www.fightgridlocknow.gov/docs/conginteroverview070301.htm
[10] Ibid.
[11] Source: FHWA, "Getting More by Working Together — Opportunities for Linking Planning and Operations" See website at: http://ops.fhwa.dot.gov/publications/lpo_ref_guide/prim0404.htm

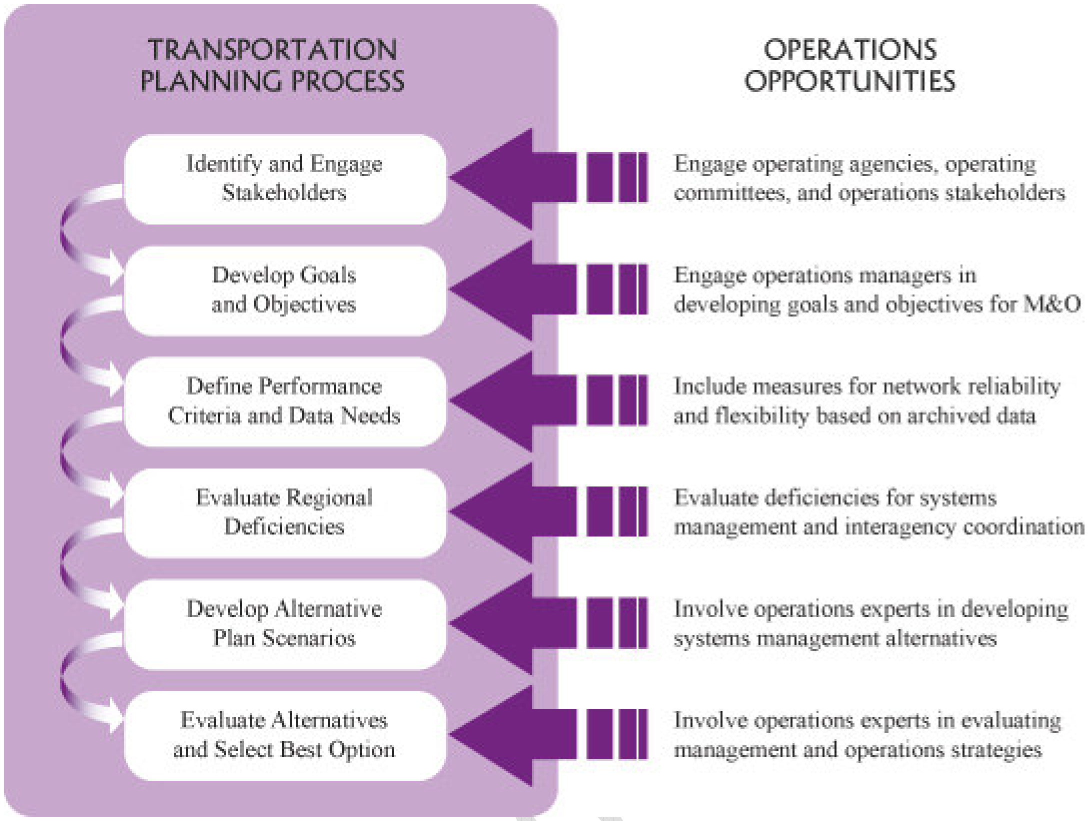
primarily operational in nature. Examples included expanded express bus service, reversible carpool lanes, and a better-connected HOV and transit system. The alternative also included more funding for streets and roads pavement shortfalls. Freeway ramp metering was assumed to be implemented for the most congested corridors, while congestion pricing was assumed for the region's major bridges in order to generate additional revenues, including transit operating revenues. In this alternative, some highway projects were deferred to provide additional funding for these management programs.

Chicago, IL (MPO)

The long-range metropolitan transportation plan for the Chicago metropolitan area has placed greater emphasis on management and operations strategies. For example, the 2020 plan listed M&O projects that were considered a high priority. The current 2025 plan establishes a regional policy that all major capital projects are to include management and operations components in order to enhance system efficiency. The current updated version of the plan anticipates an expanded emphasis on M&O, linking to specific capital initiatives.

Examples of Opportunities to Coordinate Management and Operations (M&O) in the Transportation Planning Process [12]

[12] Source: FHWA, "Getting More by Working Together — Opportunities for Linking Planning and Operations", see website at: http://ops.fhwa.dot.gov/publications/lpo_ref_guide/ex02.htm



Description:

This exhibit on the previous page shows six steps in the transportation planning process and a corresponding operations opportunity for each, as follows: [13]

1. Identify and Engage Stakeholders: Engage operating agencies, operating committee, and operations stakeholders.

2. Develop Goals and Objectives: Engage operations managers in developing goals and objectives for M&O.

3. Define Performance Criteria and Data Needs: Include measures for network reliability and flexibility based on archived data.

4. Evaluate Regional Deficiencies: Evaluate deficiencies for systems management and interagency coordination.

[13] For additional information, please see the following U.S. DOT/RITA website: http://ops.fhwa.dot.gov/publications/lpo_ref_guide/ex02.htm

5. Develop Alternative Plan Scenarios: Involve operations experts in developing systems management alternatives.

6. Evaluate Alternatives and Select Best Option: Involve operations experts in evaluating management and operations strategies.

U.S. DOT Conditions and Performance Report (Operations & Management)

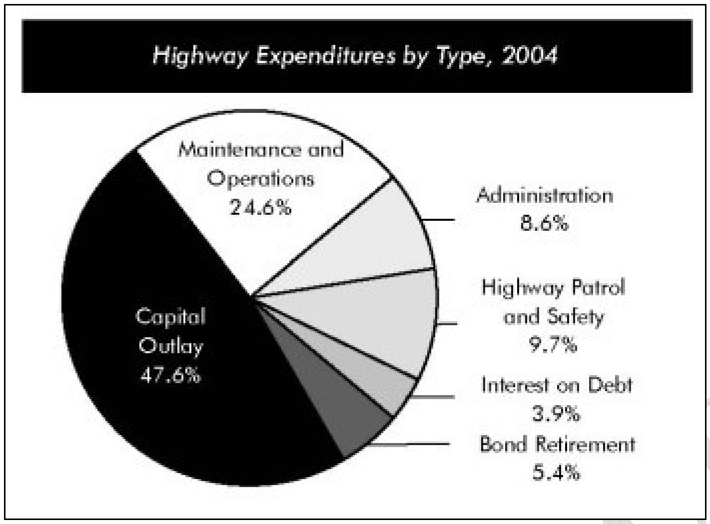
While urban mileage constitutes only 24.9 percent of total mileage, these roads carried 64.1 percent of the 3.0 trillion vehicle miles traveled (VMT) in the United States in 2004. In 2004 there were 594,101 bridges over 6.1 meters (20 feet) in length; approximately 76.8 percent of these were in rural areas. Rural local roads made up 51.3 percent of total mileage, but carried only 4.4 percent of total VMT. In contrast, urban Interstate highways made up only 0.4 percent of total mileage but carried 15.5 percent of total VMT.[14] Taken together, all levels of government spent $147.5 billion for highways in 2004.

Based upon the 2006 U.S. DOT Conditions and Performance report, cash outlays by the Federal government for highway-related purposes were $33.1 billion (22.4 percent of the combined total for all levels), including both direct highway expenditures and amounts transferred to State and local governments for use on highways. States funded $72.9 billion (49.4 percent). Counties, cities, and other local government entities funded $41.5 billion (28.1 percent). Private sector investment in the form of public-private partnerships is playing an increasingly important role in highway finance over recent years. Of the total $147.5 billion spent for highways in 2004, $70.3 billion (47.6 percent) was used for capital investments. Spending on maintenance and operations totaled $36.3 billion (24.6 percent); administrative costs (including planning and research) were $12.7 billion; $14.3 billion was spent on highway patrol functions and safety programs; $5.8 billion was used to pay interest; and $8.0 billion was used for bond retirement.

Highway maintenance and operations included approximately 25 percent of the entire share of highway expenditures by type in fiscal year 2004 (see graph below).[15]

[14] Source: U.S. DOT Conditions & Performance Report, 2006. For a copy please see: http://www.fhwa.dot.gov/policy/2006cpr/index.htm

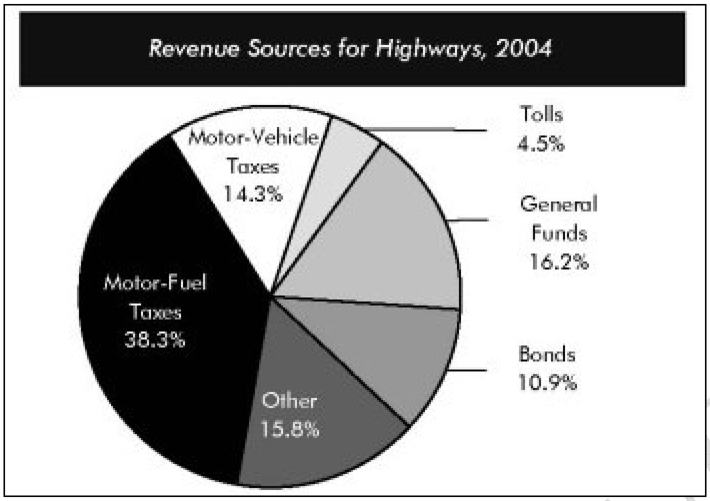
[15] Source: 2006 Conditions & Performance Report, Executive Summary, see web-link at: http://www.fhwa.dot.gov/policy/2006cpr/index.htm



Total highway expenditures by all levels of government increased 44.7 percent between 1997 and 2004. Highway spending rose faster than inflation over this period, growing 22.7 percent in constant dollar terms. Capital spending grew by 45.2 percent between 1997 and 2002. Federal cash expenditures for capital purposes rose 52.9 percent, while State and local capital investment increased by 39.9 percent. As a result of Federal capital spending rising more quickly, the portion of total capital outlay funded by the Federal government rose from 41.6 percent in 1997 to 43.8 percent in 2004. The Federal percentage in 2002 was 46.1 percent, the highest level since 1986.

Of the $70.3 billion of capital spending by all levels of government in 2004, $36.4 billion (51.8 percent) was spent for system rehabilitation, the resurfacing, rehabilitation, and reconstruction of existing roadways and bridges. An estimated $14.7 billion (20.9 percent) was used to construct new roads and bridges; $12.8 billion (18.3 percent) went for adding new lanes to existing roads; and $6.4 billion (9.0 percent) went for system enhancements such as safety, operational, or environmental enhancements.

Highway-user revenues—the total amount generated from motor-fuel taxes, motor-vehicle fees, and tolls imposed by Federal, State, and local governments—were $105.8 billion in 2004. Of this, $83.0 billion (78.4 percent) was used for highways. This represented 57.1 percent of the total revenues generated by all levels of government in 2004 for use on highways. Other major sources of revenues for highways included bond proceeds of $15.8 billion (10.9 percent) and general fund appropriations of $23.6 billion (16.2 percent). Other sources such as property taxes, other taxes and fees, lottery proceeds, and interest income totaled $23.0 billion (15.8 percent).

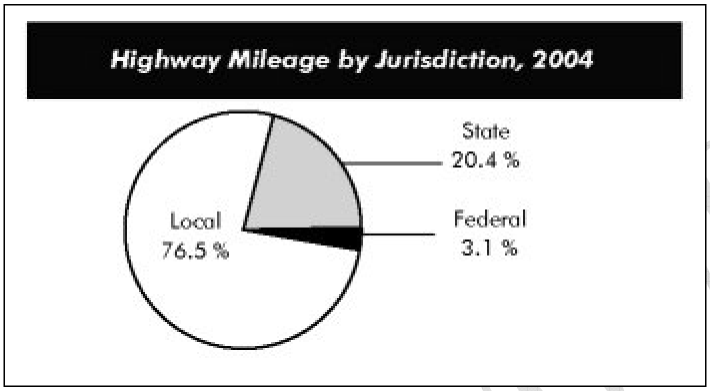


Highways are traditionally viewed as transportation facilities with fixed capacity, carrying traffic that peaks with commuters twice each weekday. However, increased traffic demand does not occur just twice daily or on a predictable schedule. It can occur several times during the day and can be driven by temporary and less predictable events. Reductions in maximum capacity caused by crashes, work zones, bad weather, and other incidents create at least as much delay as the recurring overload of traffic from commuting. This situation is especially costly to the freight transportation community and affects the economy and the American consumer.

To overcome constraints on maximum capacity and temporary capacity losses, operations strategies serve as critical tools. For freeways and other major arterials, strategies include monitoring roadway conditions; detecting, verifying, responding to, and clearing incidents quickly; providing traveler information through variable message signs, 511 telephone service, and other means; implementing lane management strategies; controlling flows onto freeways with ramp meters; and restricting some facilities to high occupancy vehicles. On minor arterials and major collectors, the timing and coordination of traffic signals are essential to facilitate the flow of traffic.

States and local governments are making progress in the adoption of these strategies, but much work in this area remains to be done. Without greater attention to operations, travelers and goods moving on the Nation's highways will continue to waste many hours as a result of delay caused by recurring congestion, incidents, work zones, weather, and poor traffic control. Lives will be ruined or lost because unsafe conditions and crashes are not detected and countered in a timely fashion. Through the effective implementation of correct operations strategies, transportation system reliability, safety, and security can be improved and productivity increased.

Total highway mileage grew at an average annual rate of 0.2 percent between 1995 and 2004, while total VMT grew at an average annual rate of 2.5 percent. Rural road mileage has been declining since 1997, partly reflecting the reclassification of some Federal roads as non-public and the expansion of urban area boundaries as a result of the decennial Census. Rural VMT grew at an average annual rate of 1.4 percent from 1995 to 2004, compared with an average annual increase of 1.8 percent in small urban areas (population 5,000 to 50,000) and 2.3 percent in urbanized areas. Rural VMT declined from 2002 to 2004 primarily as a result of boundary changes associated with the decennial Census; boundary changes also tend to inflate urban VMT growth. In 2004, about 76.5 percent of highway miles were locally-owned, States owned 20.4 percent, and only 3.1 percent was owned by the Federal government.[16]



The U.S. DOT Congestion & Performance Report (2006) also indicates that transit system coverage, capacity, and use in the United States continued to increase between 2002 and 2004. In 2004, there were 640 transit operators serving urbanized areas, of which 600 were public agencies. A public transit provider may be a unit of a regional transportation agency, a State, a county, or a city government or it may be independent. In 2002, the most recent year for which information is available, there were 4,836 providers of special services to older adults and persons with disabilities receiving Federal Transit Administration (FTA) funds; and in 2000, the most recent year for which information is available, there were 1,215 transit operators serving rural areas.[17]

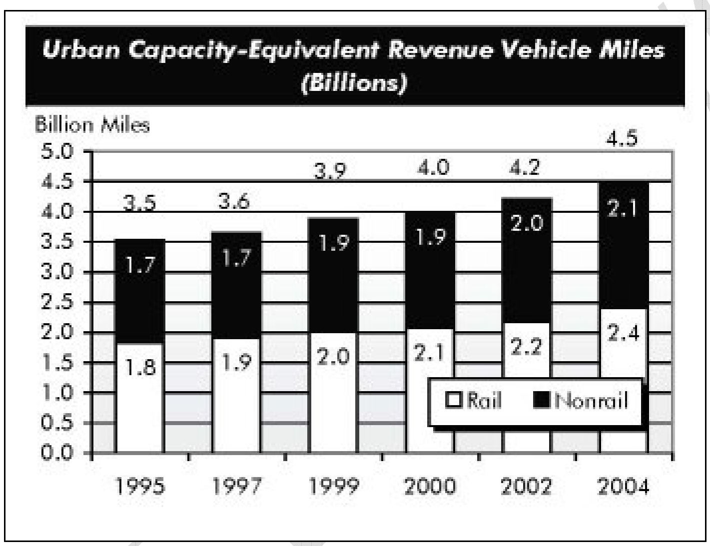
In 2004, transit agencies in urban areas operated 120,659 vehicles (5 percent more than in 2002) of which 92,520 were in areas of more than 1 million people. Rail systems comprised 10,892 miles of track and 2,961 stations. There were 793 bus and rail maintenance facilities and 2,961 stations in urban areas, compared with 769 maintenance facilities and 2,862 stations in 2002. The most recent survey of rural operators in 2000 estimated that 19,185 transit vehicles operated in rural areas. The FTA estimates that in 2002 there were 37,720 special service transit vehicles for older adults and persons with disabilities, of which 16,219 were funded by FTA. Average transit operating speeds remained relatively constant between 1995 thru 2004 and these speeds were found to be slightly higher in 2004 than in 2002. Average operating speeds measure the average speed that a passenger will travel on transit rather than the pure operational speed of transit

[16] Source: U.S. DOT's Condition & Performance Report, 2006, Chapter 2, Executive Summary at: http://www.fhwa.dot.gov/policy/2006cpr/es02h.htm

[17] Ibid

vehicles. In 2004, the average speed was 20.1 miles per hour up from 19.9 miles per hour in 2002, and equal to the ten-year average of 20.1 miles per hour.[18]

In 2004, transit systems operated 226,402 directional route miles, of which 216,620 were non-rail and 9,782 were rail route miles. Total route miles decreased by 3.8 percent between 2002 and 2004. Over this timeframe, non-rail route miles decreased by 4.1 percent and rail route miles increased by 3.1 percent. Transit revenue miles adjusted for capacity increased by 3.9 percent between 2002 and 2004. During this same time frame, rail capacity increased by 6.1 percent and non-rail capacity by 1.3 percent. Rail provided 2.4 billion capacity-equivalent miles in 2004, and non-rail provided 2.1 billion miles.

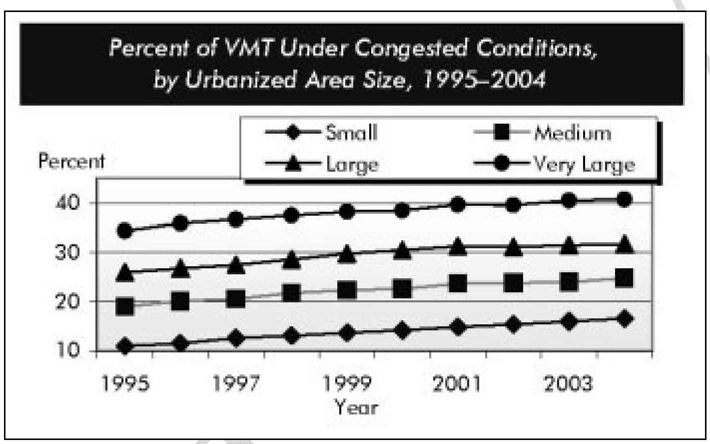


Congestion on the Nation's highways imposes significant costs on drivers and society as a whole in the form of added travel time, vehicle operating costs, and emissions. Congestion results when traffic demand approaches or exceeds the available capacity of the highway system. It is clear that traffic demands vary significantly by time of day, day of the week, season of the year, and for special events. However, the available capacity at any given time is also variable, affected by weather, work zones, traffic incidents, and other non-recurring events. Of the total congestion experienced by Americans, it is estimated that roughly half is "non-recurring," associated with temporary disruptions (e.g., traffic incidents, etc.) in traffic demand and/or in available capacity.

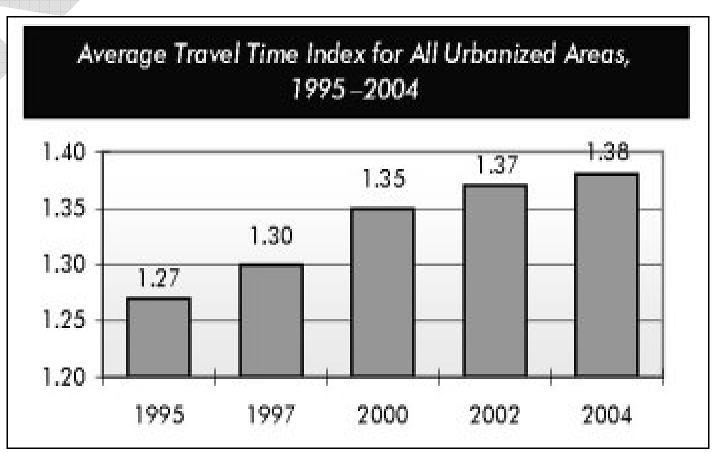
There is no universally accepted definition or measurement of exactly what constitutes a congestion "problem," and the 2006 Conditions & Performance report uses a variety of different metrics to explore different aspects of congestion. The Texas Transportation Institute (TTI) has computed data for the FHWA for several measures, based on data for all 428 urbanized areas in 2004. (Note that the values shown for these same measures in TTI 2005 Urban Mobility Study are different, since that study was based on a subset of 85 urbanized areas that is weighted more heavily to the most heavily populated areas.)

[18] Source: Ibid

The Average Daily Percent of VMT under Congested Conditions is an indicator of the portion of daily traffic on freeways and other principal arterials in an urbanized area that moves at less than free-flow speeds. This percentage increased from 25.9 percent to 31.6 percent from 1995 to 2004 for the average urbanized area, and rose for each of four subsets based on population size reported by TTI; Small (population less than 500,000) rose from 15.4 percent to 16.6 percent, Medium (population 500,000 to 999,999) rose from 19.0 percent to 24.8 percent, Large (population 1 million to 3 million) rose from 26.0 percent to 31.7 percent, and Very Large (population greater than 3 million) rose from 34.4 percent to 40.7 percent. While the percent of VMT under congested conditions rose from 2002 to 2004, it rose at a lower rate than it had from 1995 to 2002.



The Average Length of Congested Conditions, a measure of the typical duration of congested travel conditions in urbanized areas, stabilized at approximately 6.6 hours per day in 2002 and 2004, after rising from 5.9 hours per day in 1995. The Travel Time Index measures the amount of additional time required to make a trip during the congested peak travel period, rather than at other times of the day. The average travel time index for all urbanized areas for 2004 was 1.38, indicating that congestion caused travel times to be 38 percent longer. This is up slightly from the 1.37 value reported for 2002; the value for 1995 was 1.27.



In 2004, the average delay experienced by the peak period travelers for all urbanized areas was 45.7 hours, up slightly from 45.4 hours in 2002. The average annual delay per capita (including all residents of a given area, not just peak travelers) rose from 23.8 hours in 2002 to 24.4 hours in 2004.

Emerging Operational Performance Measures

Measurement of congestion is still a difficult problem. Substantial research has supported the use of delay as the definitive measure of congestion. Delay is certainly important; it exacts a substantial cost from the traveler and, consequently, from the consumer. However, it does not tell the complete story. Moreover, there currently is no direct measure of delay that can be collected both consistently and inexpensively. Reliability is another important characteristic of any transportation system, one that industry in particular requires for efficient production. If a given trip requires 1 hour on one day and 1.5 hours on another day, an industry that is increasingly relying on just-in-time delivery suffers. It cannot plan effectively for variable trip times. Additional research is needed to determine what measures should be used to describe congestion and what data will be required to supply these measures.

System Reliability

Travel time reliability measures are relatively new, but a few have proven effective at the localized level. Such measures typically compare high-delay days with average-delay days. The simplest method typically applied identifies days that exceed the 90th or 95th percentile in terms of travel times. This approach estimates how bad delay will be on specific routes during the worst one or two travel days each month.

The Buffer Index measures the percentage of extra time travelers must add to their average travel time in order to allow for congestion and be able to arrive at a location on time, about 95 percent of the time. The Planning Time Index represents the total travel time that is necessary to ensure on-time arrival, including both the average travel time and the additional travel time included in the Buffer Index. The Planning Time Index is especially useful because it can be directly compared to the Travel Time Index presented earlier in this chapter on similar numeric scales. While data are not currently available to support these measures at the national level, data have been collected on these indicators for a number of locations and will be applied to additional cities as equipment is deployed and data are accumulated.

The importance of reliability is underscored by a recently completed study of temporary losses of capacity for the FHWA by Oak Ridge National Laboratory. Temporary capacity losses due to work zones, crashes, breakdowns, adverse weather, suboptimal signal timing, toll facilities, and railroad crossings caused over 3.5 billion vehicle-hours of delay on U.S. freeways and principal arterials in 1999. For journeys on regularly congested highways during peak commuting periods, temporary capacity losses added 6 hours of delay for every 1,000 miles of travel. Americans suffer 2.5 hours of delay per 1,000 miles of travel from temporary capacity loss for journeys on roads that do not experience recurring congestion.

Traffic Bottleneck Study

A February 2004 report prepared by Cambridge Systematics, Inc. for the American Highway Users Alliance, *Unclogging America's Arteries: Effective Relief for Highway Bottlenecks 1999–2004*,[19] listed 233 locations in urban areas that it classified as bottlenecks. Traffic congestion occurs in these areas because of sudden reduction in number of lanes or a major increase in traffic volume for a specific freeway section beyond its capacity. The report estimated the benefits resulting from eliminating the 24 worst bottleneck locations. Improvements to these locations may prevent an estimated 449,606 crashes, including 1,787 fatalities and 220,760 injuries. Major reductions in pollutants also were cited as a benefit, including 101,320 tons of carbon monoxide and 10,449 tons of volatile organic compounds. Peak period user delay for the 233 locations may be reduced by an estimated 74.5 percent, which translates to approximately 32 minutes each day per commuter. An October 2005 report prepared by Cambridge Systematics, Inc. for the FHWA, *An Initial Assessment of Freight Bottlenecks on Highways*, examines bottlenecks from the freight perspective.[20]

Leading Indicators

The FHWA tracks the implementation of various operations strategies as leading indicators of potential future congestion trends. These include the deployment of ITS, as well as the deployment of regional ITS Architecture and the deployment of "511" travel information systems. The FHWA has also developed self-assessment tools for States and regions to measure their progress in work zone management, incident management, and congestion partnerships. For additional information, please see

Texas Transportation Institute Urban Mobility Data

The Texas Transportation Institute (TTI) collects urban mobility data in the form of congestion travel time index measurements. The TTI publishes its annual urban mobility studies nationwide as part of this effort (See TTI's 2007 Urban Mobility Study at: http://mobility.tamu.edu/). This data and information is used in the development and calculation of performance measures by the FHWA. Various TTI measurements related to transportation system operations and performance includes: Average Daily Percent of VMT under Congested Conditions, Average Length of Congested Conditions, Travel Time Index, Annual Delay per Peak Period Traveler, and Annual Delay per Capita. According to the U.S. DOT 2006 Conditions & Performance report[21], the mobility needs of the American people are served by a network of 4.0 million miles of public roads in 2004.

[19] Source: For a copy of this 2004 study prepared by Cambridge Systematics, Inc. please see the following web-link for additional information: http://www.highways.org/pdfs/bottleneck2004.pdf

[20] Source: For additional information, please see the FHWA white paper entitled "An Initial Assessment of Freight Bottlenecks on Highways" may be found at: http://www.fhwa.dot.gov/policy/otps/bottlenecks/

[21] See the 2006 U.S. DOT's Conditions & Performance Report at the following website location: http://www.fhwa.dot.gov/policy/2006cpr/index.htm

About 75.1 percent of this mileage was located in rural areas (those with populations less than 5,000).

Measuring Performance Using ITS Technologies

The deployment of ITS technologies provides opportunities for improved measurement of performance. For example, speed and travel time could be measured directly and unobtrusively by sensors in or beside roadways, rather than through rough approximations based on vehicle counts or surveys.

Travel time can also be measured through communications systems used in vehicles, such as monitoring truck movements on intercity and urban sections of the Interstate System. Methods for compiling ITS data, removing spurious observations, and producing useful statistics are still under development.

The Real Time System Management Information Program authorized in section 1201 of the Safe, Accountable, Flexible and Efficient Transportation Equity Act: Legacy for Users (SAFETEA-LU) should provide additional momentum towards the establishment of the types of information systems that could significant improve our ability to measure highway congestion and operational performance.

Integrated Corridor Management (ICM)

ICM is a promising new tool in the congestion management toolbox developed by the U.S. DOT that seeks to optimize the use of existing infrastructure assets and leverage unused capacity along our nation’s urban corridors. With ICM, transportation professionals manage the transportation corridor as a multimodal system—rather than taking the more traditional approach of managing individual assets.

Transportation corridors often contain unused capacity in the form of parallel routes, the non-peak direction on freeways and arterials, single-occupant vehicles and transit services that could be leveraged to help manage congestion. Traffic information today is often fragmented, outdated or not completely useful. In an ICM corridor, because of proactive multimodal management of infrastructure assets, travelers and shippers could receive information that encompasses the entire transportation network. Travelers could then dynamically shift to alternative transportation options—even during a trip—in response to changing traffic conditions.

For example, while driving in a future ICM corridor, a traveler could be informed in advance of congestion ahead on that route and be informed of alternative transportation options such as a nearby transit facility’s location, timing and parking availability.

ICM Pioneer Sites

The U.S. DOT is partnering with eight “Pioneer Sites” in a 5-year initiative to develop, deploy and evaluate ICM concepts in eight of our nation’s busiest corridors. The USDOT ICM Initiative aims to advance the state of the practice in transportation corridor operations to manage congestion. This initiative will provide the institutional guidance, operational capabilities, Intelligent Transportation Systems (ITS) technology and technical methods needed for effective ICM systems.

The USDOT ICM Initiative Has the Following Objectives:

1. Demonstrate how operations strategies and ITS technologies can be used to efficiently and proactively manage the movement of people and goods in major transportation corridors through integration of the management of all transportation networks

2. Develop a toolbox of operational policies, cross-network operational strategies, integration requirements and methods, and analysis methodologies needed to implement effective ICM systems.

3. Demonstrate how proven and emerging ITS technologies can be used to coordinate the operations between separate corridor networks to increase the effective use of the total transportation capacity of the corridor.

As part of this ICM Initiative, the USDOT recently selected eight ICM Pioneer Sites to plan, design, model and demonstrate the benefits of ICM. These ICM Pioneer Sites have distinguished themselves as innovators and leaders in the area of congestion management:

- Dallas, Texas
- Oakland, California
- Houston, Texas
- San Antonio, Texas
- Minneapolis, Minnesota
- San Diego, California
- Montgomery County, Maryland
- Seattle, Washington

These Pioneer Sites are developing, testing and evaluating combinations of new institutional approaches and advanced technologies designed to optimize the existing transportation infrastructure and offer travelers more choices. Their leadership and willingness to try new approaches as part of this groundbreaking initiative will directly contribute to more efficient and safer urban corridors for the future.

ICM Knowledgebase

The USDOT is released a beta version of the ICM Knowledgebase at the ITSA Annual Meeting held in Palm Springs, CA, June 4–6, 2007.

ICM Pioneer Sites Complete Concept Development

In March 2007, representatives from the eight Pioneer Sites met in Houston, Texas to present their ICM concepts and strategies to the USDOT's core team and to each other.

Second ICM Quarterly Newsletter- Now Available!

The ICM newsletter is produced by the U.S. DOT (RITA) in Washington, D.C. The newsletters provide an update on the latest ICM initiatives and provide current articles and briefings regarding ICM pioneer sites. The ICM newsletters also provide an update on the Analysis, Modeling, and Simulation Phases of this effort.

The most recent ICM newsletter provides articles that discuss how ICM concepts have assisted transportation engineers reroute traffic after the I-35 Minnesota bridge collapse. The ICM newsletter was launched in June 2007 and will be produced by the U.S. DOT (RITA) on a regular basis for additional information, please see the following website: http://www.its.dot.gov/icms/new_newsletter.htm

What to Look for

The need to link the MPO planning process with operations & management of the transportation system is evident under federal laws and regulations (e.g., 23 USC 134, 23 CFR 450, 23 CFR 940, etc.) and federal-aid policy guidance. The use of ITS deployments, traffic flow improvements, centralized traffic operations centers, congestion mitigation and other transportation demand management techniques as highlighted within this chapter should be documented as part of the TMA certification process. How these transportation demand management strategies affect congestion levels and mobility improvements within the MPO area as part of the congestion management process is critical in order to ensure appropriate linkages between the MPO project selection and prioritization process and the long-range performance goals for the metropolitan planning area.

One way to begin this review would be to examine the current MPO ITS regional architecture documentation for consistency with the local planning process which is required under 23 CFR 450.306(f) of the metropolitan planning regulations. A review of Subchapter K- Intelligent Transportation Systems Part 940 (23 CFR 940) provides an excellent overview of the standard ITS definitions, policy, applicability, and regional architecture minimum documentation requirements. The ITS regional architecture should be periodically reviewed, updated, and adopted by the MPO technical advisory committees and transportation policy board as needs evolve within the region. The agreements, memorandums of understanding, or other ITS regional architecture documentation should be made available by the MPO prior to the on-site certification review as part of the desk audit phase of the TMA certification process. It should be noted that all ITS projects funded with highway trust funds shall use applicable ITS standards and interoperability tests that have been officially adopted by the U.S. DOT, and prior to the authorization of federal-aid highway trust funds for construction or implementation of ITS projects, compliance with 23 CFR 940.11 must be demonstrated.[22]

The MPO long-range transportation plan should also be reviewed as part of the MPO desk audit by FHWA and FTA prior to the on-site certification review to ensure that it contains the operational and management planning factors/goals of SAFETEA-LU. If the MPO has developed its own performance measures related to operations and management, it would be beneficial to see how measures are related to the MPO planning products and project selection procedures. The MPO transportation improvement program (TIP) should also be reviewed for SAFETEA-LU compliance purposes and how the congestion management process (CMP) effectively serves to select by prioritization of demand management and ITS strategies for the safe, efficient, and effective movement of people and goods within the metropolitan planning area.

The Unified Planning Work Program (UPWP) should be reviewed as part of the MPO desk audit prior to the on-site certification review by the FHWA and FTA. This would serve to identify congestion management studies, data collection, traffic demand modeling efforts, staffing or training needs, and other corridor feasibility studies related to alleviation of congestion and improved mobility within the metropolitan planning area. The UPWP would show the consultant studies underway, programming of PL funds, research, tasks, or other planning work being performed in-house by MPO staff related to operations and management. The sum total of these UPWP work program efforts help to monitor and evaluate the system performance of the current and future transportation system and also ensures the operations and management efforts are clearly identified for the region.

Sample Discussion Questions

1. What is the current status of the ITS Regional Architecture for the metropolitan area required under 23 CFR 940? How often is the documentation or agreements subject to periodic review and updates to reflect current conditions? How is it being utilized for purposes of implementation of ITS projects funded as part of the federal-aid highway program?

2. How is operations and management of the transportation system documented within the MPO transportation planning documents, including the long-range metropolitan transportation plan, UPWP, and TIP?

[22] Ref: 23 CFR 940.13, compliance with this part will be monitored as part of the Federal-aid oversight procedures as provided under 23 U.S.C. 106 and 133.

3. Does the MPO develop or utilize performance measures to account for operations & management of its transportation system? If so, how and where are they documented within the transportation planning process and products?

4. How does the MPO fund traffic data monitoring, collection, and reporting for purposes of tracking operations and management of its transportation system? Does the MPO share this data with other planning agencies, including the State DOT for HPMS reporting purposes?

5. How does the MPO work with the cities and counties within its metropolitan planning area to assist with special events, emergency operations, and traffic control planning for potential emergency evacuation purposes?

6. Does the MPO work on any feasibility or corridor studies related to improved operations and management within heavily congested areas? If so, how are these research or planning studies shared and coordinated with its stakeholders including FHWA, FTA, universities, and city/county or local planning agencies?

7. As part of its interagency coordination and public participation plan process, does the MPO include any other State, local, or federal agencies involved in operations and management of the transportation system? If so, are these affected agencies and their representatives included in the review of draft MPO planning products?

8. How is the MPO working to improve the linkages between transportation systems operations and management with the "3-C" metropolitan planning process? How effectively has the MPO worked to coordinate and collaborate with its stakeholders to ensure that this process and linkage is strengthened and integrated over time as part of its metropolitan planning process?

9. If the MPO metropolitan planning area boundary encompasses other State or jurisdictional lines, how does the MPO staff and technical advisory committees effectively collaborating with neighboring State DOTs, city planners, or local officials?

10. Does the MPO share its notable best management practices with other MPOs and national organizations including AMPO, AASHTO, U.S. DOT Volpe Center, State DOTs, and FHWA/FTA for purposes of technology transfer?

Examples of Notable O&M Practices

Arizona- Nogales Port of Entry Inspection Process

Like many international border crossings, just a few short years ago the Nogales Port of Entry on the southern Arizona/Mexico border was operated by individual U.S. and State

Government agencies with no collaborative efforts to work together. After eight years of effort and continuous improvement, the new joint Federal-State truck inspection building at the Nogales Port of Entry was opened in November 2004.

The Nogales truck inspection building is a 2-story, 2-bay state-of-the-art facility houses the truck inspection teams from the Arizona Department of Public Safety (Highway Patrol), Arizona DOT Motor Vehicle Division and the Federal Motor Carrier Safety Administration. Perhaps even more important is the fact that this is part of a larger effort called the Nogales Port Improvement Project that has combined the efforts of these organizations as well as the FHWA, U.S. Customs and GSA.

The overall project, which demonstrates the cooperation of all of these agencies, also includes Intelligent Transportation Systems, improved access, joint credentialing facilities, out of service parking, and hazardous waste containment all within the shared Federal-State facility. Today Nogales is becoming recognized as a model Federal/State port of entry.

Arizona- Phoenix Concept of Transportation Operations

The Phoenix metropolitan area has developed a plan for regional coordination of transportation operations. This plan includes specific strategies on how transportation agencies, incident and emergency management, transit and other agencies work together to get the most benefit out of the region's existing systems and transportation resources. The Regional Concept of Transportation Operations (RCTO) sets out a regional operations vision and mission, sets goals and performance measures, describes institutional arrangements and highlights the resources required to carry out the plan.

A Transportation Operational Manual has been developed to assist the agencies in implementing the RCTO. This document is one of the first of its kind in the country and has tried to stay at the cutting edge of thinking for Transportation System Management and Operations. The RCTO has been adopted by the Maricopa Association of Governments (the MPO) and a Memorandum of Understanding is currently being signed by the participating organizations and agencies.

Additional information, including reports is available on the web at: http://www.mag.maricopa.gov/project.cms?item=1395 The Regional Concept of Transportation Operations has been adopted by a broad range of local stakeholders engaged in operations (see Figure 3). Several new AZTech initiatives have been inspired by the RCTO and are producing solutions for improving transportation operations. Overall, the collaborative process that was followed by MAG in developing the RCTO has led to very encouraging results. The Regional Concept of Transportation Operations project received the 2006 Best ITS Planning Project Award from ITS Arizona.

Arizona DOT Traveler Information System

The Arizona Department of Transportation (ADOT) in cooperation with other agencies and jurisdictions has made strides in the past couple years in improving the traveler information available in Arizona. And it is really paying off in the amount of traveler information that is available to the public and how much it is getting used.

The ADOT website received an average of 3 million "hits" per month in 2002, which doubled to 6.2 million hits per month by 2003, increased to 10.5 million hits per month in 2004, and recorded a huge 24.5 million hits during the first month of 2005. The 511 system is also seeing significant increased usage.

The average calls-per-month in 2003 were around 25,000, in 2004 the average doubled to around 50,000 call/month, and the first month of 2005 recorded over 90,000 calls. This usage also seems to be only the tip of the iceberg as the systems become easier to use and the data entered into the system is expanded.

Combined Transportation, Emergency, and Communications Center (CTECC) in Austin, Texas

In its initial several weeks of operation, the Combined Transportation, Emergency and Communications Center (CTECC) in the Austin, Texas region demonstrated its capacity to increase coordination between traffic operations, emergency services, and police departments. For example, by facilitating direct communication between the traffic operations and emergency services staff, the center has increased awareness about traffic impacts caused by accidents so that emergency vehicles are less likely to unnecessarily block traffic. As the region considers new projects in the future that involve emergency services, the CTECC will provide a forum to involve the broad range of management and operations constituents in regional planning. For more information about this example, contact Brian Burk: bburk@dot.state.tx.us.

I-95 Corridor Coalition's Quick Clearance Program

In a March 2008 letter to the I-95 Corridor Coalition, U.S. Department of Transportation Secretary Mary Peters recently stated: "The I-95 Corridor Coalition's Quick Clearance Program and Toolkit is an important educational element for improved responder safety and system performance. The I-95 Corridor Coalition's leadership in advancing traffic incident management and highway safety is a national model, and its success continues to provide an excellent example to other regions in the country. We encourage advancement of the National Unified Goal for Traffic Incident Management in the I-95 corridor and believe the I-95 Corridor Coalition's Quick Clearance Program and Toolkit can provide a valuable resource for doing so."

The Coalition's Quick Clearance Program began with a study and documentation on best practices, followed by the development of a toolkit for first responders and instructional workshops offered throughout the corridor. Workshops have been held in thirteen locations to date, with a combined attendance of over 600 individuals, representing personnel from DOT's, fire, police, EMS, towing, and other first responders. In addition to the workshops, we are assisting State's with implementation of their quick clearance programs. For more information on the I-95 Corridor Coalition, the Quick Clearance Program, and the events referenced above, please visit our website at **www.i95coalition.org**.

Dallas, TX: US–75 Corridor

The ICM corridor in Dallas, TX (US–75), has a heavy volume of traffic and is one of the most critical corridors in the region. Dallas is home to a wide variety of large employers and universities. The corridor has no ability to expand and will be impacted by major construction planned in the surrounding area. Along the US–75 corridor, the Dallas ICM team aims to help develop a truly regional network, deliver better traveler information, expand Intelligent Transportation Systems (ITS) and integrated operational systems, coordinate incident management, increase the capacity of park-and-ride facilities, and increase the capacity of transit (e.g., light rail) during major incidents and events. Dallas is implementing HOV and is considering value-pricing strategies.

The city opened its DalTrans regional Traffic Management Center in July 2007, allowing all partner ICM agencies to be connected. Key ICM partners in Dallas include the Dallas Area Rapid Transit (DART) in association with the city of Dallas, Town of Highland Park, North Central Texas Council of Governments (NCTCOG), North Texas Tollway Authority (NTTA), city of Plano, city of Richardson, Texas Department of Transportation Dallas District, city of University Park, Texas Transportation Institute (TTI), University of Texas at Arlington (UTA), Southern Methodist University (SMU), and Telvent Farradyne.

Dallas-Fort Worth MPO Linking Transportation Planning and Operations

The North Central Texas Council of Governments (NCTCOG), the MPO for the Dallas-Fort Worth region, has planned, developed and implemented a $30 million M&O program, using CMAQ and STP funds. The program focuses on short-range actions to address air quality, congestion and safety issues.

At AMPO's September 2001 Annual Conference, Michael Morris, Transportation Director of the NCTCOG, presented operations activities underway at the MPO. He spoke of these activities in terms of the transportation programs, policies, and projects underway in the region and their relationship to enhanced M&O, and provided examples of each. NCTCOG programs involving operations include freeway bottleneck removal, mobility assistance patrols, speed limit reduction, thoroughfare audits, public education, and sustainable development. Policies include speeding construction using better management and incentives for early completion, training police and fire to respond to incidents, a uniform towing ordinance to eliminate bottlenecks, development of a memorandum of understanding among partners, project streamlining, and expanded criteria for selecting projects. Specific projects include traffic management centers, real-time information in truck cabs, movable barrier and control-flow lanes, red light running enforcement, and smart parking garages.

Implementation of each of these programs, policies, and projects adds up to an enhanced transportation system. Performance measures are taken to determine improvements. These include, a state of the region report that documents transportation indicators and trends, safety reports, air quality measurements, ands low level aerial photography. The driving force behind these activities boils down to a customer focus. Traditional planning methods alone are not sufficient. Another meaning for MPO, Mr. Morris emphasized, is Management Planning and Operations. NCTCOG is re-orienting itself to focus on people, not transportation facilities, when planning the transportation system.

Dallas/Fort Worth Region- 2012 Olympic Bid Lessons

In preparing a bid for the 2012 Summer Olympics, the Dallas/Fort Worth region worked collaboratively to design a system of managed lanes throughout the region. Through this planning exercise, operations managers and planning staff learned that managed lanes were the only feasible way to provide rapid priority travel to particular sites. Although Dallas did not win the Olympic bid, the planning exercise resulted in some important lessons about the flexibility of a regional managed lane network. For more information about this example, contact Dan Lamers: dlamers@nctcog.org.

Denver Regional Council of Governments (DRCOG) Signal Coordination Program

Since 1989, the Denver Regional Council of Governments (DRCOG) Traffic Operations Program has been working with the Colorado DOT and local governments to coordinate traffic signals on major roadways in the region as a way of reducing traffic congestion and improving air quality. Traffic signal timing improvements have been completed across jurisdictional boundaries. DRCOG was one of the first MPOs to conduct such a program, and remains a leader among MPOs throughout the country involved in traffic signalization efforts.

The Traffic Operations Program's efforts are governed by the Traffic Signal System Improvement Program (TSSIP), which has two major components: A capital improvement program, which provides equipment and installs communications links that allow signals to operate as a system, rather than as individual units; and a traffic signal timing improvement program. In the year 2000, four capital projects were completed on major streets in the region, and new traffic signal timing and coordination plans were implemented on 28 corridors.

DRCOG prepared a brochure titled "Why Are the Signals Red," which provides an informative overview of some of the challenges involved in improving traffic signal timing and coordination. For information about the Traffic Operations Program or the brochure contact Jerry Luor, at (303) 480-6753.

Florida DOT Strategic Intermodal System (SIS)

The Florida Department of Transportation (FDOT) has developed a multimodal level of service (LOS) analysis process to measure and provide mobility for diverse roadway users. The Florida Legislature authorized creation of multimodal transportation districts in the late

1990's. It also directed FDOT to develop methods for measuring performance of various modes to assist local governments with concurrency requirements for growth management.

For the last few years, the Florida Department of Transportation has been working with all of its partners to develop a transportation system that will enhance Florida's economic competitiveness. This system, known as the Strategic Intermodal System (SIS), is composed of transportation facilities and services of statewide and interregional significance. In 2003, the Florida Legislature enacted and the Governor signed a law establishing the Strategic Intermodal System (SIS).

This new system represents a fundamental shift in the way Florida views the development of – and makes investments in – transportation facilities and services. The FDOT has developed specific performance goals related to O&M as part of its 2025 Long-Range Transportation Plan, one of the long-range strategic goals includes: "Optimize the efficiency of Florida's transportation system by implementing operational, management, access and land use strategies that support the intended use of each element of the system identified as part of evolving statewide, regional or community visions." Another performance goal identified within the 2025 Long-Range Transportation Plan includes: "Provide for smooth and efficient transfers for both people and freight between transportation modes and between other transportation facilities." For additional information, please see the following website:
http://www.dot.state.fl.us/planning/2025ftp/mec081905.pdf

Georgia DOT Traffic Incident Management Enhancement

The Georgia Division has a strong leadership role in the metro Atlanta Traffic Incident Management Enhancement (TIME) Task force. The task force has attracted broad, active membership from a number of agencies around the region, representing county and state DOTs, operations, fire, law enforcement, and highway assistance.

The task force has served as a forum to conduct the FHWA Traffic Incident Management self assessment and serves as a continuing forum for sharing lessons learned from major incidents. Some of the other activities have included: training for emergency responders (including towing and recovery); a "steer it and clear it" PSA campaign; the Governor's proclamation of the state' first ever "traffic incident management day;" a tabletop exercise of a major Hazmat event; initial coordination on standardized communications procedures between motorist assistance patrols (Georgia's HERO and Tennessee's HELP).

The task force meetings have improved cooperation, coordination, and communications among over thirty active member organizations involved in emergency response to traffic incidents on the region's roadways. Material available includes: information on any of the activities above. The TIME website can be found at
www.dot.state.ga.us/specialsubjects/time/index.shtml

Hampton Roads MPO Uses GPS/GIS to Perform Travel Time Study

The Hampton Roads Planning District Commission (HRPDC), the MPO for the Hampton Roads metropolitan area, recently conducted the first comprehensive travel time study in the region to use global positioning system (GPS) technology for data collection and geographic information system (GIS) technology for data analysis. Although the MPO has conducted travel time studies since the early 1980's, previous studies were conducted using a computer-equipped vehicle and a calibrated distance-measuring instrument.

Travel time data was collected on more than 1,100 miles of roadway, including all of the thoroughfares that make up the Congestion Management System for Hampton Roads. To facilitate data collection, the roadway network was first divided into more than 300 segments of varying lengths. These travel time "run segments" were identified in the MPO's GIS map. Data was collected using a vehicle equipped with a GPS receiver. The driver attempted to pass roughly the same number of vehicles that passed him, and was not allowed to exceed the posted speed limit on any road. A hand-held data logger collected position, time, and speed data once every second during each data collection run. One data collection run was made in each direction during the morning and afternoon peak hours for each segment.

The GPS unit provided real-time differential correction for the position of the vehicle on the earth. The unit was comprised of a GPS receiver, an external antenna, and the data logger, which stored the collected GPS data so it was not necessary to have a separate computer in the vehicle. During the run there was no need for the driver to handle the data logger, allowing him to focus solely on driving. Upon returning to the office, the driver downloaded data from the data logger to the HRPDC computer network. The data was then processed and joined to the HRPDC transportation GIS using a customized ArcView application.

HRPDC is using the data as a means to assess the performance of the area's transportation system. One useful way to view travel time data is in the form of a travel time contour map. To construct a contour, a point of interest, or centroid, is selected and travel time is summed in all directions to or from that point. The contours in earlier studies were hand calculated and hand drawn. Those developed in this study were generated with the help of the HRPDC Transportation GIS and ArcView application, drastically reducing the time required to produce a contour. Ten and twenty-minute "away from the centroid" contours were produced for twelve activity centers using peak hour data.

The data allow HRPDC to get a handle on the many causes for changes in travel times and average speeds from one study year to another. Changes can occur due to improvements to the transportation system, degradation of sections of the network, capacity expansion, improved signal coordination, and changes in traffic patterns and number of vehicles on the road. HRPDC concluded several things from the analysis, including that:

- 64% of the sample of point-to-point trips in the study exhibited worse travel time in 2000 than in 1995;
- 20% of the sample point-to-point trips showed better travel time in 2000;

- most of the significant improvements shown in travel time could be attributed, in part, to major transportation improvement projects; and
- travel time contour data, coupled with demographic or socioeconomic, provide a powerful tool for economic development or facilities location.

Among the benefits of collecting travel time data with a GPS-equipped vehicle are simple and trouble-free data collection, an easy interface for linking the data to the GIS, and efficiency in terms of time and manpower. Limitations include inability to collect data inside tunnels and under dense foliage. In the latter case, runs have to be made in the fall or winter months after leaves have fallen.

For more information, contact Michael Kimbrel, Senior Transportation Engineer, at mkimbrel@hrpdc.org or (757) 420-8300.

Houston, TX: I-10 Corridor

Traffic demands along Houston's ICM corridor (I–10) continue to grow because the population is increasing and three of its major employment centers are expanding.
Along the I–10 corridor, ICM will help manage delay through ITS and congestion pricing strategies; empower travelers to make decisions with multimodal, personalized information; and enhance multiagency incident management and corridor operations. Houston plans to convert the Katy Freeway (I–10) HOV lanes to semi-HOT lanes as one strategy to help increase capacity. Key ICM partners in Houston include the Texas Department of Transportation, Houston Metropolitan Transit Authority of Harris County, city of Houston, Houston TranStar, and the Houston-Galveston Area Council.
http://www.its.dot.gov/icms/pioneer.htm

Kansas City Operation Green Light

Operation Green Light is a joint effort between State and local governments to synchronize traffic signals on 1500 intersections throughout the Kansas City area in order to improve traffic flow and air quality. The Mid-America Regional Council (MARC), the area's MPO, is the umbrella under which the Missouri and Kansas Departments of Transportation and 17 area cities work together to develop coordinated timing plans and signal communication systems. The coincidence of several key events helped bring Operation Green Light into existence. In 1998, MARC allocated funds to study the impact of traffic signal coordination on emissions reduction.

That same year the Missouri DOT and the Public Works Department of Kansas City conducted a study addressing common hardware standards for traffic signal equipment. In the summer of 1998, the two studies were combined and resulted in a recommendation for regional signal timing coordination. With its recent eligibility for CMAQ funds, the Kansas City region was able to initiate Operation Green Light. At the present time, the region is assembling resources and working with local agencies to deploy signal timing plans. Operation Green Light is expected to reduce traffic delays, improve traffic flow, reduce emissions, and assist in managing changes in traffic patterns resulting from a new freeway management system. For more information about this example, contact Ron Achelpohl: rona@marc.org.

Kentucky -- Transportation Operations Center

The KYTC's new office building includes a modern, state-of-the-art Transportation Operations Center (TOC). The new TOC will serve as KYTC's focal point for dispatching vehicle enforcement officers, coordinating snow/ice removal, disaster coordination, incident management, providing traffic information to the public and serving as the Commonwealth's back-up Emergency Operations Center. The new TOC has been integrated with the four existing regional ITS systems as well as with several other Commonwealth Agencies.

Minneapolis, MN: I–394 Corridor

The Minneapolis ICM team hopes to reduce congestion caused by incidents and planned events; encourage travelers to shift travel modes and routes; increase traffic flow with managed lanes, transit signal priority, and coordinated signal timing; and improve signal equipment reliability.

The Minneapolis ICM team is focusing actively on developing relationships with key partner agencies and stakeholders to exchange incident data along its ICM corridor. This is a first step toward the city's goal for full computer-aided dispatch (CAD) integration. In the very near term, it is considering sharing information through manual channels, such as by radio, e-mail, and telephone, to improve communications and increase shared visibility among the different agencies.

After the August 2007 Minneapolis bridge collapse, Minneapolis area transportation agencies used lessons learned from the development of their ICM CONOPS to implement some ICM strategies to address the lost capacity on one of the city's main transportation corridors. Key ICM partners in Minneapolis include the Minnesota Department of Transportation, Metro Transit, Hennepin County, city of Minneapolis, and the Minnesota State Patrol.

Montgomery County, MD: I–270 Corridor

Montgomery County, MD, is home to one of the busiest regional metro lines in the country and boasts an extensive transit system with express buses. Yet the increased commuter traffic, combined with capacity limitations, poses serious challenges for the corridor. Along the I–270 corridor, ICM will help integrate multiagency operational and incident data, coordinate multimodal traveler information, deliver real-time transit vehicle status and commuter parking information, predefine signal timing plans and management plans for incidents, and optimize traffic signals on arterials.

Montgomery County ICM partners are developing a prototype Regional Integrated Transportation Information System (RITIS) that will help commuters make more informed transportation choices. RITIS will serve as a clearinghouse for all data and information coming from multiple Transportation Management Centers in the region and will help to integrate incident and operational data for a more robust shared operational picture among agencies. Key ICM partners in Montgomery County include the Maryland Department of Transportation (MDOT), Maryland State Highway Administration (MDSHA), Maryland Transit Authority (MTA), Montgomery County Department of Public Works and Transportation (DPWT), and the Washington Metropolitan Area Transit Authority (WMATA).

Nebraska DOT Emergency Management Exercises

The Nebraska Department of Roads has been involved in extensive disaster preparedness training exercises. They have observed high levels of collaboration and cooperation among agency divisions and regions during the exercise development and execution process. These training exercises have led to a better understanding of the physical assets and expertise available to each agency and region, helping to promote greater collaboration in day-to-day management and operations activities. For more information about this example, contact Jim Schmailzl: jschmail@dor.state.ne.us.

New Jersey -- Department of Transportation's Quick Fix Task Force

In an effort to deliver highly visible, quick improvements to localized congestion, the New Jersey Department of Transportation (NJDOT) has initiated the Quick Fix Task Force. The Quick Fix Task Force is an interdisciplinary group of NJDOT and FHWA personnel. Problem areas are identified through the NJDOT Commissioner's email suggestion box. The team reviews these suggestions for "quick fix" opportunities to make safety or congestion improvements. Once the potential projects are identified and prioritized based on the emails, the team performs a field investigation.

After the field investigation, the team will either recommend a "quick fix" solution for implementation or will refer the project to be considered with other project needs because no "quick fix" was identified. The individuals recommending the "quick fix projects" are given feedback on their suggestions through the email suggestion box. The "quick fix" solutions identified by the team have included signal retiming, re-striping, channelization, signing, tree trimming, and other low cost solutions. Often the improvements are made with maintenance forces or through existing NJDOT agreements.

New Jersey -- Department of Transportation's Traffic Mitigation Advocate

Traffic Mitigation is a broad reaching activity and affects every aspect of the project delivery process from planning, through design and construction. It not only impacts the traveling public but also contractors, area residents and businesses. It involves the broader transportation industry including transit and freight as well as the communication industry. The New Jersey Department of Transportation (NJDOT) adopted a Traffic Mitigation Policy in 2001. As part of this policy, a Traffic Mitigation Advocate was created within the NJDOT. The mission of the Advocate was to develop and oversee design efforts and process to ensure that traffic impacts to the traveling public during construction and maintenance activities are minimized in a cost effective manner.

The NJDOT had several successful projects that utilized innovative mitigation techniques such as: additional bus service provided by NJ Transit, shuttle buses to local train stations, van pools, brochures, highway advisory radio, advertising on primetime (commute time) radio, websites, advertising on NJ Transit buses, fax networks with local communities, and renting additional space for park-n-ride lots. Although the NJDOT had several successful projects and project teams, it was realized that many opportunities were not available because traffic mitigation was usually thought about late in the design phase. Traffic mitigation involves many stakeholders. The Advocate is responsible to setup and monitor a process that will facilitate the coordination of the different stakeholders early in the project development phase.

Oakland, CA: I–880 Corridor

The Oakland ICM corridor (I–880) experiences significant volumes of local commuter and freight traffic and has some high-incident areas. Along the I–880 corridor, ICM will help agencies share actionable information among freeway, arterial, and transit network systems; improve real-time supply and demand balancing; and improve traffic management for planned events and incident response.

In April 2007, after completing their draft ICM CONOPS, Oakland's corridor managers were able to use some of the ICM concepts discussed in that plan to respond to the collapse of an elevated section of highway that carries motorists from the San Francisco-Oakland Bay Bridge to a number of freeways. Key ICM partners in Oakland include the California Department of Transportation District 4, Metropolitan Transportation Commission, Alameda County Congestion Management Agency, Alameda Contra Costa Transit District, and the BART District.

Oregon DOT Maximum Allowable Corridor Delay

Due to increases in construction volume, it is becoming very likely that a major route will have several ongoing construction projects at any one time. While the travel time delay from any one project may be tolerable, the Oregon DOT (ODOT) was not considering the impacts of accumulated delays to the freight industry or to the long distance traveler. Oregon is currently facing a strain on the transportation system's ability to keep traffic and freight moving. The Oregon Legislature, stakeholders, and the public expect ODOT to ensure mobility even as ODOT delivers an ever-increasing volume of projects.

ODOT is expecting construction volume to double with the passage of the Oregon Transportation Investment Act. In response to this increasing construction activity, ODOT has established maximum allowable corridor delay thresholds for major highway corridors in the state to manage traffic mobility for the traveling public and the freight industry. Construction activities in each corridor are coordinated through a Corridor Mobility

Committee and a Statewide Traffic Mobility Manager to ensure that statewide mobility goals are achieved and that the total maximum allowable delays are not exceeded.

As part of this effort, ODOT created a Mobility Operations Center to give managers the ability to coordinate projects construction delays and avoid conflicts by tracking road and bridge work statewide. ODOT uses a database to gather and map mobility data from the regions throughout the state and uses that data in conjunction with GIS information about current state and local projects, traffic volumes, estimated delays, and other details like bridge weight limits, lane restrictions, and detours. Staff at the center can view a map of all projects scheduled along the major corridors and traffic can be rerouted and construction times staggered to keep traffic moving freely. This is a major advantage to truckers, commuters, tourists, and commerce.

By establishing corridor delay thresholds and tracking the amount of delay generated by construction activities, ODOT can plan projects so the negative impacts to mobility can be minimized. The program is still in the early stages. ODOT's Highway Mobility Operations Manual was introduced July 1, 2005. Results so far have been anecdotal. Early in the planning, coordinators discovered they should reschedule construction work planned for Oregon Route 99E next year because that route would be needed as a detour while several projects are underway on Interstate 5. Similarly, another project showed plans to divert southbound truck traffic to US 97 in Central Oregon at the same time that parts of that highway would be closed for construction work in California.

San Antonio, TX: I–10 Corridor

San Antonio's ICM corridor (I–10) serves a broad range of mobility needs: Downtown business traffic, tourist traffic, and traffic from regional shopping centers and medical centers. The corridor has continuous frontage roads adjacent to I–10 and several major arterial roads. The corridor also boasts one of the region's most popular amusement parks and two colleges.

Even with the significant traffic flowing through the I–10 corridor, ICM will help colocate operations and emergency/incident management, support decisions with real-time and historical data, promote mode and route shifts through improved information, manage traffic flow through seamless traffic signal control and signal timing plans, and improve infrastructure flexibility using lane control signals and ramp dynamic message signs. Key ICM partners in San Antonio include the Texas Department of Transportation, city of San Antonio, and VIA Metropolitan Transit Agency.

San Francisco's Bay Area Freeway Service Patrol

Established in 1992, the Bay Area Freeway Service Patrol (FSP) is a joint project between the Metropolitan Transportation Commission (MTC) Service Authority for Freeways and Expressways, the California Highway Service Patrol, and the California DOT. The 74 FSP trucks patrol 450 miles of the Bay Area freeways to clear crashes, remove debris, and help stranded motorists without a fee. FSP's fast response time helps to reduce congestion and secondary crashes. Patrol trucks are equipped with advanced communications equipment, including an automatic vehicle location system to assist in dispatch. As an indication of its widespread success, on March 24, 2003, FSP recorded its 1 millionth driver assist. For more information about this example, contact Rod McMillan: rmcmillan@mtc.ca.gov.

Regional transportation systems management and operations (TSM&O) means an integrated program to optimize the performance of the existing infrastructure though implementation of multi-modal, cross-jurisdictional systems, services, and projects. These systems, services, and projects are designed to preserve capacity and improve security, safety, and reliability of transportation systems.

Regional TSM&O projects include a diverse range of activities, as illustrated in the box to the right. Regional TSM&O projects can help to link planning and operations in a number of ways. If an MPO leads an operations-oriented project, for example, MPO planners often work closely with operations agencies, and develop a better understanding of operations in the process. The involvement of planners helps to ensure that regional TSM&O projects are adequately supported in the long-range planning and programming process.

Tennessee -- Simplifying Statewide ITS Projects

The FHWA, in conjunction with the TDOT, are in the process of developing guidance to simplify the implementation of ITS projects statewide. The guidance first categorizes projects as Small, General or Major ITS projects. Then a packet of information is passed on detailing the requirements to meet federal regulations along with examples. This is intended to achieve more consistent results statewide, with an appropriate amount of effort based on the scope of the project. Currently, guidance for Small ITS projects has been completed and the remaining guidance is being developed.

Texas- Traffic Incident Management Teams

As transportation agencies, we recognize that at most highway incidents the first responders are in charge of the scene. Many times, these professionals are not trained or concerned with the effect of the incident on traffic. There are a number of efforts and best practices that the FHWA can promote.

Best practices include: regular meetings of Traffic Management Teams to discuss issues and debrief major incidents; freeway service patrols for motorist assistance and traffic control; formal agreements between agencies addressing response and clearance goals; cross agency and jurisdictional training; and the co-location of transportation and public safety in a combined center.

Traffic Analysis Toolbox

"Traffic analysis tools" is a collective term used to describe a variety of software-based analytical procedures and methodologies that support different aspects of traffic and transportation analyses. Traffic analysis tools include methodologies such as sketchplanning, travel demand modeling, traffic signal optimization, and traffic simulation. The purpose of the *Traffic Analysis Toolbox* is to provide guidance, recommendations, and examples on the selection and use of traffic analysis tools.

Currently, there are three volumes in the Traffic Analysis Toolbox:

- **Volume I: Traffic Analysis Tools Primer**
  The primer presents a high-level overview of the different types of traffic analysis tools and their role in transportation analyses.

- **Volume II: Decision Support Methodology for Selecting Traffic Analysis Tools**
  This volume identifies key criteria and circumstances to consider when selecting the most appropriate type of traffic analysis tool for the analysis at hand.
  - To help implement the guidance of the Decision Support Methodology for Selecting Traffic Analysis Tools and execute the Criteria for Selecting the Appropriate Type of Traffic Analysis Tool, access the Decision Support Methodology Automated Tool (HTML, XLS 786KB)

- **Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software**
  These guidelines provide a recommended process for using traffic microsimulation software in traffic analyses.

- **Volume IV: Guidelines for Applying CORSIM Microsimulation Modeling Software**
  This report describes a process and acts as guidelines for the recommended use of CORSIM traffic simulation software in transportation analyses. The seven-step process presented in these guidelines highlights the aspects of a CORSIM analysis from project start to project completion. The seven steps in the process include: 1) scope project, 2) data collection, 3) base model development, 4) error checking, 5) calibration - comparing model MOEs to field data (and adjusting model parameters), 6) alternatives analysis, and 7) final report. Each step is described in detail and an example problem a plying the process is carried through the entire document.

The website indicates that coming soon will be “Volume V: Traffic Analysis Tools Case Studies: Benefits and Best Practices.” Please see the following website for additional information on this subject: http://ops.fhwa.dot.gov/trafficanalysistools/type_tools.htm

Washington State DOT HOV Projects

There have been major debates within the Seattle region regarding who has driving privileges in the HOV lanes. Operations managers at the state DOT recognized that these policy concerns were the domain of planning practitioners. Planners who became involved with HOV policy development had to learn everything about the operation of such facilities so that they could make well-informed policy decisions. As a result of taking the time to understand the systems operations issues associated with HOV operations, these planners have gained a broader connection with operations staff and have been exposed to "operations thinking."

Additional References

- **Congestion Management Process (CMP) Innovations: A Menu of Options** (PDF 534KB) – This document was prepared for the New York State Association of Metropolitan Planning Organizations (NYSMPOs). The document provides a menu of options for metropolitan planning organizations (MPOs) to consider in implementing a Congestion Management Plan (CMP).

- **Congestion Management System Practices** (PDF 244KB) – This report describes the summary of Congestion Management System (CMS) processes currently in use around the United States. This report describes the summary of Congestion Management System (CMS) processes currently in use around the United States. The primary objectives of the activities described in this report were to: 1) update the 1999 CMS Improvement Process Report, 2) understand how they use their CMS processes, and 3) review Federal Highway Administration (FHWA) material on examples of successful CMS processes in place.

- **Frequency of Work Zone Accidents on Construction Projects** – The Region 2 University Transportation Research Center has released a report that examines work zone accidents in New York State, with particular attention to the occurrence and mitigation of rear-end vehicle accidents.

- **A Guidebook for Including Access Management in Transportation Planning** (PDF 834KB) – This report (NCHRP Report 548) offers guidance for implementing access management through the transportation planning process.

- **Improving Mobility and Accessibility with Managed Lanes, Pricing, and BRT** – This report documents the proceedings of the 12th International HOV Systems Conference: Improving Mobility and Accessibility with Managed Lanes, Pricing, and BRT held in Houston, Texas on April 18–20, 2005. The proceedings summarize the presentations from the plenary sessions and the breakout sessions. The plenary sessions included presentations on the high-occupancy vehicle (HOV) system in the Houston area, updates on national activities, and future trends in managing mobility.

- **Incident Management Successful Practices: A Cross-Cutting Study** (PDF 1.09MB) – This document provides a series of successful practices on managing traffic incidents.

- **Linking Congestion Management to Operations** (PDF 468KB) Congestion is mounting in many metropolitan areas, but capacity increases are often not feasible. In order to increase transportation system performance without adding capacity, many MPOs are increasingly assessing the use of operations strategies as a way to achieve greater efficiency. The Hampton Roads Planning District Commission (HRPDC) serves a 16-jurisdiction planning area in southeast Virginia with a large number of water features, bridges, and tunnels. Therefore, proactive congestion management strategies have been required for this region. HRPDC began developing operations strategies a number of years ago and has taken a leadership role on these strategies. This case study presents an example of HRPDC's approaches for improving congestion management by strengthening the relationship between CMP and operations.

- **Managing Demand Through Travel Information Services** – The brochure highlights the opportunities and benefits for using traveler information services to manage demand during periods of congestion, including congestion during commute periods, special events, and emergencies. The brochure aims to provide ideas for the use of traveler information in states, regions, and communities. The brochure presents the diversity of traveler information systems employed around the country and overseas and how agencies are using traveler information as a demand management tool.

- **Mitigating Traffic Congestion – The Role of Demand-side Strategies** – Federal Highway Administration's Office of Transportation Management has produced a new report on demand-side strategies and the important role that it plays in 21st Century transportation operations. This report builds upon previous work done on travel demand management in the early 1990's to present a newer, more contemporary, perspective on what managing demand in the 21st Century really means. The in-depth case studies illustrate a handful of the many applications of demand-side strategies in place today. The case studies attempt to highlight the diversity of programs, with an effort to find examples that also provided one or more measures of program effectiveness.

- **Online Version of the ITS/Operations Resource Guide -** A comprehensive listing of over 500 documents, videos, websites, training courses, software tools, and points-of-contact related to ITS and other innovative transportation strategies. A PDF version of *ITS/Operations Resource Guide 2007* is also available. This is a large file - over 27 MB.

- **Ramp Management and Control Handbook** – The purpose of this handbook is to improve the operation of freeways and their associated ramps by providing support, information, guidance, and recommended practice to practitioners responsible for freeway management and operations. Publication No. FHWA-HOP-06-01, January 2006.

- **The Relationship between Congestion Management and the Planning Process** (PDF 872KB) Congestion Management Systems (CMS) have been required for Metropolitan Planning Organizations (MPOs) designated as Transportation Management Areas (TMAs) since 1991, when the Intermodal Surface

Transportation Efficiency Act was passed. This case study featuring the work of three MPOs investigates best practices of how congestion management processes (CMP), formerly known as CMS, are related to the transportation planning process. The perspectives of the planning process explored in this case study are data presentation, project prioritization, and stakeholder involvement.

- **Travel Time Reliability: Making It There On Time, All The Time** – Travel time reliability is an increasing concern of travelers, shippers, and businesses. Recent advances in data collection mean that travel time reliability can now be quantified. This report provides guidance in answering questions such as: What is travel time reliability? Why is travel time reliability important? What measures are used to quantify travel time reliability? What are the steps for developing travel time reliability measures? Are there case studies illustrating steps to calculate reliability measures? Who is using reliability measures?

- **Using CMP Tools to Advance NEPA Documentation** (PDF 208KB) In 2001, the Mid-America Regional Council (MARC), the MPO serving the greater Kansas City area, developed an enhanced congestion management system (CMS) designed to integrate with the Regional Transportation Plan (RTP), Transportation Improvement Program (TIP), and corridor evaluations, including the Major Investment Study (MIS) planning processes. At this time, MARC adopted a policy that its CMS Toolbox of strategies will be considered when the purpose and need for an environmental study includes congestion management. The agency wanted to directly demonstrate how any suggested capacity improvements had been evaluated using the congestion management process.