Mobility in the Boston Region

Existing Conditions and Next Steps

The 2004 Congestion Management System Report

A report produced by the Central Transportation Planning Staff for the Boston Region Metropolitan Planning Organization

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EXECUTIVE SUMMARY

This report of the Congestion Management System (CMS) for the Boston Region Metropolitan Planning Organization (MPO) documents the region's mobility concerns. The report contains the most recent performance-monitoring information on the regional transportation system. The information and general analysis of it provide the basis for the MPO's Central Transportation Planning Staff (CTPS) to set forth recommendations to the MPO for congestion-reducing and mobility-enhancing actions to be considered in the MPO planning and programming processes.

The CMS is an ongoing program of the MPO. The purpose of the CMS is to provide decision-makers (primarily the MPO's Transportation Planning and Programming Committee) and transportation planners with timely information about transportation system performance and make recommendations in the areas where congestion and other mobility deficiencies are found. This information is also available to the public, who may choose to use the CMS information to provide input to the planning and programming of transportation improvements through the MPO's public participation process.

THE CMS PROCESS

The CMS program's goals are achieved by conducting a systematic and continuous process that consists of the following four elements:

1. Data collection for system monitoring and analysis
2. Recommendations for the various transportation system elements that are monitored
3. Management of monitoring databases
4. CMS reports

The performance of the following components of the region's transportation system was monitored during the latest cycle of the CMS program and is reported in the present document:

- **Roadways** (limited-access highways and arterial roadways), where performance is measured in terms of travel speeds and delays, which are complemented by additional measures, such as average daily traffic and crashes.
- **Public transit**, where performance is measured in terms of schedule adherence and in-vehicle passenger crowding, with a special focus on MBTA bus routes.
- **Park-and-ride lots**, where performance is measured in terms of capacity, use, and the time of day at which lots fill up.
- **High-occupancy-vehicle (HOV) lanes**, where performance is measured in terms of the travel time saved compared to general-purpose-lane travel.
- **Travel demand management (TDM)**, which includes services provided by Mass*RIDES* and various transportation management associations (TMAs) in the region. Performance measures include the number of vanpools, TMA shuttle ridership, and ridematching assistance.
- **Bicycle and pedestrian mobility**, where performance is measured in terms of bicycle and pedestrian accessibility to transit stations and the suitability of the CMS-monitored arterial roadways for on-street bicycle use.

This report—the fourth CMS report produced for the Boston Region MPO—contains performance-monitoring information gathered since the last report was compiled in 2000 and sets forth recommendations based on that information. Many of the CMS components and performance measures presented in this report—average daily traffic, crashes, park-and-ride lot filling times, bicycle and pedestrian accessibility to transit stations, arterial roadway assessment using the bicycle suitability index, HOV lane travel time savings, and TDM activities—are newly explored areas of performance monitoring for this region.

FINDINGS

The following are highlights of the findings for each of the six elements that are monitored and/or examined as part of the CMS program.

Arterial Roadways

CMS arterial roadway data and analysis have shown that, since the previous monitoring, average peak-period speeds have dropped and delay has increased. Average peak-period speeds are now below the posted speed limit on about 40 percent of the monitored network. Of the two peak periods, the evening is the worse, with 15 percent of the monitored signalized intersections having at least two approaches at an unacceptable level of service.

Limited-Access Highways

Travel speed data show that during the latest monitoring period, 10 percent more of the region's expressway network had average morning peak-period speeds of less than 50 mph than during the previous monitoring period five years earlier. In the evening, however, the findings do not indicate that speeds have changed significantly between the two monitoring periods, possibly because deterioration of speeds during the evening peak period is harder to detect and measure, as the network is more congested at the outset of the evening peak period than at the outset of the morning peak period.

Public Transit

The performance measures of schedule adherence and passenger crowding offer a glimpse into the performance of the MBTA transit system. In the case of bus performance, these measures are an indication of roadway congestion, as encountered by the buses. Of the morning peak-period bus trips, 36 percent arrive more than five minutes late; of the evening peak-period trips, 39 percent arrive more than five minutes late. The MBTA standard for passenger crowding is violated by 5 percent of the morning peak-period bus trips and 4 percent of the evening peak-period bus trips.

Park-and-Ride Lots

Of the 107 MBTA commuter park-and-ride lots that were observed, 76 (71 percent) reached capacity (defined as being filled to 85 percent of capacity or more). Furthermore, 49 of the lots (46 percent) reached capacity well before the last morning peak-period inbound train. With regard to the five MassHighway park-and-ride lots in the MPO region, only one (Milton) reached capacity, and three of them were underutilized.

High-Occupancy-Vehicle Lanes

The I-93/Southeast Expressway HOV lane carries a daily average of about 8,700 vehicles, which corresponds to an estimated daily average of 33,660 persons. Approximately 95 percent of the

vehicles are automobiles with carpooling passengers; the remainder of the vehicles are vanpool vans, public and private transit buses, and motorcycles. Information on numbers and types of users is not available for the I-93 North HOV lane.

A user of the I-93/Southeast Expressway HOV lane saves nearly six minutes on the morning-peak-period downtown-bound approach and nearly five minutes on the evening-peak-period southbound approach, compared to the general-purpose lanes, according to 2003 monitoring. On the I-93 North HOV lane heading southbound, the morning-peak-period travel-time savings are approximately six and a half minutes.

Travel Demand Management

This CMS report documents key TDM activities in the region, largely performed by Mass*RIDES* and TMAs. For example, 40 vanpools are currently in operation; the vans originate in or are destined to urban and suburban locations in the Boston region, and they have an average daily round-trip mileage of 113 miles. Significant markets include commuters traveling from Cape Cod, southern New Hampshire, Worcester, and areas west of Worcester.

Bicycle and Pedestrian

Three pedestrian and bicycle transportation elements were examined: (1) pedestrian and bicycle access to transit, (2) the suitability of the CMS arterial roadway network for on-street bicycle use, and (3) the off-street bicycle network. The report identifies stations where safer street crossings for pedestrians could be provided and stations that lack minimal bicycle parking facilities. In terms of the suitability of CMS roadways for use by bicyclists during peak travel periods, the analysis indicates that only 14 percent of the network miles (directional[1]) can be rated "medium" or "best." For rating the CMS roadways, CTPS created a bicycle suitability index.

CONCLUSIONS

Presented below are conclusions based primarily on findings regarding various performance measures and trends for the Boston region. The basis of the conclusions also includes findings from congestion monitoring and research which, though they were conducted by other agencies and research organizations in the country, shed light on our own region's experiences regarding congestion and travel demand. These conclusions provide a frame that informs the nature of the recommendations (see Chapter 9 of this report).

Congestion and economic growth in the region have been closely related – According to figures used in the Regional Transportation Plan, employment in the Boston Region MPO area grew by about 52 percent between 1970 and 2000 and by 22 percent between 1980 and 2000.[2] The Plan also notes that suburban job growth outpaced that of the urban core during this period. Along with this economic growth came more congestion: between 1982 and 2001, daily vehicle-miles traveled (VMT) grew by 38 percent, and annual person-hours of delay more than tripled.[3]

[1] One mile of two-way roadway equals two directional miles.

[2] Central Transportation Planning Staff, *2004–2025 Regional Transportation Plan of the Boston MPO*, September 11, 2003, p. 2-2.

[3] David L. Schrank and Timothy J. Lomax, *Annual Urban Mobility Report*, Texas Transportation Institute (TTI), the Texas A&M University System, September 2003. Available at *http://mobility.tamu.edu/ums*.

Travel in the region will most likely continue to grow in the future as the region's economy grows – Every new job that is created in this region adds 14,500 miles of travel to the system annually.[4] As this region moves out of the recent recession and new jobs are added to the economy, VMT—and delay—should also be expected to grow.

Operational strategies can extract additional capacity from the region's arterial roadways and limited-access highways – As building new capacity is not always possible or desirable, it is important to maximize the capacity of the existing infrastructure. Mitigating the effects of roadway events (incident management) and improving the system's operational efficiency for all roadway users, including bus riders, are the two key areas where this strategy reduces congestion. Operational efficiency strategies include HOV lanes, traffic signal coordination, intersection redesign, intelligent transportation system strategies, and reversible commuter lanes.

Public transportation is already a very important contributor to congestion relief in this region, and it can continue to be one in the future – Annual person-hour delay on the roadways of this region is 70 percent lower than what it could have been without public transportation.[5] Annual passenger-miles on public transportation tripled between 1982 and 2001,[6] largely due to expansions of commuter rail service and of park-and-ride lots. Between 1995 and 2002, over 12,000 spaces were added to the MBTA park-and-ride system, an increase of 57 percent. Between 1992 and 2002, total MBTA ridership increased by 9 percent.

Travel demand management can be part of the integrated solution to reduce congestion and improve mobility – Though the impact on congestion of TDM measures, such as ridesharing, shifting the time of travel, and telecommuting, is limited, they can improve mobility for certain traveler markets and help reduce VMT as part of the mix of solutions.

Regulatory policies to manage urban growth and form can reduce congestion – According to the 2004–2025 Regional Transportation Plan, the MPO region had 2.5 percent more developed land in 1999 than in 1991.[7] The Plan also notes that this rate "averages out to about 7.6 acres a day. The majority of the new land consumption was for single-family housing [and] most of this development took place on formerly agricultural and forested lands."[8] Furthermore, based on a Metropolitan Area Planning Council analysis of land use/ sprawl trends, in the 1990s more land was developed per increase in population in the suburbs than in the Inner Core communities. This lower-density development results in higher VMT and is also difficult to serve by traditional public transportation modes. "Smart growth" practices, transit-oriented development, access management, and funding incentives, can reduce VMT and delays by affecting development densities and promoting sustainable development. In this region, land use is controlled at the local level, but a number of initiatives have already been taken at the state level in that direction.

[4] Based on employment growth (as provided by the Regional Transportation Plan) and VMT (as listed in Schrank and Lomax, *Annual Urban Mobility Report,* 2003).

[5] Schrank and Lomax, *Annual Urban Mobility Report,* 2003.

[6] Ibid.

[7] CTPS, *2004–2025 Regional Transportation Plan*, p. 2-2.

[8] Ibid.

Addressing safety can have secondary beneficial effects on congestion – Safety and congestion have a cause-and-effect relationship. Often, addressing safety has beneficial effects on congestion as well.

Key conclusion – The single most important conclusion that can be drawn from the regional data analysis contained in this report is that ***congestion and mobility are complex issues that require a multimodal and comprehensive program of strategies and policies to address them, including growth management tools***. Hopefully, the preceding conclusions convey the thinking that led to this key conclusion and provide decision-makers and planners with some guidelines that, together with the findings in this report and the recommendations presented in the next chapter, will help them address congestion in the short and long run.

RECOMMENDATIONS

The final conclusion above is embodied in the breadth and multimodal nature of this report's recommendations for strategies and studies to address congestion and mobility within the six elements that were monitored as part of the CMS. The CMS recommendations consist of congestion-reduction and mobility-enhancement strategies and studies for the Boston Region MPO and other lead entities to undertake in concert with other efforts they are already making. These recommendations are too numerous to list here; they are listed in Chapter 9 of this report.