1 INTRODUCTION

This report of the Congestion Management System (CMS) for the Boston Region Metropolitan Planning Organization (MPO) documents the region's mobility concerns. (The region is shown in Figure 1.1.) 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 program's goals are achieved by conducting a systematic and continuous process that consists of the following four elements:

- **Data collection and analysis** – To identify congestion and mobility concerns, transportation system performance data are collected and analyzed. The data pertain to a variety of modes and services, and are either collected in the field specifically for the CMS or gathered from existing sources at the MPO's CTPS and at MPO-member transportation agencies. Searches of relevant literature on congestion-related issues are also conducted. Analysis is performed through level-of-service calculations, rankings, and trends (temporal and geographic), which are presented in tabular and graphical forms.
- **Recommendations** – Based on the findings of the CMS data collection and analysis, CTPS recommends to the MPO a set of actions made up of strategies, initiatives, programs, and planning studies that address the identified congested facilities and mobility concerns. CMS recommendations are one of the sources that the MPO uses to develop its annual Unified Planning Work Program (UPWP).
- **CMS databases** – On a continuous and systematic basis, CMS data are available to decision-makers so that they may use it as timely and effective input into the other MPO transportation planning processes: the UPWP, Transportation Improvement Program (TIP), and Regional Transportation Plan. CMS data have been integrated into a project information system for TIP project selection.

  The CMS databases are continuously updated as new data are collected; databases are always available for searches and requests that MPO members may wish to make. In the near future, the databases will also be available on the MPO Web site for personal searches. Currently, the databases can be obtained by using the contact information displayed at the beginning of this report.
- **CMS reports** – A report has been produced periodically by CTPS in order to provide the most recent status of system performance and related recommendations (the first two elements of the CMS as described above). Under the title *Mobility in the Boston Region: Existing Conditions and Next Steps*, CTPS produced a CMS report in 1996, 1997, and 2000.

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.

1.1 REPORT ORGANIZATION (HOW TO USE THIS DOCUMENT)

The following chapter provides background on the CMS: how it started with federal legislation and how the Boston Region MPO has fashioned this transportation-planning program. Chapters 3 through 7 present the transportation system performance monitoring. Each of these chapters describes, usually for one component of the system: (1) the peak-period performance measures and the corresponding congestion threshold levels, (2) the method used to collect data, (3) the extent of the component's network or system, and (4) the monitoring results and areas/facilities/services of concern. Chapter 8 pulls together the monitoring results and other mobility measures to create a summary of travel trends and congestion for the MPO region. The final chapter presents recommendations ranging from planning studies to congestion-reducing programs and strategies.

This report contains numerous tables, maps, and diagrams, each designed to provide easy access to and comprehension of the information. Those that present key and summary information are in the main body of the report; the bulk of the information is provided in the appendices, which are on the enclosed CD-ROM. The files on the disk are available via common file formats, such as Adobe PDF, for ease of viewing and printing.

Figure 1.1. Boston Region MPO: Municipalities and Regional Transportation Corridors

2 BACKGROUND

Congestion Management Systems are mandated by federal legislation. This chapter describes the development of the CMS mandate on the federal level and how Massachusetts, in response to the original mandate, designed a CMS for its metropolitan planning regions. The chapter also explains how the CMS has been shaped to serve the needs of the Boston Region MPO's transportation planning activities.

2.1 FEDERAL LEGISLATION

The impetus for developing and operating a Congestion Management System began with the federal Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. ISTEA required state departments of transportation and metropolitan planning organizations to implement a CMS. The metropolitan planning provisions of the successor legislation to ISTEA, the Transportation Equity Act for the 21st Century (TEA-21), adopted in 1998, continued to require transportation management areas with a population of over 200,000 to maintain a CMS as part of their planning process.

The federal government wanted CMSs to continue playing a role in ensuring comprehensive, multimodal transportation planning. According to the metropolitan planning regulations:

> An effective CMS is a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet State and local needs. The CMS results in serious consideration of implementation of strategies that provide the most efficient and effective use of existing and future transportation facilities. (23 CFR 500.109a)

CMS findings must be considered in the development of a region's Regional Transportation Plan and its Transportation Improvement Program (TIP). Moreover, in transportation management areas that have not attained federal air quality standards, any expansion of roadway capacity must be developed in the context of the CMS process.[1] Federal regulations on the metropolitan planning process state that in air quality nonattainment areas, federal transportation funds may not be programmed for any project that will result in a significant increase in carrying capacity for single-occupant vehicles, unless the project results from a Congestion Management System.

2.2 THE CMS WORK PLAN FOR MASSACHUSETTS

In response to the federal directive, in the mid-1990s CTPS worked with staff from MassHighway and regional planning agencies to develop the *CMS Work Plan for Massachusetts* (October 1994), thus establishing a framework for conducting the CMS work. The CMS was designed as an ongoing process of data collection and system evaluation to be carried out, in large part, by individual MPOs. The intent of this process is ultimately to provide technical support for planning and programming decisions. To attain this, the work plan discussed the basic operation of the CMS, consisting of collecting information, identifying needs, and developing recommendations of next steps to address the critical mobility issues. Furthermore, the work plan identified three broad categories of facilities

[1] The Boston Region MPO area is in nonattainment for the pollutant ozone. The communities of Boston, Cambridge, Chelsea, Everett, Malden, Medford, Quincy, Revere, Somerville, and Waltham have been redesignated as in attainment for carbon monoxide, but they are still subject to specific air quality requirements.

(roadways, transit routes, and park-and-ride lots) that MPOs should monitor as part of the region's CMS. (As stated earlier, this CMS report includes information on additional modes.)

2.3 CMS MONITORING AND THE TRANSPORTATION PLANNING PROCESS

The focus of the Boston Region MPO's Congestion Management System is on identifying mobility concerns in order to support multimodal improvements to the transportation system. Concerns are identified through the CMS's transportation system monitoring. This exercise helps CTPS analysts to formulate recommendations for strategies, programs, and planning studies—basically proposing the next course of action to address the mobility concerns. The monitoring effort also provides data and information to be used by planners and decision-makers for project planning, prioritizing, and programming. In short, the monitoring effort addresses the question, *How is the region doing regarding congestion and mobility?* The CMS recommendations answer the question, *What can be done to address congestion and mobility concerns in the region?*

Mobility concerns are identified using field-collected data combined with complementary information from existing sources. Determining where the mobility concerns are located enables the appropriate next steps to address them to begin. In some cases, a planning study, which entails analyzing a facility or area in great detail, is best applied. In other cases, a project that will address a mobility concern is in the works, but needs to be programmed in the TIP; thus CMS data can be provided to select the facilities and areas most in need of improvements. In some cases, a mobility concern is identified that warrants a long-term goal or broad-scope policy to address the concern; the goal or policy can then be adopted in the long-range Regional Transportation Plan.

Figure 2.1 illustrates how the four elements of the CMS program are linked to other MPO transportation-planning processes and activities.

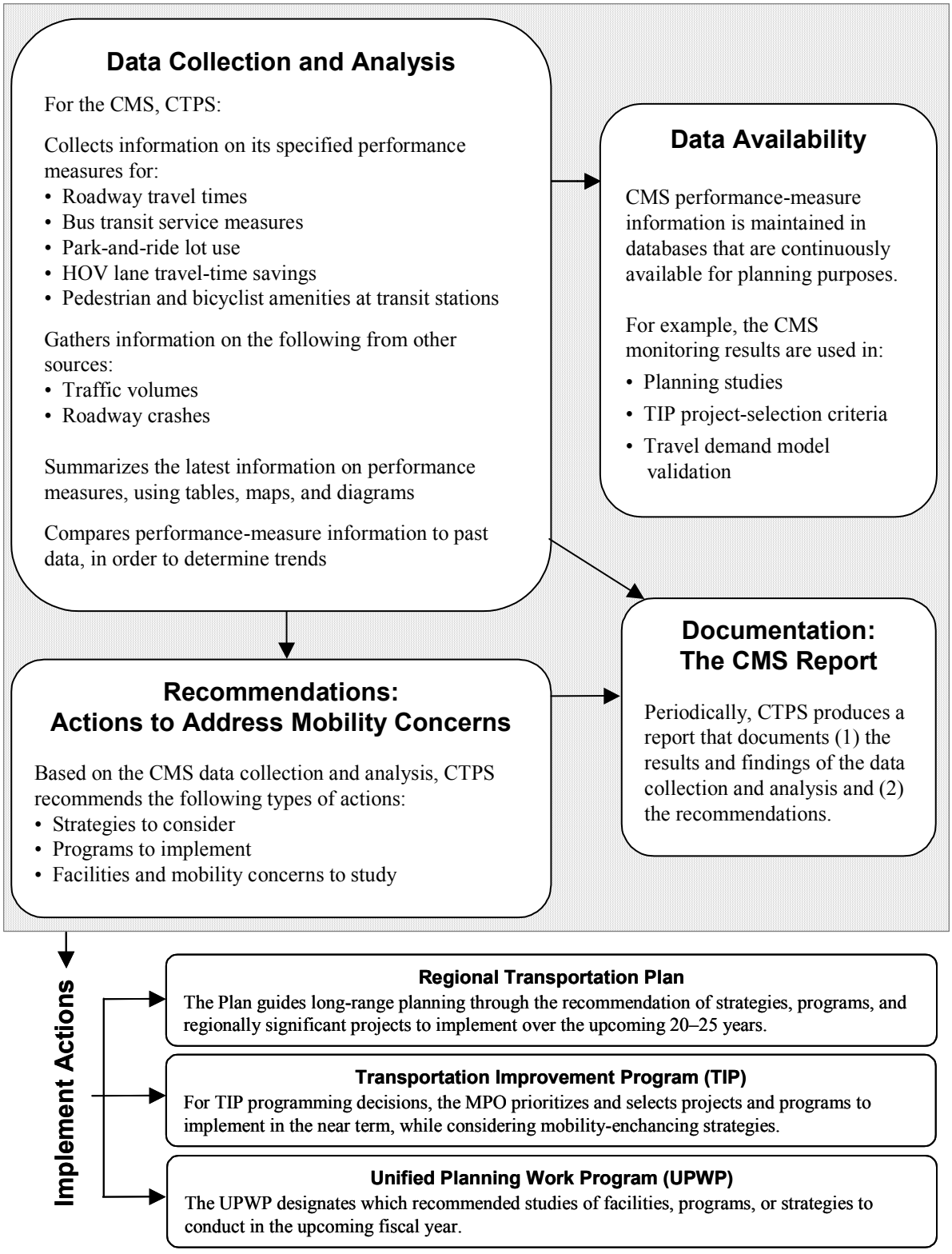
The application of CMS findings in MPO transportation-planning processes may be described in more detail as follows:

1. **Recommendations for further study.** New transportation studies can be fashioned based on the information collected by the CMS monitoring element. Planning studies are the means through which alternatives, often multimodal, for addressing mobility issues are evaluated. They involve a detailed analysis of the existing travel conditions and recommend appropriate improvements based on an exhaustive alternatives analysis. The MPO's Transportation Planning and Programming Committee can choose to add studies to the Unified Planning Work Program based on the recommendations of the CMS.

   CMS monitoring has resulted in the recommendation and development of numerous planning studies that resulted in the successful implementation of improvements. CMS-recommended studies that have recently been completed or are ongoing include the Congested Signalized Intersections Study (multiple subregions), Lower North Shore Transportation Improvement Study, MAGIC Subarea Study, MetroWest Subarea Study, MassHighway Park-and-Ride Lot Study, MBTA Bus Route 66 Arterial Improvement Study, Route 138 Corridor Study, Route 53 Transportation Plan, and SWAP Subarea Study, among others.

2. **Inputs to Transportation Improvement Program (TIP) programming.** By identifying mobility concerns, the CMS monitoring program aids the decision-making in programming projects. CTPS can provide guidance to the Transportation Planning and Programming

Figure 2.1. Congestion Management System Elements within the Transportation-Planning Process



Committee by using the CMS to identify the geographic areas or facilities with the greatest need for mobility improvements. CTPS can also suggest strategies and programs that the committee could consider as part of its TIP package.

Furthermore, in the previous and current TIP cycles, roadway data collected as part of the CMS effort have been used as one factor among the TIP project-selection criteria. For instance, speed-related data and intersection approach delay data collected as part of the CMS were provided for 172 projects during the fiscal year 2005 TIP project-selection process. (CMS data are used for projects in the categories of Arterials and Intersections, Bridges, Major Highways, and Other Enhancements.)

3. **Guidance to the Regional Transportation Plan.** For the CMS program, CTPS identifies geographic patterns and chronological trends of congestion. Based on these analyses, CTPS suggests strategies and programs that could be adopted in the long-range Regional Transportation Plan.