

1. Introduction

The Congestion Management Process (CMP), as defined by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), is “a systematic approach, collaboratively developed and implemented throughout a metropolitan region that provides for the safe and effective management and operation of new and existing facilities through the use of demand reduction and operational strategies.” Formerly known as the Congestion Management System (CMS), the CMP has become an objectives driven, performance based approach to congestion. The CMP is required to be part of the overall planning process for designated Transportation Management Areas (TMA’s). TMA’s are urbanized areas with a population of over 200,000. The Northern Middlesex region, designated as a TMA in the 2000 US Census (Pop. 281,225), has maintained a CMS as part of the ongoing planning process and is currently making the shift to a CMP.

The Congestion Management Process is a federally mandated program updated in the Safe Accountable Flexible Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), the most recent reauthorization of the nation’s transportation program. In TMA’s, SAFETEA-LU requires that the Metropolitan Planning Organization (MPO) “shall address congestion management through a process that provides for effective management and operation, based on a cooperatively developed and implemented metropolitan wide strategy, of new and existing transportation facilities...through the use of travel demand reduction and operational management strategies.” The updates includes the change from a CMS program to the CMP in an effort to address congestion through a process that focuses on regional objectives that drive performance based planning in the region.

The Northern Middlesex CMP is an integral part of the overall planning process that reflects in the Northern Middlesex Regional Transportation Plan (RTP) and the Northern Middlesex Regional Transportation Improvement Program (TIP), the two federally mandated documents prepared by the Northern Middlesex MPO. In addition to being designated as a TMA, the Northern Middlesex Region has not attained federal air quality standards for ozone. Metropolitan Transportation Planning regulations stipulate that in an air quality nonattainment area, federal transportation funds may not be programmed for any project that will result in a significant increase in capacity for single-occupant vehicles, unless the project is derived from the CMP.

1.1 Development of the Congestion Management Process

The Federal Highway Administration, in its publication *An Interim Guidebook on the Congestion Management Process in Metropolitan Transportation Planning*, has provided a guide to integrate

management and operations strategies into metropolitan planning processes. Of these strategies, the CMP guides transportation planning. The CMP consists of eight steps in its development:

1. Develop Congestion Management Objectives;
2. Identify Area of Application;
3. Define System or Network of Interest;
4. Develop Performance Measures;
5. Institute System Performance Monitoring Plan;
6. Identify and Evaluate Strategies;
7. Implement Selected Strategies and Manage Transportation System; and
8. Monitor Strategy Effectiveness.

NMCOG and the NMMPO have developed a CMP designed to follow each of these steps in its implementation. By following these steps a “coherent, objectives driven, performance based approach” to congestion issues will be put in place.

Step 1 - Congestion Management Objectives

The Northern Middlesex Congestion Management Process derives its objectives from the vision and goals of the Northern Middlesex Regional Transportation Plan. The primary vision of the RTP is to develop a balanced multi-modal, cost-effective, transportation system connecting points inside and outside the Northern Middlesex Region. The RTP also strives to:

1. Provide safe, secure and convenient transportation service to all area residents, especially the transit dependent groups such as the elderly, low income, and disabled;
2. Maximize energy conservation, improve air quality, and minimize traffic congestion;
3. Encourage development patterns consistent with local and regional land use policies, and
4. Increase the number of travel choices for people and freight.

The objectives of the CMP are developed to address the overall goals outlined in the RTP. The following objectives are presented in the effort to reduce congestion throughout the region and achieve the stated goals.

1. Provide timely information on transportation system performance (Goal)
 - a. Perform multi-modal transportation system monitoring on a continuing basis (Objective)
 - i. Travel Times
 - ii. Park and Ride capacity data collection
 - iii. Transit Ridership
 - iv. Safety Analysis
 - v. Pedestrian and Bicycle facility information

2. Develop Strategies to facilitate the mobility of people and goods throughout the region (Goal)
 - a. Evaluate Transportation Demand Management (TDM) strategies providing alternatives to single occupancy vehicle (SOV) traffic and promote such strategies when appropriate (Objective)
 - i. Rideshare Programs such as carpooling and vanpooling
 - ii. Parking Management
 - iii. Transit Subsidies for improvement to service
 - iv. Promotion of alternative work schedules and telecommuting
 - v. Congestion Pricing
 - vi. High Occupancy Vehicle (HOV) Lanes
 - vii. Trip Reduction Programs
 - b. Evaluate traffic operational improvement strategies and recommend such strategies when needed (Objective)
 - i. Geometric improvements
 - ii. Traffic Signal Improvements
 - iii. Incident Management Promotion
 - iv. Use of ITS technologies
 - v. Highway Capacity Expansion
 - c. Manage construction and maintenance projects (Objective)
 - i. Shortening duration of construction
 - ii. Alternative work scheduling
 - iii. Creation of Project websites to relay information regarding status of project
 - d. Evaluate incident management strategies and recommend where appropriate (Objective)
 - i. Promote MassHighway Motorist Assistance (CaresVan) Program
 - ii. Promote 511 traveler information system
 - iii. Encourage use of ITS in development of management programs
3. Support the RTP goals and objectives developed in the Plan and adopted by the NMMPO. (Goal)
 - a. Provide timely data and information for inclusion in the RTP so goals continue to be met. (Objective)

Step 2 - Area of Application

The congestion management process should be applied to a specific geographic area and network of surface transportation facilities. In the Northern Middlesex region, the CMP network consists

of the boundaries of the MPO area which covers the Lowell TMA. This includes the nine member communities including: Billerica, Chelmsford, Dracut, Lowell, Tewksbury, Tyngsborough, and Westford.

Step 3 - System Definition

The Northern Middlesex CMP is multimodal in nature including both highway and transit facilities in the process. Thus the entire metropolitan area is included with specific corridors identified. Map 1 provides a regional overview of the Northern Middlesex metropolitan planning area.

Step 4 - Performance Measures used in Development of NMCOG CMP

Performance measures are guidelines used in determining the level of mobility in a transportation network. These measures will provide the basis for identification of congested roadway segments, transit facilities, and parking areas. This information will be presented to local and state officials and the public as a means of providing assistance in development of transportation improvement projects. As transportation improvements are implemented, these measures can be used to evaluate the effectiveness of these improvements.

Some characteristics of good performance measures include¹:

- Clarity and simplicity (e.g. Simple to present and interpret, unambiguous, quantifiable units, professional credibility)
- Descriptive and predictive ability (e.g. Describes existing conditions, can be used to identify problems and to predict changes)
- Analysis capability (e.g. Can be calculated easily and with existing field data, techniques available for estimating the measure, achieves consistent results)
- Accuracy and precision (e.g. Sensitive to significant changes in assumptions, precision is consistent with planning applications and with operational analysis)
- Flexibility (e.g. Applies to multiple modes, meaningful at varying scales and settings)

The Northern Middlesex Congestion Management Process has identified performance measures that are used to determine mobility and identify congestion. These include the following:

- Roadway Facilities: Average Speed, Average Delay, LOS, Traffic Volumes, Crash Rates
- Transit Facilities: Monthly Bus Ridership, Passenger Load Capacity
- Park and Ride Facilities: Percent Capacity of Lot

¹ Excerpt from "An Interim Guidebook on the Congestion Management Process in Metropolitan Transportation Planning", US DOT, FHWA, FTA.

Step 5 - Development of a Performance Monitoring Plan

The Final Rule on Metropolitan Transportation Planning calls for “a coordinated program for data collection and system performance monitoring to assess the extent of congestion, to contribute in determining the causes of congestion, and evaluate the efficiency and effectiveness of implemented actions.”¹ The collection of transportation data has become a priority of the Northern Middlesex Council of Governments as part of the planning process. Through contracts funded by the MassHighway, FHWA, and FTA, NMCOG staff collects data as part of its overall system performance monitoring effort.

a) Roadway Data

CMP performance measures for the regional roadway network are monitored on an ongoing basis and currently include travel time, ATR counts, and crash data. Travel time runs are performed to determine average travel speed, delay, and level of service of a specific corridor. ATR counts are performed on a three year cycle as part of NMCOG’s traffic counting program. Crash data is collected yearly as part of NMCOG’s overall traffic safety program. This program identifies top crash locations in the region, of which the data often coincides with the congested roadways throughout the MPO area.

b) Transit Data

Because the regional public transit service consists of mainly fixed route buses that travel on the roadway network, MPO staff decided to use bus load percentages as its primary performance measure. In cooperation with the Lowell Regional Transit Authority (LRTA), NMCOG staff has collected ridership data for the entire bus system in the region. LRTA maintains this data on a daily basis and provides monthly trends to the MPO. Any buses considered over capacity will be subject to review and possible additional capacity will be made available.

c) Parking Facility Data

Park and Ride lots and MBTA Commuter Rail Station parking areas are counted as part of the congestion management process as well. Determination of parking lot availability provides a glimpse of how commuter rail is utilized in the region and where improvements to service can be made. This data is shared with the MBTA, LRTA, EOTPW, and the Boston MPO in a continuing, coordinated effort to provide the most complete transportation services possible.

Step 6 - Identification and Evaluation of Congestion Management Strategies

NMCOG has identified a number of congested areas through its Unified Planning Work Program (UPWP) and the Regional Transportation Plan (RTP). Through the direction of the NMMPO, a toolbox of congestion management strategies has been identified and is presented in Chapter 5 of this report.

Step 7 - Implementation of Selected Strategies and Management of Transportation System

CMP data is used in developing projects for the Transportation Improvement Program (TIP), the UPWP, and the RTP. Data collected through the CMP is applied in the establishment of TIP projects in the region.

Step 8 - Monitoring Strategy Effectiveness

NMCOG has several monitoring programs in place to monitor effectiveness of the CMP. Such programs include the following:

- NMCOG Annual Traffic Counting Program
- NMCOG Crash Record and Safety Program
- Corridor and Planning Studies conducted by NMCOG
- Reviews of environmental notification forms and impact studies
- CMP Monitoring programs including travel times, transit ridership monitoring, park and ride monitoring, and turning movement counts.

The effectiveness of the strategy toolbox is continually being monitored and updated to remain current with best practices. In addition to this, performance measures and data collection techniques are monitored and revised as necessary as part of the overall transportation planning process.