



## 9. CONGESTION MANAGEMENT PROCESS

### A. Introduction

The following information comes from the 2010 Congestion Management Process (CMP) document (September 2010), which is available on the NFRMPO's website: [www.nfrmipo.org](http://www.nfrmipo.org). The CMP document contains more detailed information and outlines the data collection effort recommended to address the performance measures and agencies responsible.

Federal requirements state that regions with more than 200,000 people, known as Transportation Management Areas (TMAs), must maintain a Congestion Management Process (CMP) and use it to make informed transportation planning decisions.

These requirements were introduced by the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 and were continued under the successor law, the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21). Whereas previous laws referred to this set of activities as a congestion management system (CMS), the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), refers to a "congestion management process," reflecting that the goal of the law is to utilize a process that is an integral component of metropolitan transportation planning.

FHWA defines a CMP as "a systematic transparent process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing mobility." The purpose of the CMP is to define congested corridors in the region, develop strategies to mitigate the congestion, and provide a way to monitor the effectiveness of the strategies. The CMP is also intended to harness performance measures to direct funding toward projects and strategies that most effectively address congestion. The CMP is intended to augment and be folded into the overall metropolitan transportation planning process for the NFRMPO.

FHWA requires that consideration be given first to strategies that reduce single occupancy vehicle (SOV) travel and improve the efficiency of the existing system. All other reasonable strategies must be analyzed before a capacity increase is proposed as a congestion management technique.

The FHWA regulations (23 CFR Part 450. 320) specify that an effective CMP should include:

- ▶ Methods to monitor and evaluate the performance of the multi-modal transportation system, identify the causes of reoccurring and nonrecurring congestion, identify and evaluate alternative strategies, provide information supporting the implementation of actions, and evaluate the efficiency and effectiveness of implemented actions;
- ▶ Definition of objectives and performance measures to assess the extent of congestion and support the evaluation of the effectiveness of congestion reduction and mobility enhancement strategies;

- ▶ Establishment of a program for data collection and system performance monitoring to define the extent and causes of congestion, to contribute in determining the causes of congestion, and to evaluate the efficiency and effectiveness of implemented actions;
- ▶ Identification and evaluation of the anticipated performance and benefits of both traditional and non-traditional congestion management strategies;
- ▶ Identification of an implementation schedule, implementation responsibilities, and possible funding sources for each strategy; and
- ▶ Implementation of a process for periodic assessment of the efficiency and effectiveness of implemented strategies, in terms of the area's established performance measures.

## **B. History of NFRMPO's CMP**

The NFRMPO was designated a Transportation Management Agency (TMA) in 2002 as a result of data from the 2000 U.S. Census. In 2004, FHWA accepted a Congestion Management Framework in lieu of a Congestion Management System, given the short time frame between the NFRMPO designation as a TMA and the publication of the 2030 Regional Transportation Plan (RTP).

In 2007, the NFRMPO expanded the framework into a full Congestion Management Process, which was integrated with the 2035 RTP. During the development of the 2035 RTP and CMP in 2007, the Technical Advisory Committee (TAC) and NFRMPO Planning Council identified the Tier One Regionally Significant Corridors (RSCs) to be the focus of the Congestion Management Process in the North Front Range. Tier One corridors include I-25, US 34, US 287, and their parallel facilities. The 2007 CMP identified the causes of congestion on the Tier One corridors as well as strategies to manage congestion.

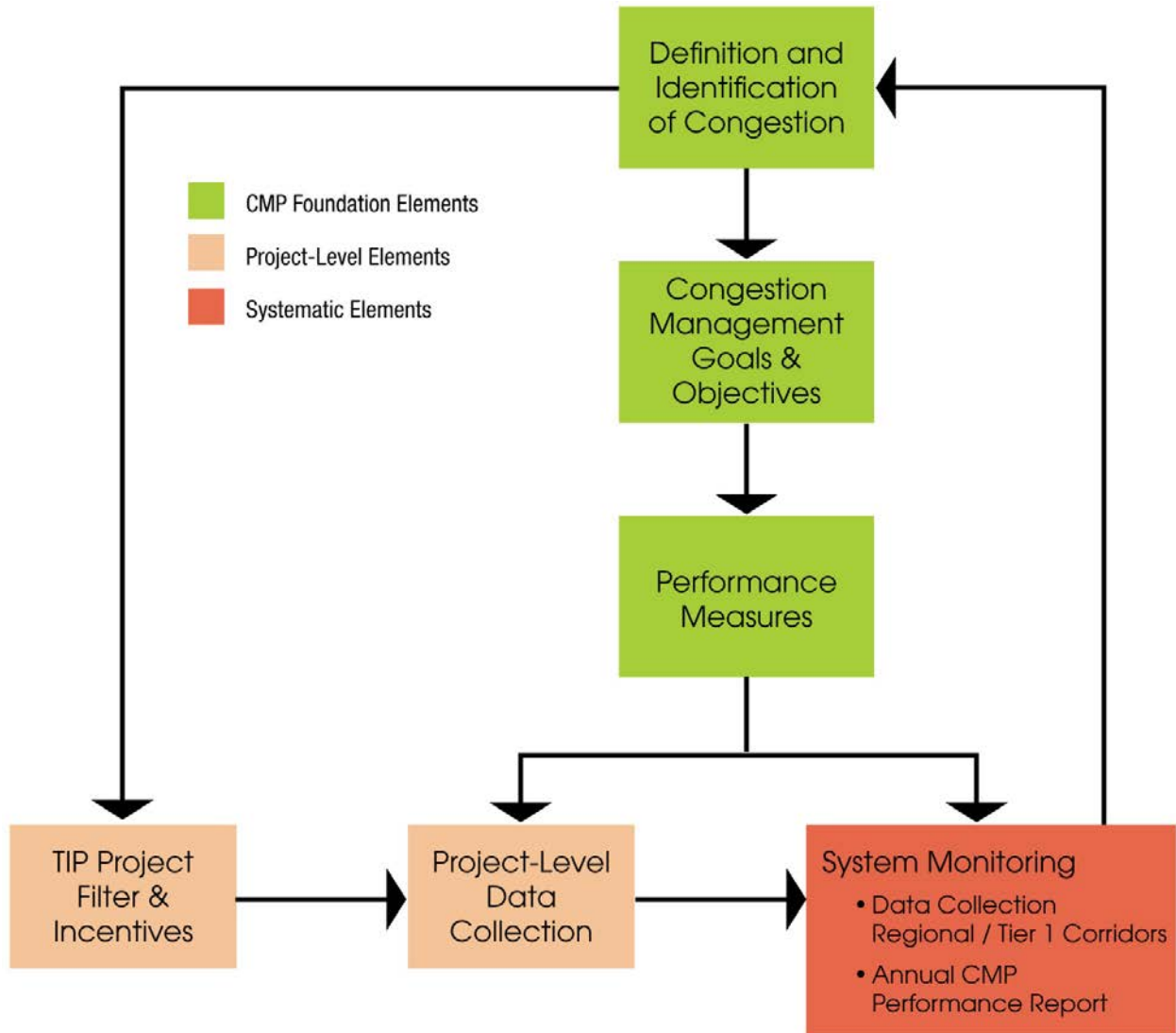
### **CMP Structure**

The structure of the MPO's Congestion Management Process is depicted on **Figure 9-1**. The green boxes represent elements of the CMP that establish the state of the region's congestion and what is important to the region in terms of managing or mitigating the congestion. The beige boxes represent project-level components of the CMP; the CMP serves as both a filter and an incentive in selecting projects for the Transportation Improvement Program (TIP), and all projects that receive funding through the MPO are required to collect before and after data. Finally, the salmon colored box represents the systemic component of the CMP; regional and corridor-level data will be collected on an annual basis to compare the state of the region in terms of congestion levels on a year-to-year basis. Both the system monitoring and the project-level data collection will be documented and analyzed in the Annual CMP Performance Report. These basic elements of the process are to operate as a cycle to continually adjust and monitor the effectiveness of the CMP and the projects that are being funded.

Not only is it important to understand how the elements of the CMP interact, it is also important to recognize the CMP's role in the overall regional transportation planning process. The CMP is closely tied to the RTP. The CMP focuses on the Tier One corridors as identified in Chapter 2 of this plan. The CMP goals and objectives feed into this plan. Both the RTP and the CMP inform the programming of projects in the TIP—the RTP by providing the vision, and the CMP by serving as both a filter and incentive.



**Figure 9-1 CMP Structure**



## C. CMP Vision, Goals, and Objectives

### CMP Vision

The vision for the CMP recognizes that the North Front Range is a growing region. The CMP vision is the following:

**Manage the increase in congestion levels on the regional transportation system.**

### CMP Goals and Objectives

The congestion management goals and objectives, shown in **Table 9-1**, were developed in support of the CMP Vision.

**Table 9-1 Congestion Management Goals and Objectives**

Goals	Objectives
<b>1. Improve Mobility</b>	<b>1A.</b> Reduce travel times along Regionally Significant Corridors
	<b>1B.</b> Improve transportation system reliability and reduce unexpected traveler delay for commercial, public, and private users
	<b>1C.</b> Provide transportation alternatives
<b>2. Make the best use of the existing transportation facilities</b>	<b>2A.</b> Reduce the demand for travel by implementing TDM programs
	<b>2B.</b> Improve transportation system management and operations
	<b>2C.</b> Collaborate land use planning to help reduce the need for long distance travel
<b>3. Decrease reliance on Single Occupancy Vehicles (SOV)</b>	<b>3A.</b> Increase carpool and vanpool ridership
	<b>3B.</b> Increase transit ridership on existing services
	<b>3C.</b> Develop regional and inter-regional transit services and support the development of feeder services to regional routes
	<b>3D.</b> Encourage active travel by expanding bicycle and pedestrian facilities
<b>4. Improve accessibility for all modes of transportation</b>	<b>4A.</b> Encourage local communities to develop land use plans that provide balanced access to all modes of travel
	<b>4B.</b> Maximize access to alternative transportation systems
<b>5. Minimize environmental impacts of the transportation system</b>	<b>5A.</b> Reduce growth in mobile source air pollution emissions
	<b>5B.</b> Reduce transportation-related fuel consumption



## D. Definition of Congestion

Congestion in the North Front Range MPO is defined as a corridor operating at level of service (LOS) E or F during the peak periods, as calculated in the travel demand model. LOS E on a roadway segment can be defined as a volume to capacity (V/C) ratio between 0.9 and 1.0. LOS F can be defined as a V/C ratio of 1.0 or greater.

### Identification of Congested Corridors

The transportation network used for identifying congested corridors in the North Front Range is the Tier One Regionally Significant Corridors. The NFRMPO went through the process of identifying and ranking those corridors which are most significant to the region (as a part of the 2007 2035 RTP planning process) to focus the limited transportation resources. The facilities within the Tier One RSCs are shown in **Chapter 7**.

## E. Causes of Congestion

The causes of congestion for the Tier One corridors have been categorized as follows:

- ▶ Lack of Parallel Facilities – Often short, local trips are forced onto high functional classification facilities (i.e., expressways or interstates) when parallel facilities are not available, resulting in congestion.
- ▶ Lack of Other Modes – When alternative travel modes such as transit or vanpool service, or bicycle/pedestrian facilities are not provided, travelers are forced to drive, resulting in congestion.
- ▶ Need for HOV – A lack of Travel Demand Management (TDM) techniques such as carpool/vanpool programs or congestion pricing can contribute to congestion along a corridor.
- ▶ Operations – Inefficient signal timing and progression and/or lack of auxiliary lanes can result in delays and queuing along a corridor.
- ▶ Capacity – While the CMP focuses on identifying non-roadway capacity expanding solutions to congestion, in some cases, the cause of congestion on a corridor is a result of limited capacity.
- ▶ Other (e.g., Land Use) – When communities or subareas have an unbalanced jobs/housing mix, travelers are forced to travel long distances for work and other types of trips, resulting in congestion.

The primary causes of congestion are identified and mapped for each segment of the Tier One corridors that is expected to be congested by 2035 in the Congestion Management Process Report, 2010.

## F. Congestion Management Strategies

A variety of strategies can be employed to address congestion in the North Front Range. **Table 9-2** presents a menu of strategies that could be used to address the cause(s) of congestion. The congestion management objectives refer to the objectives in **Table 9-1**. This menu of strategies has been intentionally generalized to accommodate potential new technologies in transportation. The categorization is for organizational purposes, and strategies in the same or different categories may

overlap. Often a comprehensive set of strategies can be more effective at relieving congestion than a single congestion management strategy.

The federal regulations specify that all reasonable congestion management strategies must be evaluated and deemed ineffective or infeasible prior to considering a roadway capacity increase as a congestion management approach.

**Table 9-2 Congestion Management Strategies**

Category	Strategy	Objective(s) Addressed
<b>Access Management</b>	Access control	<b>1A, 1B</b>
	Frontage roads	<b>1A, 1B</b>
	Median control	<b>1A, 1B</b>
<b>Alternative Travel Modes</b>	Transit fleet and facilities expansion	<b>1C, 3B, 3C</b>
	Transit service expansion	<b>1C, 3C</b>
	Transit priority treatments	<b>3B, 3C</b>
	Transit information systems	<b>3B, 3C</b>
	Bus only lanes	<b>1C, 3B, 3C</b>
	New rail service	<b>1C, 3C</b>
	Improved intermodal connections	<b>1C, 4B</b>
	Improved/expanded bicycle/pedestrian network	<b>1C, 3D</b>
Bicycle/pedestrian amenities	<b>1C, 3D</b>	
<b>Travel Demand Management/ Congestion Pricing</b>	Telecommuting	<b>2A, 5A, 5B</b>
	Flextime/compressed work week	<b>2A, 5A, 5B</b>
	Vanpool/carpool services	<b>1A, 2A, 3A</b>
	Parking management/preferential parking (for vanpools/carpools)	<b>2A, 3A, 5A, 5B</b>
	Road user fees (toll lanes)	<b>2A, 5A, 5B</b>
	Park-and-ride facilities	<b>1C, 3A, 4B</b>
	HOV/HOT lanes	<b>2A, 5A, 5B</b>
<b>Land Use Considerations</b>	Adequate Public Facilities regulations	<b>2C, 4A</b>
	Impact fees	<b>2C, 4A</b>
	Land use regulations/growth management	<b>2C, 4A</b>
	Land use plans	<b>2C, 4A</b>



Category	Strategy	Objective(s) Addressed
<b>Operational Improvements</b>	Intersection geometric improvements	1A, 2B
	Intersection channelization	1A, 2B
	Intersection turn restrictions	1A, 2B
	Intersection signalization improvements	1A, 2B
	Intelligent Transportation Systems (ITS)	1A, 2B
	Coordinated signal systems	1A, 2B
	Elimination of bottlenecks on freeways	1A, 1B
	Ramp metering	1A, 2B
	Incident management	1B
<b>Capacity Expansions<sup>1</sup></b>	Freeway lanes	1A
	Arterial lanes	1A

<sup>1</sup> All reasonable congestion management strategies must be evaluated and deemed ineffective or infeasible prior to considering a roadway capacity increase.

## G. System Monitoring

The system monitoring element of the CMP outlines an annual data collection program that will track the progress of the region in terms of congestion and is focused on the Tier One RSCs and the region as a whole. Results of the system monitoring will be incorporated into an Annual CMP Performance Report.

### Performance Measures

A performance measure is a quantifiable measure to assess how well the communities of the North Front Range region are meeting the established congestion management goals and objectives. Performance measures serve as indicators to better understand the usage of a transportation facility or the characteristics of travelers using the transportation system. A measure may refer to the experience of a traveler on a trip between a particular origin and destination, it may summarize all trips on a particular corridor, or it may describe the operation of one mode of transportation versus another.

The CMP establishes a set of performance measures that can be calculated from real world data on an annual basis and that will provide the NFRMPO with useful information and trends to inform transportation investment decisions. The following considerations were taken into account in establishing performance measures:

- ▶ Performance measures should reflect the region’s congestion management goals and objectives.
- ▶ Performance measures should be relevant and should speak to the user’s experience.
- ▶ Performance measures should be simple and understandable by the general public.
- ▶ Performance measures need to be based on readily available data.



- ▶ Performance measures should be meaningful both at a regional/corridor level as well as a project level.
- ▶ The mix of performance measures should address all modes of travel and should address both the supply and demand sides of transportation.
- ▶ The number of performance measures should be limited to avoid diluting the importance of any single indicator and to simplify output.
- ▶ While some performance measures may be in conflict with one another, the mix of performance measures should provide an understanding of the “state of the region” in terms of managing congestion.
- ▶ Performance measures should provide benchmarks for continued improvement and value in making investment decisions.

### Annual CMP Performance Measures Reports

The NFRMPO prepares updates to the CMP Performance Measure Report on an annual basis. The annual report illustrates congestion trends in the region, which help inform the next update of the CMP and potentially the way TIP projects are selected. At the time of this plan adoption, the most current CMP Performance Measure Report (for 2007-2009) is from June 2010. Please check the NFRMPO website for the most current report.

The system-wide data collection effort will be focused on the Tier One corridors, or region-wide, as appropriate for the particular performance measure.

## H. TIP Project CMP Consistency

The CMP not only provides a vision for managing congestion as part of the RTP and a mechanism for reporting regional trends, it also serves an important role in the selection of projects for the Transportation Improvement Program (TIP).

### Project Filter

The federal regulations specify that all reasonable congestion management strategies must be evaluated and deemed ineffective or infeasible prior to considering a roadway capacity increase as a congestion management approach. The intention of this requirement is to ensure consideration of viable solutions to mitigate congestion that may be more cost effective and with less environmental impact than roadway capacity expansions. For the purpose of the CMP, roadway capacity expansion is defined as additional general purpose through lane capacity.

Any project on a Tier One corridor that is applying for federal or state funding through the NFRMPO must be consistent with the CMP. If a project includes roadway capacity expansion for general purpose lanes, the project application must provide documentation of a thorough evaluation of alternative congestion mitigation strategies. The evaluation should demonstrate that alternative strategies would be ineffective at relieving congestion or would be infeasible and that capacity expansion has been deemed the best solution.





Additionally, any roadway capacity expanding projects on Tier One corridors should incorporate alternative congestion management strategies (such as ITS infrastructure, TDM programs, or transit priority treatments) into the overall project.

### **CMP Next Steps and Update**

The next major update of the NFRMPO's Congestion Management Process will be a component of the 2040 RTP. At that time, the NFRMPO may revisit the definition of the CMP network and the identification of congested corridors. The following suggestions may be possible modifications to the future CMP:

- ▶ Update the identification of currently congested corridors based on actual data collected through the region-wide data collection program, rather than using travel demand model results.
- ▶ Reconsider the network for which the CMP applies; the CMP may not be as appropriate to rural portions of the Tier One corridors as the portions that are in urban areas.

The CMP may also be expanded to include new objectives, performance measures, and/or strategies for mitigating congestion.