Congestion Management Process

METRO 2050
TRANSPORTATION • MOVING • AHEAD

INTRODUCTION

The Fargo-Moorhead Metropolitan Council of Governments (Metro COG) recently became a designated Transportation Management Area (TMA) in 2022, with an urban population exceeding 200,000 people. A Congestion Management Process (CMP) is required for all TMAs. This document builds on the CMP started in the 2045 Metropolitan Transportation Plan and updates the CMP to current regional priorities.

The CMP is a systematic approach to managing congestion that assesses transportation system performance and considers a range of alternative strategies for congestion management. The Metro COG CMP includes:

- A long-term network of CMP corridors.
- Performance criteria.
- Objectives focused on congestion mitigation practices.
- Strategies to advance projects that address current congestion or prevent future congestion.
- Recommended congestion mitigation projects that address current and future potential congestion issues in the MPO area.

The purpose of the CMP is to address congestion through a metro-wide process and set of strategies that provide for safe and effective management of the transportation system. CMP projects can address travel demand reduction, job access improvements, and operational management strategies.

The CMP should include multimodal system performance measures and strategies that are integrated into the Metropolitan Transportation Plan (MTP) and the Transportation Improvement Program (TIP).

Since the 2019 CMP was adopted Metro COG has monitored the congestion management network and collected data for monitoring, evaluating, and informing future transportation improvements. Recent Federal transportation performance measure rulemaking introduced a **Greenhouse Gas Reduction Planning Standard** that requires MPOs to individually set GHG reduction level goals for future years. The congestion management strategies developed in this process can aid the MPO in reaching the GHG reduction level goals set as part of the federal requirements. The Bipartisan Infrastructure Law established carbon reduction program funds for MPOs to distribute to qualifying projects that can reduce vehicle emissions and congestion such as transit projects, multimodal improvements, and ITS infrastructure.

Elements of a CMP

The Federal Highway Administration (FHWA) produced a guidebook, *Congestion Management Process: A Guidebook*[1], outlining the eight action elements to include as part of a successful CMP.

1. Develop Regional Objectives for Congestion Management
2. Define a CMP Network
3. Develop Multimodal Performance Measures
4. Collect Data and Monitor System Performance
5. Analyze Congestion Problems and Needs
6. Identify and Assess Strategies
7. Program and Implement Strategies
8. Evaluate Strategy Effectiveness

CMP Focus Areas and Objectives

The CMP objectives are built with the goals of the 2050 MTP in mind, zeroing in on the principles of congestion management in the major road network. The 2050 MTP goal focus areas from which the objectives were built are safety & system security, travel efficiency & reliability, walking, biking, & rolling, transit access & reliability, maintain transportation infrastructure, community context and impact reduction, freight network - moving goods, emerging transportation trends, transportation decisions, and community connection.

The resulting congestion management objectives drawn from the MTP goal focus areas are:

- Promote projects that improve safety for all users of the transportation system
- Minimize congestion by building the efficiency of the transportation system through strategic investments
- Support operational and maintenance improvements that improve multimodal network connectivity
- Improve safety and system management in corridors with reliability issues
- Encourage transportation projects that that provide improved access to destinations using a variety of modes

As each objective was developed, they were evaluated for multiple ties to the overarching long-term transportation goals as outlined in the 2050 MTP. Outlined below in Table 1 shows how different goal focus areas overlap with each CMP objective. A strong relationship between MTP goals and CMP objectives positions the metro area to be successful when implementing and executing projects that reduce or prevent congestion on major roadways.

[1] https://ops.fhwa.dot.gov/plan4ops/focus_areas/cmp.htm

Table 1. CMP Objectives Related to MTP Objectives

	Safety and system security	Travel efficiency and reliability	Walking, biking, and rolling	Transit access and reliability	Maintain transportation infrastructure	Community context and impact reduction	Freight network – Moving Goods	Emerging transportation trends	Transportation decisions	Connecting people and places
Objective: Promote projects that improve safety for all users of the transportation system										
Objective: Minimize congestion by building the efficiency of the transportation system through strategic investments										
Objective: Support operational and maintenance improvements that improve multimodal network connectivity										
Objective: Improve safety and system management in corridors with reliability issues										
Objective: Encourage transportation projects that include a variety of modes to provide improved access to key destinations										

CMP Network

The CMP Network is studied as part of each CMP update to examine any possible additions or adjustments and is intended to change dynamically with the overall transportation system over time as the need to manage congestion in the region changes. The 2024 CMP Network remains largely unchanged from the initial 2019 CMP Network. The National Highway System (NHS), Principal Arterials and Minor Arterials are considered part of the network with NHS roads being the primary focus and arterials being secondary. **Figure 1** shows the CMP network for the Metropolitan Planning Area (MPA), and **Figure 2** shows the CMP network for the Urbanized Area (UZA). The current CMP network consists of 959 lane miles. **Table 2** shows the lane miles for each facility type within the Fargo-Moorhead CMP network.

Table 2 – CMP Network Mileage by Facility Type

Total Interstate Lane Miles	**513.37**
Total Principal Arterial Miles	229.56
Total Minor Arterial Miles	216.11
TOTAL CMP NETWORK MILES	**959.04**

CMP Performance Measures

Performance measures allow us to understand the current performance of the CMP network, and how that performance will change over time. As required under Federal Highway Administration (FHWA) guidelines, performance measures accomplish this goal through utilizing quantitative measures to define the level of progress made towards specified objectives. As the CMP process evolves in the region, it is anticipated that the data and measures will change as well.

The Fargo-Moorhead CMP performance measures fall into four different categories; reliability measures, street network connectivity measures, peak hour congestion measures, and traffic incident measures.

Safety and Traffic Incident Measures

- **Number of Crashes**
  The number of crashes indicates where safety improvements may be necessary and also measures the effectiveness of safety measures.
- **Roadway Clearance Time (includes detection, response and clearance times)**
  As Fargo-Moorhead's traffic incident management (TIM) program matures, this performance measure would evaluate how long it takes for the incident to be detected, and after detection how long it takes for the incident to be cleared. *Implementation of the proposed Traffic Operations Center (TOC) in the region is essential for this performance measure and the First Responder Time measure to be implemented*.
- **First Responder Time to the Scene**
  A similar TIM performance measure would be the time it takes from detection until first responders arrive on the scene.

Figure 1. Metro COG CMP Network (MPA)

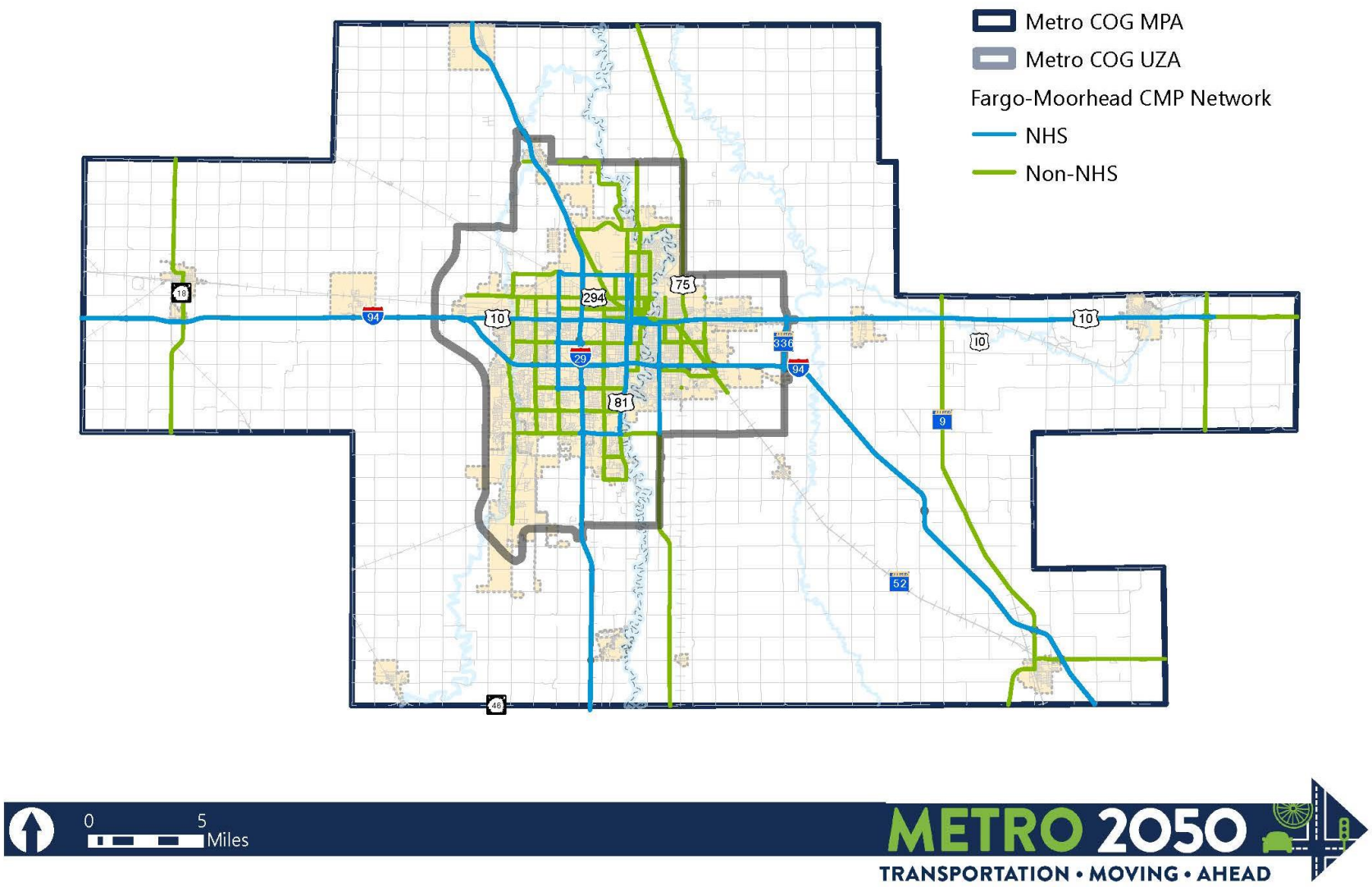
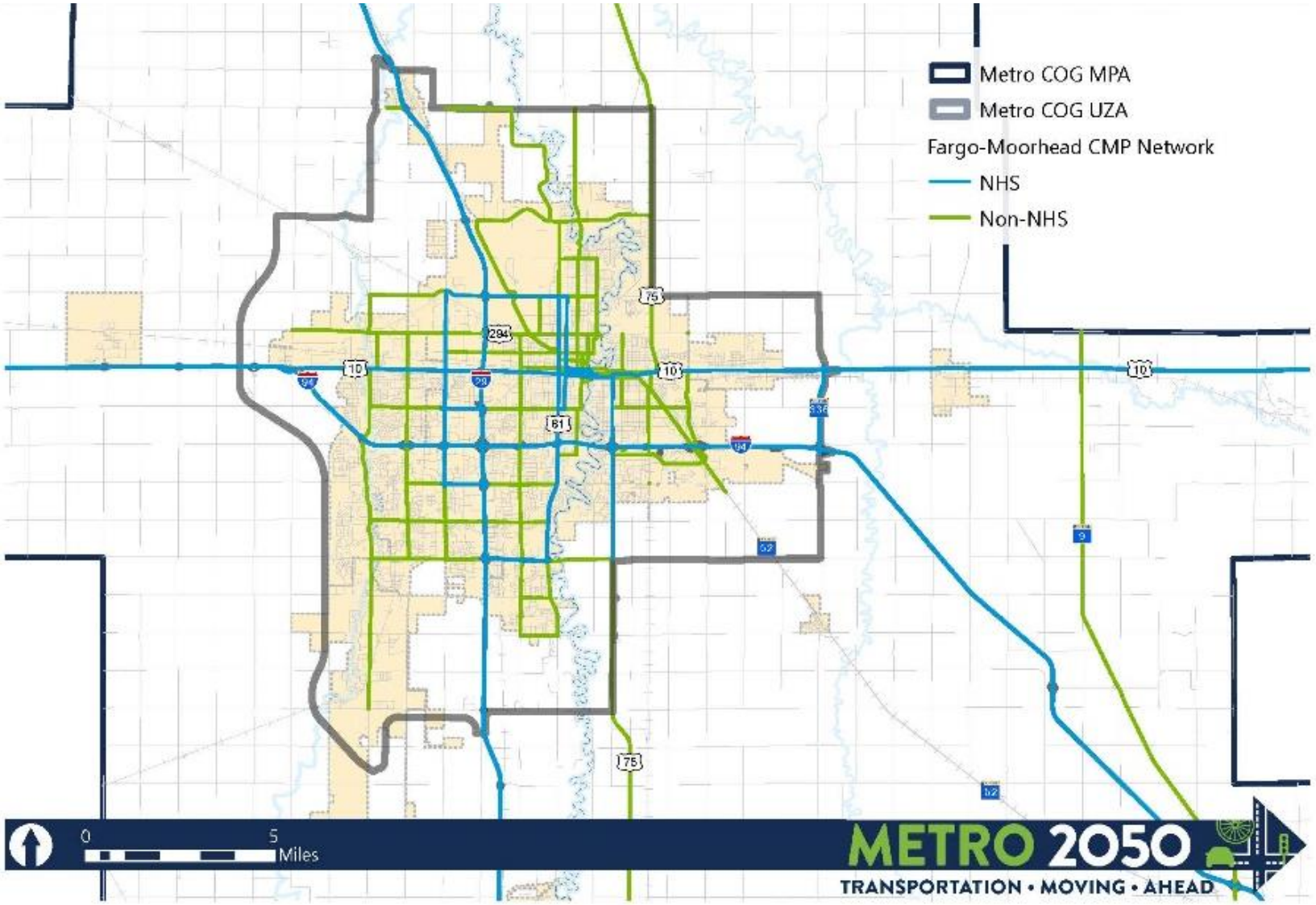


Figure 2. Metro COG CMP Network (UZA)



- **Weather Event Metric for Non-Recurring Congestion**
  Winter weather and road conditions are significant factors in reliability and safety issues in the metro area. This is an annual measure that tracks hours of CMP route closures due to weather conditions annually.

Peak Hour Congestion Measures

- **Peak Hour Excessive Delay**
  This measure evaluates how much travel is spent at 20 miles per hour or 60% of the posted speed limit travel time, whichever is greater.
- **Signals per Capita**
  Traffic signals can provide traffic operations benefits at intersections with high peak hour traffic volumes. Too many signals can lead to discontinuous traffic flow for many trips. This measure would evaluate the number of traffic signals per capita in the metro area compared to other metro areas.
- **Vehicle Miles Traveled (VMT) per Capita**
  VMT is the number of miles traveled by vehicles within a specified region, during a specified time period.
- **Extent of ITS Capital**
  This measure keeps an account of ITS improvements within the metro area, likely measured in terms of miles of ITS-served corridors. Can be used to measure the effects of ITS services and devices.

Reliability Measures:

- **Travel Time Reliability (TTR)**
  This measure leverages the Federal performance measure level of travel time reliability (LOTTR) to evaluate the percentage of person-miles traveled on both the Interstate and Non-Interstate NHS systems that are reliable. The TTR is defined as the ratio of the longer travel times (80th percentile) to a "normal" travel time (50th percentile) time.
- **Truck Travel Time Reliability (TTTR)**
  This measure supports freight movement by evaluating the travel time reliability on the Interstate System. The TTTR evaluates the ratio of the 95th percentile truck travel time by the "normal" travel time (50th percentile) time.

Multimodal Connectivity Measures

- **Modal Share (% Non-Single Occupant Vehicle Commuter Trips)**
  Travel to work often occurs during peak periods, and most commute trips occur in SOVs, which consume more space on the transportation network than any other mode.
- **Transit Ridership per Capita**
  Transit ridership indicates the use of the transit system relative to the population served by the transit system.

- **Miles of Sidewalks and Bike Paths/Lanes added within 1/4 mile of a transit stop**
  Miles of walking, biking, and rolling facilities added within 1/4 mile of a transit stop indicates the availability of travel crossing multiple modes.
- **Modal Linkage**
  This measure evaluates missing links between existing pedestrian, bicycle, or transit facilities.
- **Intersection/Collector Density Metric**
  Intersection density measures network connectivity through intersections per Transportation Analysis Zone (TAZ) or per square mile to identify the connectivity levels of existing or planned street grids. Similarly, the length of collector street segments over the same geographic area can convey how much neighborhood access is provided to the larger arterial network.
- **Bicycle and Pedestrian Count Data**
  Measuring the number of bicycle and pedestrian users on key trail or sidewalk systems on a regular basis highlights the need additional facilities in some locations and also measures the effectiveness of CMP improvements before and after they were implemented.

Supporting CMP Data

Multiple sources of data support the evaluation of congestion management practices over time. Table 3 outlines data sources and applicable performance measures to streamline the data.

Table 3. Performance Measures and Data Sources

Performance Measure	Data Sources
Number of Crashes	5-year crash data used for Federal Performance Measure
Roadway Clearance Time	Data collected by first responders via TIM program. Future Traffic Operations Center (TOC) can monitor and report.
First Responder Time to the Scene	Data collected by first responders via TIM program. Future TOC can monitor and report.
Weather Event Metric for Non-Recurring Congestion	NDDOT and MnDOT District Offices
Peak Hour Excessive Delay	National Performance Management Research Data Set (NPMRDS) and Metro COG's Urban SDK data on non-NHS corridors.
Signals per Capita	Literature / Internet Review
Vehicle Miles Traveled (VMT) per Capita	Metro COG VMT Estimates and US Census MPA Population Estimates
Extent of ITS Capital	Partner Agency Coordination / GIS Database. Measure of ITS corridors.
Travel Time Reliability	LOTTR measure from NPMRDS
Truck Travel Time Reliability	TTTR measure from NPMRDS

Table 3. Performance Measures and Data Sources (Continued)

Performance Measure	Data Sources
Modal Share	MATBUS transit ridership data and US Census Journey to Work data. Consider expanded and standardized pedestrian / bike counts.
Miles of Sidewalks and Bike Paths/Lanes by transit stop	Sidewalk and transit system GIS data from jurisdictions and MPO data sources; analyze a 1/4-mile buffer.
Modal Linkage	GIS Data evaluating the gaps between bike / ped system and transit stops
Intersection/Collector Density Metric	GIS density calculation of intersections - the point where two streets meet on a TAZ or square mile basis.
Bicycle and Pedestrian Count Data	Non-motorized counts at key locations

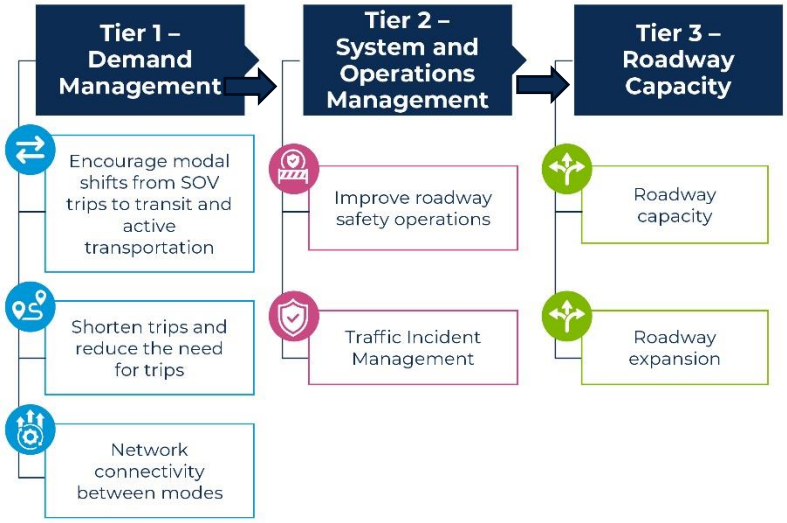
Metro COG CMP Strategy

Congestion management strategies can take the form of a variety of actions, policies, and project ideas that aid in decreasing traffic congestion and addressing multimodal connectivity on the transportation network. The following strategies are designed to reflect the context of the Fargo-Moorhead MPO region and its current and future traffic congestion management needs. The strategies and example implementation components should reflect appropriate and attainable actions for the region to consider when planning transportation projects related to traffic congestion relief.

Using the FHWA's *Congestion Management Process: A Guidebook (2011)* as a guide, strategy themes and actions were developed to address the MPO area. This process is outlined in **Figure 3**. The congestion management strategies are separated into a three-tiered CMP strategy:

- **Tier 1 - Demand Management**: Focused on reducing the demand and intensity for vehicle trips.
- **Tier 2 - System and Operations Management**: Improving the efficiency of the existing system through small physical improvements and technology enhancements.
- **Tier 3 - Roadway Capacity**: Adding more travel lanes to existing streets and adding new roadways.

Figure 3. Draft Metro COG CMP Strategy



When addressing corridor or systemic travel issues in the region, the range of strategies considered and tested should progress through each tier sequentially.

Demand Management (DM)

DM focuses on providing system users with choices on how and when to travel. Strategies aimed at expanding connections between various modes, efficient land development, encouraging flexibility in timing of travel, and reducing vehicle trips all relieve congestion within the system and improve travel reliability. Managing demand can be an effective way to redistribute traffic volumes across the system. Often DM strategies can be a more cost-effective way to manage congestion than expanding roadways.

DM Strategies and Actions

- **DM1: Encourage modal shifts from single-occupancy vehicle trips to transit and active transportation methods**
  - Improve transit services and transit facilities
  - Implement Transit Oriented Development design guidelines
  - Plan for and fund walking, biking, and rolling infrastructure
  - Parking management
- **DM2: Shorten trips and reduce the need for peak period trips**
  - Encourage alternative work schedules and/or telecommuting
  - Use land use controls or zoning to support and encourage mixed use development
- **DM3: Facilitate network connectivity between modes**
  - Intersection, interchange, and sidewalk improvements
  - Expansion of modal connections in areas of high population and job density

System and Operations Management (SM)

SM addresses how the system can improve current operations, safety, and traffic conditions. Measures to improve system supply management include responses to both recurring and non-recurring congestion and can include technological advances, signal management and emergency response practices.

SM Strategies and Actions

- **SM1: Improve roadway safety operations**
  - Implement access management measures such as installing roundabouts and minimizing driveways and curb cuts to optimize traffic flow and reduce the number of conflict points between motorized and non-motorized users Implement an advanced traveler information system
  - Implement variable speed limits
  - Automatic road enforcement
  - Utilize ramp metering
  - Optimizing traffic signals
  - Install traffic calming features
- **SM2: Enhance traffic incident management activities**
  - Enhance the visibility of law enforcement
  - Improve management of work zones
  - Identify weather and road surface problems and target rapid responses
  - Plan for addressing special events such as emergency evacuations that cause surges in traffic
  - Continually improve the traffic incident management program
- **SM3: Enhance Existing Roadway Operations**
  - Install technology enhancements to improve efficiency
  - Implement intersection improvements
  - Close gaps in the street network
  - Install center turn lanes where appropriate
  - Consider on-street parking restrictions during peak hours

Roadway Capacity (RC)

RC addresses how and when additional capacity should be added to roadway to address new growth or other factors that contribute to significant congestion that cannot be met with less invasive means.

RC Strategies and Actions

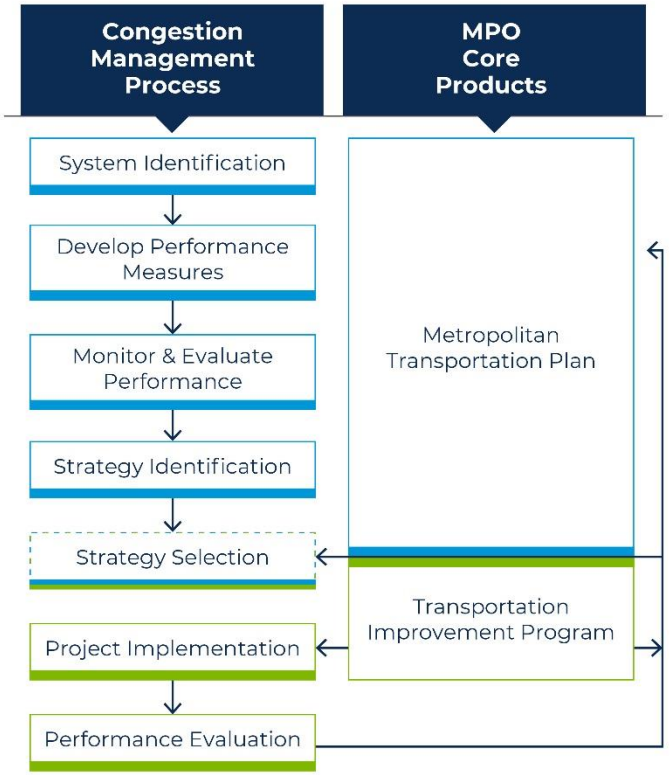
- **RC1: Widen existing roadways**
  - Consider strategic roadway widenings to relieve bottlenecks
  - Add new travel lanes
- **RC2: Add new roadways**
  - Construct new major roadways to accommodate growth

Integrating the CMP into the Metropolitan Project Selection Process

While the CMP is a freestanding process independent of the MTP, TIP and other metro transportation planning documents, its strategies and objectives inform and are informed by those documents. As the overarching, long-range planning document, the MTP drives the overall regional vision and is a basis for decision-making and project prioritization. The CMP objectives were developed with consideration to the MTP goals to be consistent with future planning efforts. The TIP is a four-year implementation document containing those projects that will be funded and initiated within the following four years. TIP projects are annually evaluated and scored by the Policy Board using criteria that is designed to place the highest importance on those projects with the highest need and most consistency with the MTP goals, objectives, and priority projects.

To show the relationship between the CMP, MTP and TIP, **Figure 4** illustrates how the CMP process and the metro's transportation plans, policies, and project selection processes work together to ensure the implemented projects and programs reflect the intent of each planning document. The CMP system identification, performance measure development, performance monitoring, and identification of strategies are informed by the goals and objectives of the MTP. Individual congestion management strategies selected implementation consideration are incorporate into the MTP prioritized projects listing and then scored for inclusion into a four-year TIP. Periodically, the CMP should be evaluated for effectiveness and adjustments made, especially considering the cyclical updating of metro planning policies, processes, and planning documents.

Figure 4. CMP Overlay with Metro COG Core Work Products



Implementation

CMP strategy projects and programs will be considered in developing MTP and TIP programming and scoring criteria or consideration should be included as part of the project selection process. During the annual TIP project solicitations for federal funding awards under the STBG / Urban Roads, TA, CRP, and other applicable funds application questions related to how well a project addresses congestion management practices should be included as part of project screening and scoring. Scoring criteria to include in the TIP scoring application could include information on if the project is located on the congestion network and if the project is consistent with the CMP process and listed CMP strategies. The extent to which each project evaluated for inclusion into the TIP satisfies application criteria focused on congestion management strategies justifies a higher score on the overall merit of the proposed project. Projects that are consistently implemented with these CMP strategies aid future congestion control in the metro area as traffic volume increases.

Evaluating the CMP

Measuring and evaluating the effectiveness of the CMP at regular intervals is important for measuring progress toward implementing congestion management actions and exploring potential changes to objectives and strategies to best address congestion in the metro area. FHWA suggests two approaches for evaluating the CMP:

- **System level performance evaluation** – includes a regional analysis of historical trends to identify improvement or degradation in system performance in relation to objectives
- **Strategy effectiveness evaluation** – project-level or program-level analysis of conditions before and after the implementation of a congestion mitigation effort.

Metro COG will continue to evaluate and report on its system-wide performance measures by:

- Collecting data on performance measures
- Monitoring regional data over time
- Reporting trendlines on performance

As the CMP process matures it will highlight the local effectiveness of the tiered congestion management process and various congestion management strategies. Regional-level data will capture larger trends related to congestion within the network over time. Data specific to individual projects or programs should also be collected at the project level over time to measure the performance of one strategy within the overall network. Evaluation should be gathered in a periodic report to demonstrate progress as well as to inform how strategies may be altered or new strategies introduced. Evaluation reports should be used as a resource when updating the MTP and the CMP in future planning efforts.