Introduction

The Madison Area Transportation Planning Board (TPB) is the policy body responsible for cooperative, comprehensive regional transportation planning and decision making for the Madison Metropolitan Planning Area as designated by the Governor of the State of Wisconsin under federal law and regulations. The goal of the MPO planning process is to build regional agreement on transportation investments that balance roadway, public transit, bicycle, pedestrian, and other transportation needs and support regional land use, economic, and environmental goals and plans.

As an MPO for a Metropolitan Planning Area with a population over 200,000, the Madison Area TPB is required to maintain a congestion management process (CMP) as part of its ongoing transportation planning process. The CMP is intended to address congestion based on a cooperatively developed and implemented metropolitan-wide strategy that provides for the safe and effective management and operation of the multimodal transportation system. Strategies and projects are to be reflected in the MPO’s long-range Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP). Strategies that manage travel demand, reduce single occupant vehicle (SOV) travel, and improve transportation system management and operations are all to be considered, as well as those that explicitly address bicycling and walking.

The Madison Area TPB has maintained a CMP, but it has been mostly focused on:

(a) Using the regional travel demand model to project 20+ year future traffic volumes and identify major roadway capacity expansion needs consistent with the MPO’s policy to accept a Level of Service (LOS) D and to explore Transportation Demand Management (TDM) and Transportation System Management (TSM) strategies first; and

(b) Supporting corridor and area studies to further analyze and develop more specific project level recommendations based on more detailed traffic operations modeling.

There has not been an ongoing coordinated, systematic inter-agency process in place for examining congested corridors and intersections where TDM strategies and lower cost targeted TSM improvements could enhance operation of the current transportation system. There also has not been a coordinated process in place for assessment of the effectiveness of implemented strategies and projects.

Federal Requirements

The current MPO CMP needs to be updated to meet the current Federal requirements, which require the CMP to include the following:

(1) Methods to monitor and evaluate the performance of the multimodal transportation system, identify the causes of recurring and non-recurring congestion, and identify and evaluate alternative strategies;

(2) Definition of congestion management objectives and performance measures to assess the extent of congestion and support the evaluation of the effectiveness of congestion reduction and mobility enhancement strategies for the movement
of people and goods. The measures and the system performance deemed acceptable are to be cooperatively developed by the State, MPO, and local transportation officials.

(3) Establishment of a coordinated program for data collection and system performance monitoring to define the extent and duration of congestion, to contribute in determining the causes of congestion, and evaluate the efficiency and effectiveness of implemented actions;

(4) Identification and evaluation of the anticipated performance and expected benefits of appropriate congestion management strategies that will contribute to the more effective use and improved safety of existing and future transportation systems based on the established performance measures.

(5) Identification of an implementation schedule, implementation responsibilities, and possible funding sources for each strategy (or combination of strategies) proposed for implementation; and

(6) Implementation of a process for periodic assessment of the effectiveness of implemented strategies, in terms of the area's established performance measures.

It is noted that a CMP does not require an MPO to change its process for identifying priority projects or TIP project development selection process. CMP's do not require that specific federal performance measures or targets be adopted but that performance goals are supposed to reflect local conditions and transportation system goals. CMP's do not require MPO's to set aside a portion of their project funds for congestion mitigation other than what they normally identify as part of their TIP process. A CMP also does not require MPO member agencies to change their internal processes.

Figure 1 illustrates the congestion management process for the Madison MPO Planning Area.
Executive Summary Congestion Management Process

IDENTIFY CONGESTED LOCATIONS
[Requires agreement on baseline performance measures]
- Beltline and Interstate System
- Urban principal and minor arterial streets
- Metro Transit and other area transit operators
- Bicycle and pedestrian modes

IDENTIFY CAUSES OF CONGESTION
- Inadequate main line capacity (v/c)
- Poor incident management (lane closures and duration)
- Inadequate intersection capacity (traffic volume, geometrics, and modal conflicts)
- Transit: impact of arterial congestion, inadequate service capacity to meet demand

DEVELOP CONGESTION MANAGEMENT STRATEGIES
- Transportation systems management (ITS, focused improvements at bottlenecks and intersections, transit signal priority, pedestrian separation)
- Improved regional incident management
- Regional travel demand management strategies
- Add transit facilities and service
- Add pedestrian and bicycle facilities
- Construct new roadway capacity

IMPLEMENT STRATEGIES
- Where do they fit in the Regional Transportation Plan?
- Where do they fit in Transportation Improvement Program priorities?
- What agency is responsible for implementing the strategy?

MONITOR RESULTS
- Develop performance measurement framework
- Agree to enhanced performance measures
- Assign responsibility for data collection and analysis
- Assess congestion regularly

Figure 1 – Applying the Federal CMP Guidance to Madison
Identifying Madison's Congested Transportation Facilities

The geographic base for the CMP is primarily the Madison Metropolitan Planning Area as defined by the MPO. While federal funds may be spent on functionally classified collectors, it is the intent that this CMP be applied to principal arterials and minor arterial streets within the Planning Area and only principal arterials in the outer Dane County area.

The geography encompasses the service area of the Madison Metro and Monona Transit systems, as well as the primary generators of bicycle and pedestrian travel and freight demand.

The first step in the CMP development is to identify existing congested facilities and transportation elements in the MPO Planning Area. Existing congestion measures on these facilities and services are described in Table 1.

Table 1 – Existing Transportation Performance Measures and Definitions

<table>
<thead>
<tr>
<th>Modes of Transportation</th>
<th>Performance Measure</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Arterial Freeways</td>
<td>v/c</td>
<td>Measures the traffic volume on a roadway segment to the theoretical capacity. The v/c ratio corresponds to a LOS for planning purposes.</td>
</tr>
<tr>
<td>Urban Arterials</td>
<td>v/c</td>
<td>A qualitative measure describing operational conditions.</td>
</tr>
<tr>
<td>Intersection</td>
<td>LOS</td>
<td>Measures the traffic volume on a roadway segment to the theoretical capacity. The v/c ratio corresponds to a LOS for planning purposes.</td>
</tr>
<tr>
<td>Metro Transit</td>
<td>Frequency</td>
<td>Measures the number of bus route trips per hour in a given direction on a roadway segment.</td>
</tr>
<tr>
<td></td>
<td>Ridership</td>
<td>Measures the number of boardings per bus stop.</td>
</tr>
<tr>
<td></td>
<td>On-Time Performance</td>
<td>Measures the frequency with which a bus arrives at or leaves a time point as scheduled.</td>
</tr>
<tr>
<td>Bicycle</td>
<td>Capacity/Conflicts</td>
<td>Measures the volume to capacity of bike facilities.</td>
</tr>
<tr>
<td></td>
<td>Facility Continuity</td>
<td>Measures the continuity of bicycle facilities and parallel routes.</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>Capacity/Conflicts</td>
<td>Measures the capacity and conflicts at intersections and along paths.</td>
</tr>
<tr>
<td></td>
<td>Facility Continuity</td>
<td>Identifies the continuity of sidewalks and multi-use trails/paths for pedestrians.</td>
</tr>
<tr>
<td>Crash Information</td>
<td>Incident Frequency/Non-Recurring Congestion</td>
<td>Measures the number of incidents that result in a lane closure on a roadway segment.</td>
</tr>
</tbody>
</table>

Existing System Performance

Figure 2 illustrates the existing arterial roadways that are currently operating at ‘congested’ or ‘very congested’ conditions based on roadway segment volume to capacity ratios. Figure 2 also identifies existing problem intersections for traffic and transit operation due to high levels of congestion and/or modal conflicts.
Figure 3 highlights Metro Transit route segments with chronic passenger overloading conditions during weekday peak periods when school is in session.

**Figure 3 - Metro Transit Route Segments with Chronic Passenger Overloading Conditions**
System Performance Measures

In order to better identify system operating condition deficiencies, it is important to identify CMP performance measures that can be quantified based on reliable existing and new data sources that are relatable to the existing measures described in Table 1, but that are also more understandable to the traveling public. Table 2 identifies the set of performance measures and update cycle recommended for the Madison CMP. Many of these measures will require new data sources and a commitment to collect the data on a regular schedule through development of a sampling process on selected corridors or area wide over a specific time frame such as 3 or 5 years. The goal is to be able to evaluate trends in system performance and the effectiveness of congestion mitigation strategies.

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Data Type</th>
<th>Collector</th>
<th>Analyst</th>
<th>Archive Owner</th>
<th>Update Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway LOS</td>
<td>Freeway Volume</td>
<td>WisDOT</td>
<td>MPO</td>
<td>MPO/WisDOT</td>
<td>Tri-Annually</td>
</tr>
<tr>
<td>Freeway Travel Time Index</td>
<td>Corridor/Segment Travel Time</td>
<td>Floating Car: MPO Automated: WisDOT</td>
<td>MPO</td>
<td>MPO/WisDOT</td>
<td>Floating Car: 3-5 Years Automated: Quarterly</td>
</tr>
<tr>
<td>Freeway Congestion Duration</td>
<td>Hourly Traffic Volume</td>
<td>WisDOT, City of Madison</td>
<td>City of Madison/WisDOT/MPO</td>
<td>City of Madison/WisDOT/MPO</td>
<td>Tri-Annually on Selected Corridors</td>
</tr>
<tr>
<td>Freeway Non-Recurring Delay</td>
<td>Crash Records</td>
<td>Dane County Sheriff/Police/TOPS Lab</td>
<td>WisDOT</td>
<td>MPO/WisDOT</td>
<td>Annually</td>
</tr>
<tr>
<td></td>
<td>Service Patrol Records</td>
<td>Dane County Sheriff; STOC</td>
<td>WisDOT</td>
<td>MPO/WisDOT</td>
<td></td>
</tr>
<tr>
<td>Freeway Incident Index</td>
<td>Incident Location, Duration, Lane Closure</td>
<td>WisDOT, Dane County Sheriff</td>
<td>MPO</td>
<td>MPO/WisDOT</td>
<td>Annually</td>
</tr>
<tr>
<td>Urban Arterial Street LOS</td>
<td>Traffic Volume</td>
<td>City of Madison/WisDOT</td>
<td>MPO</td>
<td>City of Madison/WisDOT/MPO</td>
<td>Tri-Annually on Selected Corridors</td>
</tr>
<tr>
<td>Urban Arterial Street Travel Time Index</td>
<td>Corridor Travel Time</td>
<td>Floating Car: MPO Automated: Private Vendor Data Source</td>
<td>MPO</td>
<td>MPO</td>
<td>3-5 Years on Selected Corridors</td>
</tr>
<tr>
<td>Urban Arterial Street Congestion Duration</td>
<td>Hourly Traffic Volume</td>
<td>WisDOT, City of Madison</td>
<td>City of Madison/WisDOT/MPO</td>
<td>City of Madison/WisDOT/MPO</td>
<td>Tri-Annually on Selected Corridors</td>
</tr>
<tr>
<td>Urban Arterial Street Intersection LOS</td>
<td>Turning Movement Traffic Counts, Signal Timings, Geometrics</td>
<td>City of Madison/WisDOT</td>
<td>City of Madison/WisDOT</td>
<td>City of Madison/WisDOT</td>
<td>Selected Intersections Each Year</td>
</tr>
<tr>
<td>Urban Arterial Roads Non-Recurring Delay</td>
<td>Crash Records</td>
<td>Dane County Sheriff/State Patrol/TOPS Lab</td>
<td>City of Madison/WisDOT/MPO</td>
<td>City of Madison/WisDOT/MPO</td>
<td>Annually</td>
</tr>
<tr>
<td>Transit On-Time Performance</td>
<td>Schedule Time vs. Actual Time</td>
<td>Metro Transit</td>
<td>Metro Transit</td>
<td>Metro Transit</td>
<td>Semi-Annually (once automated)</td>
</tr>
<tr>
<td>Transit Demand/Capacity Ratio</td>
<td>Boarding and Alighting Counts</td>
<td>Metro Transit</td>
<td>Metro Transit</td>
<td>Metro Transit</td>
<td>Semi-Annually (once automated)</td>
</tr>
<tr>
<td>Pedestrian Volume</td>
<td>Pedestrian Counts</td>
<td>City of Madison</td>
<td>City of Madison</td>
<td>City of Madison</td>
<td>As Needed for Projects</td>
</tr>
<tr>
<td>Pedestrian Facility Continuity</td>
<td>Construction Project Records</td>
<td>MPO</td>
<td>MPO</td>
<td>MPO</td>
<td>Annually</td>
</tr>
<tr>
<td>Bicycle Volume</td>
<td>Bicycle Counts</td>
<td>City of Madison</td>
<td>City of Madison</td>
<td>City of Madison/MPO</td>
<td>Selected Intersections, Annually</td>
</tr>
<tr>
<td>Bicycle Demand/Capacity</td>
<td>Bicycle Counts</td>
<td>City of Madison</td>
<td>City of Madison</td>
<td>City of Madison/MPO</td>
<td>As Needed for Projects</td>
</tr>
<tr>
<td>Bicycle Facility Continuity</td>
<td>Construction Project Records</td>
<td>MPO</td>
<td>MPO</td>
<td>MPO</td>
<td>Annually</td>
</tr>
</tbody>
</table>

Table 2 – Performance Monitoring Plan
Performance Measurement Targets

A critical step to integrate the long-range Regional Transportation Plan (RTP), Congestion Management Process (CMP), and project implementation through the Transportation Improvement Program (TIP) and local Capital Improvement Programs is setting targets for each of the congestion performance measures. It is important to understand that targets do not in themselves establish priorities to guide investment in the transportation system. The MPO RTP and TIP development process will accomplish priority setting in terms of how congestion relief fits with safety, system preservation, other modal improvement needs, and livability/quality of life considerations in the Madison area. The CMP targets guide choices within the congestion goal area. It should be noted that the performance measure targets were selected based on available data and professional judgment, but the lack of comprehensive, system-wide data for many of them means that the targets will need to be refined. The MPO will work with the Congestion Management Committee to refine and recommend changes to the performance measures and targets as additional data becomes available.

There are no federal requirements for specific performance measure targets which are supposed to reflect local conditions and goals. Targets can be adjusted over time, usually linked to updates of the long-range Regional Transportation Plan and CMP. In general, performance targets should relate directly to the priority assigned to congestion mitigation by mode and strategy. If, for example, improvement of transit service is a high priority objective, transit related performance targets would be more aggressive. The public will expect to see progress on the performance targets, so the MPO must commit to investing in the strategies and projects linked to achieving improved transportation system performance. In the future, the MPO may also choose to include a timeline with each target; for example, “reduce average incident clearance time on the Beltline by 15% within 3 years”. Each performance target may also be linked to baseline conditions, making it apparent how much progress is required to achieve the desired condition. Baselines may represent regional average or corridor-specific conditions. Regional transportation performance baselines may also be reported in terms of percent of mileage, routes, or locations at defined levels; “22% of intersections on urban arterial corridors are at LOS E.” Table 3 identifies the recommended initial performance targets for the Madison CMP performance measures.
### Table 3 – Performance Targets

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Threshold Goals</th>
<th>Monitoring Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway LOS</td>
<td>LOS ‘D’</td>
<td>Currently Implemented</td>
</tr>
<tr>
<td>Freeway Travel Time Index</td>
<td>1.75 (daily peak and non-peak travel time should not vary by more than 25 percent from average travel time due to congestion during any given time period)</td>
<td>Selected corridors beginning in 2013</td>
</tr>
<tr>
<td>Freeway Congestion Duration</td>
<td>Peak hour traffic congestion should not exceed a duration of 1 hour.</td>
<td>Selected corridors beginning in 2013</td>
</tr>
<tr>
<td>Freeway Non-Recurring Congestion</td>
<td>70% of non-recurring congestion should not last longer than 30 minutes.</td>
<td>Selected corridors beginning in 2013</td>
</tr>
<tr>
<td>Freeway Incident Index</td>
<td>Total lane-hours of closure/average weekday &lt; 2.0</td>
<td>Requires data tabulation beginning in 2012</td>
</tr>
<tr>
<td>Urban Arterial Street LOS</td>
<td>LOS ‘D’</td>
<td>Currently Implemented</td>
</tr>
<tr>
<td>Urban Arterial Street Travel Time Index</td>
<td>1.75 (traffic speeds on 30-40 mph roadways should not experience incident-related speed reductions of more than 30 percent)</td>
<td>Selected corridors beginning in 2013</td>
</tr>
<tr>
<td>Urban Arterial Street Congestion Duration</td>
<td>Peak hour traffic congestion should not exceed a duration of 1 hour.</td>
<td>Selected corridors beginning in 2013</td>
</tr>
<tr>
<td>Urban Arterial Street Intersection LOS</td>
<td>LOS ‘D’ Overall</td>
<td>Selected intersections beginning in 2012</td>
</tr>
<tr>
<td>Urban Arterial Street Non-Recurring Delay</td>
<td>Incident clearance average &lt; 1 hour</td>
<td>Requires data tabulation beginning in 2012</td>
</tr>
<tr>
<td>Special Event traffic management plans in place for all events.</td>
<td>Currently Implemented</td>
<td></td>
</tr>
<tr>
<td>Transit On-Time Performance</td>
<td>Peak period bus trips for each route should leave the time points within 5 minutes of the scheduled time at least 90% of the time.</td>
<td>System-Wide 2013</td>
</tr>
<tr>
<td>Transit Demand/Capacity Ratio</td>
<td>Average of 125% of seating capacity (about 10 standees) over a 1-hour period. No single trips over 150% of capacity.</td>
<td>System-Wide 2013</td>
</tr>
<tr>
<td>Pedestrian Volume</td>
<td>The number of pedestrians should increase by a minimum of 2% per year.</td>
<td>As Needed for Projects</td>
</tr>
<tr>
<td>Pedestrian Facility Continuity</td>
<td>All arterials should have a sidewalk on both sides of the roadway.</td>
<td>Beginning in 2012</td>
</tr>
<tr>
<td>Bicycle Volume</td>
<td>The number of bicyclists should increase by a minimum of 2% per year at selected locations.</td>
<td>Currently implemented at 7 routes with more to be added in 2012</td>
</tr>
<tr>
<td>Bicycle Demand/Capacity</td>
<td>Bicycle paths should operate at a peak daily demand no greater than 90% of its capacity.</td>
<td>Selected paths beginning in 2013</td>
</tr>
<tr>
<td>Bicycle Facility Continuity</td>
<td>All urban arterials should have bicycle accommodations and parallel routes where feasible.</td>
<td>Currently Implemented</td>
</tr>
</tbody>
</table>
Congestion Management Strategies

Transportation Demand Management (TDM) and Transportation System Management (TSM) programs encourage the use of alternative transportation modes and seek efficient public transportation systems. Transportation demand management initiatives attempt to reduce or spread out peak traffic demand patterns. These strategies and programs typically do not require large capital investments, but they often require an ongoing commitment to support operation of the programs. In comparison, transportation system management strategies involve direct improvements to the operation or capacity of the transportation system to reduce traffic congestion and to increase the efficiency of the transportation system. Implementation of TDM program initiatives and TSM strategies should generally be considered and implemented prior to major corridor capacity projects. These include projects that provide additional all purpose traffic lanes and/or interchange reconstruction of existing at-grade intersections.

Transportation Demand Management (TDM) programs can be classified into two distinct but related activities: land use management and travel demand management. These strategies or programs help manage congestion by reducing the need to travel or the number of peak period trips on arterials by encouraging commuters to shift to shared-ride or other modes of travel or to trips that occur at a more efficient time, route, or place.

Land Use Planning Polices and Development Practices:
Land use, the spatial location of residential, employment, and other trip ends, is the primary controlling factor in transportation movement. Low density, single use development patterns increase dependence on cars, resulting in longer trip lengths, more vehicle-miles of travel, and ultimately traffic congestion. More compact development combined with mixed uses and connected streets can reduce trip length and frequency, offering at least a portion of the population an opportunity to live near where they work, shop, or meet other needs. This creates an environment supportive of travel by modes other than the automobile. The benefits of land use planning policies and pedestrian and transit supportive development do not result in short-term improvements, but require extensive time periods to realize the benefits as development occurs over time. Transportation improvement projects need to consider their impact on adjacent land uses and long-term impact on resident quality of life.

Demand Management Programs:
Demand management programs provide information and incentives to reduce travel during peak periods. These include rideshare programs like Madison’s Rideshare/Etc, parking policies such as preferential parking for people using car/vanpools, parking “cash out,” and provision of covered bicycle parking; free or reduced price transit passes; transportation allowances for transit; and guaranteed ride home programs.

It is understood that TDM programs are regional in nature and that the impact on mitigating congestion on a specific corridor may be difficult to measure. They are still an important component of a congestion management program because working to influence the travel behavior of individuals can have a long-term impact.

Transportation System Management (TSM) involves actively managing the regional transportation system to effectively mitigate corridor congestion problems. These actions often require less capital investment than constructing new roadway capacity. Not only...
is constructing new lanes costly, it adds capacity that may be used for only a short time each day. It can also induce additional travel and negatively impact the pedestrian and bicyclist level of service. Active management utilizes technology in a way that facilitates communication between drivers, vehicles, and the roadway environment to maximize the available physical capacity of the corridor. While the techniques differ between signalized urban arterial streets, freeways, and transit systems, the goal is the same. The more efficient the vehicle flow, the better the existing corridor capacity is utilized. When travelers have good information about congested conditions (for example with respect to non-recurring congestion) they can make better decisions. Those individual decisions can collectively have a meaningful impact on congestion, particularly on certain corridors such as the radial arterials leading to the downtown/UW campus area or through traffic in the Madison Planning Area. Transportation system management includes the use of intelligent transportation system technologies and operational system improvements.

 Intelligent Transportation System (ITS) technology can be implemented on the following three systems:

- Freeway Management System
- Traveler Information System
- Public Transportation System

A freeway management system monitors traffic flow conditions on freeways, manages traffic entering the freeway system with ramp meters, and during incident related traffic delays assists in reducing incident clearance time and provides information to motorists using message board systems so they divert their trip to alternative routes. A traveler information system can provide real-time guidance on route operating conditions via the internet. A public transportation system can use an automatic vehicle locator system to identify to bus passengers bus arrival times and allow dispatchers to adjust routes and schedules if necessary to minimize transit service delays.

 Operational Improvements are implemented to decrease congestion and travel delays and include the following strategies:

- Access Management
- Parking Modifications
- Traffic Signal Improvements
- Transit Priority Signal Operation
- Hard Shoulder Running
- Interchange and Intersection Improvements

 Transportation Service Areas

To effectively plan for transportation improvements, it is necessary to understand how the existing system is performing based on an evaluation of agreed upon system performance measures. Each congested transportation corridor in the Madison area has been inventoried and its performance summarized based on its transportation characteristics. The corridors are grouped into the following seven transportation service areas which are shown on the following page in Figure 4:

- East Isthmus
- Central/Near West
- North/Northeast
- West/Southwest
- Northwest
- East/Southeast
- South

Each area comprises several arterial corridors that have been identified as currently experiencing congested or very congested peak hour traffic operating conditions. The CMP report describes each corridor’s traffic, transit, and pedestrian and bicycle operation and facility characteristics, as well as any current programmed or planned transportation improvements.
Monitor Strategy Effectiveness

A critical step in maintaining the Congestion Management Process is the development of a system performance monitoring plan that all of the participating agencies agree upon. Performance measurement is not a one-time event, but rather an ongoing activity that must be matched to the existing and future resources of each participating agency. This is how the MPO will monitor not only the ongoing performance of the region’s transportation system, but also the effectiveness of the strategies and projects that are put in place. By conducting performance updates on a regular schedule, the MPO and its member agencies can determine which strategies worked the best in mitigating specific types of congestion, and which had the least impact. This will in turn identify the best actions in subsequent CMP, TIP, and Long Range Plan updates.

Establishing Project Priorities

The Congestion Management Process does not in itself establish priorities for the Madison MPO or its member agencies as projects are selected for inclusion in the Transportation Improvement Program or local capital improvement programs. Nor does the CMP require that a certain proportion of available federal or state funds be spent on congestion mitigation. What the CMP does provide is a credible framework for weighing congestion relief projects against one
another in terms of effectiveness. It also provides a more level playing field for comparing these projects to those that are primarily safety or state of good repair. While there are longstanding data collection and performance measures for pavement and bridge sufficiency, as well as a crash record system, congestion is more difficult to measure and most often addressed on a project specific basis. Having regional performance measures and targets can make it easier for decision makers to direct their investment choices.

As with each element of the CMP, establishing priorities must reflect the goals and objectives of the MPO's long range regional transportation plan. The Madison MPO's Regional Transportation Plan 2030 states explicitly that managing roadway operations should be addressed first through improved transportation system operation and transportation demand management, with construction of new roadway capacity considered only as a last option. The plan also strongly supports improving public transit service, bicycling, and walking as important modes of travel. The CMP reflects a multi-modal perspective of the region's transportation needs.

The following is the MPO's general hierarchy of congestion management strategies:

1. Strategies that eliminate peak period vehicle trips through land use changes or other actions like flexible work hours or telecommuting.
2. Strategies that eliminate peak period vehicle trips by causing a mode change from auto to transit, cycle, or pedestrian mode.
3. Strategies that increase auto occupancy by encouraging ridesharing.
4. Strategies that improve the operation of the existing roadway system, making it more efficient for all users.
5. Strategies that add roadway capacity, primarily at bottlenecks or other strategic locations.

Because the CMP is a process, priorities can also evolve through subsequent cycles of long-range plans that may change the governing goals and objectives, or through modification of the TIP development process, as the MPO Board reassesses the importance of congestion mitigation against other investment priorities.

The analysis of current conditions demonstrates that congestion is an issue in much of the Madison metropolitan area. Within each of the transportation corridor areas, there are a number of roadway corridors that have been identified by the MPO as congested or very congested. Based on sample transit on-time performance data, it is clear that arterial street congestion is having a significant impact on bus operations. Transit schedules have been adjusted over the years to factor in the increased congestion with longer travel times. The transit system itself has capacity issues, which Madison Metro addresses by assigning extra buses to routes either on a predetermined or on an as-needed basis to respond to high passenger loads. Bicycling and walking make up a larger percentage of travel in Madison than in most metropolitan areas, and there is potential for continuing to increase their mode through the provision of more continuous facilities. This will also reduce conflicts with motorized transportation modes. Vehicles classification counts indicate there is a significant percentage of trucks on major arterials, particularly on the Interstate. Whether they are related to regional commerce or moving through the region, Madison area roadway congestion is affecting the efficiency of freight truck movement.

**Recommended Actions**

The following actions are recommended for travel demand management, transportation system management and operations, and new capacity construction:

**Transportation Demand Management (TDM):**
Managing travel demand to reduce peak period automobile travel is important in the Madison MPO's CMP priorities. TDM strategies are generally regional in nature, making the impact on congestion in a specific corridor hard to measure. There is no question, however, that TDM is an important part of the overall congestion mitigation package.
• Coordination of Transportation Investments and Land Use
  Coordinate regional transportation investments with land development to promote mixed use infill and (re)development, particularly along transit corridors, to maximize accessibility to jobs and services.

• Promotion of Alternatives to SOV Travel
  The MPO’s Rideshare/Etc program works in partnership with the City of Madison, Dane County, Metro Transit, the State Vanpool program, and major employers. It is a truly comprehensive TDM program, encompassing carpool and vanpool matching, guaranteed ride home, park & ride, and related services. A continuing commitment to the program is important, including being responsive to changing conditions like fuel and parking prices that may make people more amenable to ridesharing.

  Opportunities from successful examples in other communities to expand the region’s TDM initiatives should be explored and evaluated by the MPO. Local units of government should also be encouraged to adopt TDM requirements for large commercial developments.

• Enhancing Metro Transit Service
  Like transit operations nationwide, Metro Transit struggles with finding the budgetary resources to provide the service that is needed. Major transit enhancement needs include the addition of suburban commuter and express services and higher service frequencies in high volume corridors. Finding the funding for improving service and developing a truly regional system is extremely difficult, if not impossible, under the existing transit finance and governance system. A dedicated source of transit funding is needed, and until that is implemented through a regional transit authority or other means, only modest incremental improvements to the system will likely be possible.

• Providing Safe and Convenient Bicycle Travel
  Another way to reduce automobile travel is to make bicycle travel more attractive. It is noted in the corridor analysis that there are a number of congested corridors with incomplete bicycle accommodations and/or no good parallel route. Bicycle facilities have been provided as part of almost all urban arterial street projects for many years with the exception of some capacity constrained corridors. Efforts should be continued to create a continuous bicycle facility network and to implement the MPO’s regional bikeway plan with an emphasis on congested corridors.

Transportation Systems Management and Operations (TSM): Active operation of the regional transportation system is already recognized in the MPO Regional Transportation Plan’s objectives as an important strategy to mitigate congestion. Making this a high priority demonstrates the understanding that good operations can increase the capacity of roadway-based modes without constructing new lanes.

Roads:

• Transportation Operations Infrastructure Plan (TOIP) Implementation
  By creating this plan, WisDOT has demonstrated an understanding that deploying a very robust system of Intelligent Transportation Systems (ITS) devices in the Madison region is important. Since this forms the backbone of improved operations, improved traveler information, and provision of data for performance measurement, implementation is a high priority. It is understood that TOIP project elements must compete with other needs for funding.

• Enhanced Regional Incident Management Plan
  The National Traffic Incident Management Coalition has adopted a National Unified Goal for managing roadway incidents. The goal encompasses responder safety, quick
clearance, and interoperable communications. Reducing the number and duration of lane closures reduces the amount of congestion caused by a roadway crash or other incident, as well as the likelihood of a secondary crash when unsuspecting motorists come upon the back of a queue. Having the response agencies, (including police, fire, EMS, WisDOT and local transportation agencies) and towing all sharing a standard protocol that emphasizes quick clearance without compromising responder safety can do a great deal to accomplish this goal at very little cost.

- **Traffic Signal Operations**
  The City of Madison should be recognized for the excellent job they do to continually optimize the operation of its traffic signals. There may be room for significant improvement only in terms of working with other outlying jurisdictions and WisDOT. However, additional data through travel time and delay studies and corridor and intersection analyses may assist in identifying opportunities for spot improvements and the fine tuning of signal operations.

**Transit:**

Transit operations will be helped by employing strategies that will improve on-time performance of buses on routes along congested arterial streets. The first strategy involves transit signal priority at key intersections, where buses that are running behind schedule can be given extended green time to clear the intersection. This can be combined with queue-jumper lanes where space is available. These permit the bus to approach an intersection in a special lane so it can bypass congestion and also take full advantage of the priority signal timing. ITS technology is available using the on-board AVL to match the bus to its schedule at predetermined time points so only buses running late will be granted priority. Because Madison does such a good job optimizing signals, it must be understood that transit priority is a trade off in which there will be slightly less capacity for auto movement.

**Constructing New Capacity:** Adding general purpose travel lanes to a roadway or other major capacity expansion projects are the lowest in the MPO's hierarchy of strategies to address congestion. It is general policy to consider such projects only after implementing TDM and TSM strategies. However, to the extent that bottleneck relief can be provided through focused construction (for example at interchanges or intersections), it is reasonable to include this as a higher priority action.

This does not mean that construction of new capacity that will not be considered unless there is a severe congestion problem. There are contexts other than congestion management that influence decision-making as projects are developed. For example, changing land use patterns that influence demand may properly lead to the widening of two lane roads as they begin to serve traffic from developing areas.

**Implementing Priority Actions**

As the Madison MPO and its member agencies that own and operate transportation facilities select projects, programs, and strategies from among the priority action lists, the MPO must be cognizant of issues of schedule, funding, and responsible agency.
Those actions that are selected for federal funding will become candidates in subsequent rounds of updating the Transportation Improvement Program. Other actions may be progressed by local, regional, and state agencies without federal aid. While the MPO may not have direct decision making authority over these actions, they are still an important part of the CMP.

Because Congress has not acted to reauthorize the programs of the Federal Highway Administration and Federal Transit Administration, there is a great deal of uncertainty about the ability of the MPO to add projects to its TIP in forthcoming updates. Recognizing the uncertainties regarding available funding, the CMP proposes the following general implementation schedule for projects and strategies: Ongoing, short-term actions (1-5 years) and mid-term actions (6-10 years). While longer term strategies may be identified in upcoming and subsequent updates of the long range plan, these can be incorporated through the CMP updating process. Since the Madison MPO has an adopted TIP covering the years 2011-2015, the short term element of the CMP includes projects programmed in the TIP that have congestion mitigation elements along with ongoing area-wide TDM programs and TSM strategies. The CMP report includes an implementation schedule that lists these projects, programs, and strategies.

Other implementation considerations for the CMP include:

1. MPO staff should track the total amount of funds for TIP roadway projects utilized for TSM/safety projects and project elements to inform the TIP development process.

2. All congestion mitigation projects should include a before/after data collection analysis effort to measure their impact on CMP performance. A small portion of overall project resources should be allocated for this analysis.

3. MPO staff and funding resources shall be dedicated to collecting and analyzing data on a prescribed schedule to provide performance measure information required for the Madison CMP as part of its annual Work Program.

4. The CMP Committee should investigate the feasibility, benefits, and costs of developing an urban arterial street incident response program that involves coordination with EMS, fire, police, traffic engineering staffs, and an Arterial Traffic Response Team to mitigate traffic congestion problems related to incidents on capacity-constrained arterial street segments.

Integration into the Regional Plan

Once the Congestion Management Process is adopted, it will be directly linked to the MPO’s long-range Regional Transportation Plan (RTP). The current RTP, Regional Transportation Plan 2030, was cited previously as the source of the goals and objectives of this CMP. While it is the intent of the MPO that Regional Transportation Plan 2035 be a minor update, the timing is such that the CMP can be incorporated by reference. Subsequent RTP updates will offer the opportunity to thoroughly review the MPO’s approach to multi-modal congestion mitigation. The next update will have the benefit of a number of years of experience with the CMP. Data from new sources may be available. Data on the effectiveness of implemented strategies may also be available.
This entire approach fits well with the new national focus on outcome-oriented, performance-based planning. As noted throughout, congestion mitigation is amenable to the application of performance measurement in a way that requires the MPO and its member agencies to shift their attention from agency-oriented outputs to user-oriented outcomes. The CMP can form the basis for looking at other elements of transportation investment in the same way.

**Update Process**

Once adopted, it becomes the responsibility of the MPO, in cooperation with member agencies, to implement the Congestion Management Process, which in turn means that there must be a regular update cycle. First, using the Performance Monitoring Plan, the MPO is expected to periodically share with its Board members and the public the state of the regional transportation system. This will be done through the MPO’s website and an annual trends report. The annual CMP report will document system performance and projects that have been completed and projects planned for the next year. It will also provide information on the status and effectiveness of congestion mitigation strategies.

The Transportation Improvement Program (TIP) is another important MPO action that is linked to the CMP. Because the Madison MPO updates its TIP every year as a rolling five-year capital program, there is an opportunity to match projects identified in the CMP with programming opportunities in the TIP. As reviewed earlier in the report, the TIP includes all projects to be funded under programs of the FTA and FHWA. Consequently, the TIP is the vehicle for implementing transit and roadway improvements, (including ITS deployments) identified in the CMP.

The MPO should adopt a procedure in which an annual CMP update is completed prior to and coordinated with the annual TIP update.

While the MPO will generate a CMP report each year and coordinate its implementation with TIP development, it is most appropriate to link a full update of the CMP with the update of the long-range Regional Transportation Plan (RTP). The CMP must incorporate the goals and objectives of the RTP. The RTP includes land use, economic, and travel baseline data and forecasts which are updated with each cycle. Each RTP update also provides an opportunity for decision makers to consider modifications to the goals and objectives for the regional transportation system. Once all of this is in place, it is appropriate to revisit the CMP so that it will continue to reflect what the MPO expects to accomplish in terms of congestion mitigation. As such, the MPO should program funds to update the CMP in the year following the RTP update.

**Conclusion**

The Madison MPO has the responsibility to satisfy federal planning regulations that require an updated congestion management process. The current Madison CMP focuses on identifying existing and future LOS ‘D’ operating deficiencies in the existing planning area transportation system, which includes freeway and arterial streets, transit, freight, pedestrian, and bicycle systems. The federal regulations require an updated CMP to include development of congestion management performance measures and mitigation strategies for these transportation system elements.
that allow for regular evaluation of the effectiveness of the implemented congestion mitigation strategies. Each performance measure is required to have a target goal that can be refined in successive CMP updates. The CMP performance measures have been developed based on the need for operational characteristics that are easily understood by the public and provide consistency with existing MPO goals and objectives and national practice.

This report presents a preliminary set of performance measures and target goals based on existing Madison area transportation related data sources. The performance measures and targets will be refined in the future as new and more comprehensive data becomes available. It will be necessary for the MPO and its partner agencies to increase their efforts in terms of data collection, tabulation, and analysis to expand on the sample data collected for this report.

It is important that the adopted performance measure evaluation be considered as an additional information source when setting project priorities in the selection of TIP projects. The MPO will adopt a procedure in which an annual CMP report is completed prior to the annual TIP update. The mitigation strategies in this report reflect both transportation demand management (TDM) (including land use development goals of the long-range plan) and transportation system management (TSM) initiatives. It is understood that the CMP will evolve over time as new data sources become available. Data on the outcomes of implemented strategies will also inform future CMP updates. Subsequent long-range plan updates will provide an opportunity to review the MPO’s approach to congestion mitigation.