

Congestion Management System for the Madison Urban Area

A Congestion Management System (CMS) is a systematic process of monitoring, measuring, and diagnosing the causes of current and future congestion in major travel corridors; evaluating and recommending alternative strategies to manage or mitigate current and future congestion; and monitoring and evaluating the performance of strategies that have been implemented to manage or mitigate congestion. Federal transportation legislation requires MPOs to develop and implement a CMS as part of the metropolitan transportation planning process (See 23 C.F.R. 500). The CMS provides a consistent basis to make transportation investment decisions and ensures that travel demand management (TDM) and transportation system management (TSM) measures are considered prior to roadway capacity expansion, in accordance with goals and objectives established by the Madison Area MPO.

The Madison Area MPO has a CMS that integrates the current traffic count databases maintained by WisDOT and the City of Madison; the TRANPLAN (TP+) regional travel demand model, which includes current bus transit network and capacities for the regional roadway network; and future traffic projections based on development assumptions derived from local land use plans. Roadway facilities experiencing current congestion or projected to experience congestion in the future are identified and alternatives developed to alleviate or manage the congestion.

The CMS is integrated into the MPO planning process. The Madison Area MPO serves as a forum for a variety of transportation planning activities that encompass all modes of transportation. MPO staff assists in coordination and provides technical support to all major regional transportation planning studies, including the ongoing Transport 2020 (East-West Transit Corridor) Alternatives Study, Verona Road/West Beltline Study, and USH 51 Corridor Studies. The MPO's TRANPLAN (TP+) regional travel demand model is used for all of these studies. In many cases, additional more detailed traffic operations modeling is conducted, which builds off of the regional travel modeling.



The Madison Area MPO CMS consists of the following components:

- CMS network and performance measures
- System monitoring/data collection
- Congestion management strategies
- System evaluation, which is integrated into the MPO planning process
- Review and update

CMS Network and Performance Measures

The CMS network consists of the entire countywide functionally classified arterial roadway system. This includes three primary components: (1) an outer radial system leading into the Madison area; (2) a circumferential system around the Madison area; and (3) an inner radial system leading to the central Isthmus area.

The outer radial system includes the following state roadways leading into the Madison area: Interstate 39/90 (North and South); Interstate 94 (East); USH 151 (Northeast); USH 12 (Northwest); USH 14 (West and South); USH 18/151 (Southwest); USH 12/18 (East); and USH 51 (North and South). The circumferential system includes primarily the Interstate 39/90 and Beltline system, but also CTH M (North), STH 19, USH 51 (Stoughton Road), and CTH PD (McKee Road). Two important future planned north-south arterials that will supplement the circumferential system are the CTH M (West)/Pleasant View Road corridor on the West side and CTH C/Reiner Road/Sprecher Road/CTH AB corridor on the East side.

The inner radial system includes the following local and state connecting roadways: East Washington Avenue (USH 151); Northport Dr./Packers Ave. (STH 113); Johnson/Gorham Streets; Williamson St./Atwood Ave.; John Nolen Dr.; Park St.; Fish Hatchery Rd. (CTH D); Nakoma Rd./Monroe St.; Mineral Point Rd. (CTH S); and University Ave.

The performance measure used for the CMS network is Level of Service (LOS), which is based upon observed and projected Volume to Capacity (V/C) ratios. The V/C ratio is the demand for travel on a roadway segment divided by the capacity of the roadway segment. LOS is a qualitative measure of roadway performance as outlined in the Transportation Research Board publication *Highway Capacity Manual* that is based on the V/C ratio. LOS is reported on a scale of A through F, with A representing the best operating conditions and F the worst.

Figure 14 on page 37 shows the existing congested network based upon Year 2000 observed traffic volumes and roadway capacities. Roadway segments shown in blue as “congested” had a volume-to-capacity (V/C) ratio of 0.75 to 0.89. This V/C ratio range is generally equivalent to LOS D. Those segments shown in red as “very congested” had a V/C ratio of 0.9 or greater or LOS E or F, indicating the roadway is operating at levels approaching or exceeding the design capacity.

A variety of factors determine the design capacity of a roadway, including the facility type (arterial, collector, etc.), number of travel lanes, lane width, average travel speed, spacing of intersections and driveways, and percent truck traffic. Capacities used in the TRANPLAN (TP+) travel model are planning capacities based primarily on facility type, number of travel lanes, and average travel speed. More detailed capacities are generally developed as part of corridor or area studies, which typically include traffic operations modeling. For the Madison area, LOS E has been determined to be the congestion level at which transportation system performance is no longer acceptable due to traffic interference.

System Monitoring and Data Collection

The Madison Area MPO collects and analyzes traffic count data taken by the City of Madison Traffic Engineering Division and WisDOT, and maintains a database of historical traffic volume data. Regular traffic counts are taken on the entire CMS network as well as most of the collector roadways in urban areas.

The City of Madison collects annual traffic counts on all central area arterials and collectors. On the East and West sides of the City, counts are taken every two years. Bicycle traffic counts are also taken on University Avenue and at several path locations. WisDOT collects traffic counts on the Interstate every year. Counts on other arterial and collector roadways are taken every three years. These counts are in addition to the few locations in the county that are part of the Highway Performance Monitoring System where continuous daily counts are taken. Continuous counts are also available at several locations on the Beltline where traffic detectors have been installed as part of the ITS Program. This traffic volume database is supplemented by counts taken as part of special studies.

In addition to the traffic volume data, special origin-destination (O/D) surveys are done every ten years or so as part of the major update of the regional transportation plan. The O/D survey information is used in conjunction with socio-economic data, primarily obtained from the U.S. Census, and traffic count data to update and calibrate the TRANPLAN regional travel forecast model maintained by Madison Area MPO staff. The TRANPLAN (TP+) model is then used to develop future year traffic forecasts based upon local community and neighborhood land use plans.

Congestion Management Strategies

The Madison Area MPO goals and objectives and the CMS outline the strategies that are considered within the metropolitan transportation planning process to resolve congestion issues. The strategies, which are discussed in other sub-sections of this section of the plan report, are listed below. Some can be implemented in the shorter term while others such as land development strategies and high capacity transit service are longer term strategies.

1. Travel Demand Management (TDM) Strategies

- (a) Promotion of ridesharing, alternative work hours, and telecommuting
- (b) Park-and-ride facilities
- (c) Guaranteed ride home programs
- (d) Land use planning and development strategies that coordinate planned development with transportation system improvement and encourage development patterns more easily served by public transportation and walking and bicycling

2. Transportation System Management (TSM) Strategies
 - (a) Access Management
 - (b) Intersection Improvements
 - (c) Peak period curb-lane parking restrictions
 - (d) Operational improvements (traffic signal coordination, freeway ramp meters, HOV lanes, etc.)
 - (e) Incident (crashes, construction, special events, etc.) management
 - (f) Use of intelligent transportation systems and advanced public transportation system technology (traveler information systems, emergency vehicle signal pre-emption, incident detection and response, transit vehicle signal priority, etc.)
3. Transit service enhancement or expansion
4. Bicycle and pedestrian facilities
5. Roadway capacity expansion (i.e., addition of general purpose travel lanes)

System Evaluation and Review

The implementation and impact of the congestion management strategies are tracked through the annual development of the Transportation Improvement Program (TIP) and collection of data on motor vehicle traffic and bicyclist volumes, bus transit ridership and service improvements, carpooling, and land development. The socio-economic data inputs and TRANPLAN model roadway and transit networks are updated in advance of each regional transportation plan update.

The CMS is only one component of the overall metropolitan transportation planning process. It is integrated with the long-range *Regional Transportation Plan (RTP)*, *Transportation Improvement Program (TIP)*, and area and corridor studies through its data and analysis functions. The goals and objectives of the RTP and the process for preparing the RTP ensure that an aggressive program of TDM, TSM, and alternative mode CMS strategies are considered before roadway capacity expansion. The impacts of such strategies, including a high capacity transit system, are evaluated as part of the travel modeling analysis for the RTP prior to consideration of roadway capacity expansion. The CMS provides system performance information, which is used to identify corridors or segments for further detailed analysis as part of corridor or area studies or traffic impact studies conducted for neighborhood plans or large development projects. The CMS provides alternative congestion management strategies for consideration in these studies, which ultimately provide recommendations for preferred strategies to be incorporated into the RTP and TIP. An analysis of alternative CMS strategies other than roadway capacity expansion is conducted as part of these studies. The CMS also provides system performance information for local jurisdictions that implement the CMS strategies. All elements of the CMS are reviewed and updated as part of each RTP update.



The following are ongoing and planned major corridor studies that have been or are being initiated to develop short- and long-term solutions to address identified congestion problems in the Madison metropolitan area:

- East-West Transit Corridor Alternatives Analysis Study (“Transport 2020”)

Status: Initiated Phase II (EIS/PE)
- Verona Road/West Beltline Environmental Impact Study

Status: Draft EIS. Possible short-term, lower cost solutions being studied.
- USH 51 (I-39/90/94 to McFarland) Corridor Study

Status: Needs assessment completed; EIS/Alternatives Analysis underway.

- USH 51 (McFarland to Stoughton) Corridor Study
Status: Needs assessment completed; EIS/Alternatives Analysis underway.
- Interstate 39/90 (USH 12/18 to South State Line) Study
Status: Study underway.
- North Mendota Parkway Corridor Study
Status: Completed; work underway on intergovernmental agreement; environmental study to be done to identify best routing for west end of corridor.
- West Beltline (USH 14 to Interstate 39/90) TSM/Safety Study
Status: Study just getting underway.
- STH 19/STH 113 (Waunakee to Sun Prairie) TSM/Access Study
Status: Study just getting underway.