APPENDIX I: CONGESTION MANAGEMENT PROCESSS

CONGESTION MANAGEMENT PROCESS

Executive Summary

The Congestion Management Process (CMP) provides the Des Moines Area Metropolitan Planning Organization (MPO) and its members with a process that provides for the effective integrated management and operation of the multimodal transportation system. This strategy is based on a cooperatively developed and implemented, metropolitan-wide strategy for new and existing transportation facilities. Currently, in the MPO area, congestion is not a major issue. The objective of this document is to stay ahead of any potential problems with the network so that the system continues to operate effectively.

The following steps represent the primary framework of the CMP:

- Selection of objectives;
- Define the network;
- Develop performance measures;
- Collect data and monitor system performance;
- Analyze congestion issues;
- Identify appropriate strategies; and,
- Monitor improvements and revise process.

Selection of Objectives

Mobilizing Tomorrow set a number of objectives that relate to congestion management. These are long-term objects intended to allow the region to achieve desired outcomes for congestion management by horizon year 2050.

The CMP process identifies 12 primary objectives that will assist the MPO in maintaining an efficient and effective transportation network. These 12 objectives are directly linked to goals in the Mobilizing Tomorrow (2050 Metropolitan Transportation Plan). The CMP offers shorter-term objectives that the MPO can measure more often to determine if current strategies are working and adjust accordingly while aligning with the objectives of Mobilizing Tomorrow.

Defining the Network

The CMP defined what components of the transportation system are the focus. The CMP focuses on the Federally Functionally Classified roadways in MPO planning area. The network consist of freeways, arterials, and collectors that included data from INRIX software program. However, all roads that data is available for are part of the CMP network.

Performance Measures

Performance measures were established to identify and evaluate areas of recurring congestion. A two-level approach was developed to identify congestion and make efficient use of limited resources.

The following recurring congestion performance measures were selected:

- Daily segment volume to capacity ratio;
- Percent of free flow speed;
- Travel Time Index; and,
- Planning Time Index.

Collect Data and Monitor System Performance

The MPO will primarily use data collected from INRIX to monitor and evaluate existing congestion level on a regional level. Other sources of data include the Iowa DOT's Traffic Management Center, travel time surveys, traffic counts, transit ridership numbers, and the MPO's travel demand model. These sources can be used periodically to supplement INRIX when monitoring system performance.

Analyze Congestion Issues

The CMP uses the identified performance measures to locate areas with congestion issues. The plan monitors current and long-term congestion issues. Present and anticipated congestion issues are analyzed on a segment-by-segment basis to determine the general source of the congestion.

Identify Appropriate Strategies

The CMP identified a variety of strategies to address congestion. These include transportation demand management, operational management, and capital intensive strategies. The plan sets a hierarchy of strategies to address congested segments based on least-cost planning principals. Each congested segment is identified in the plan, and includes potential strategies to address the issues at that location.

Monitor Improvements and Revise Process

Finally, the CMP outlines a process for monitoring the success of the implemented strategies. The CMP is a flexible document that is updated on a regular basis. This provides opportunities to revise the process to ensure the congestion issues are being address in an efficient and effective manner.

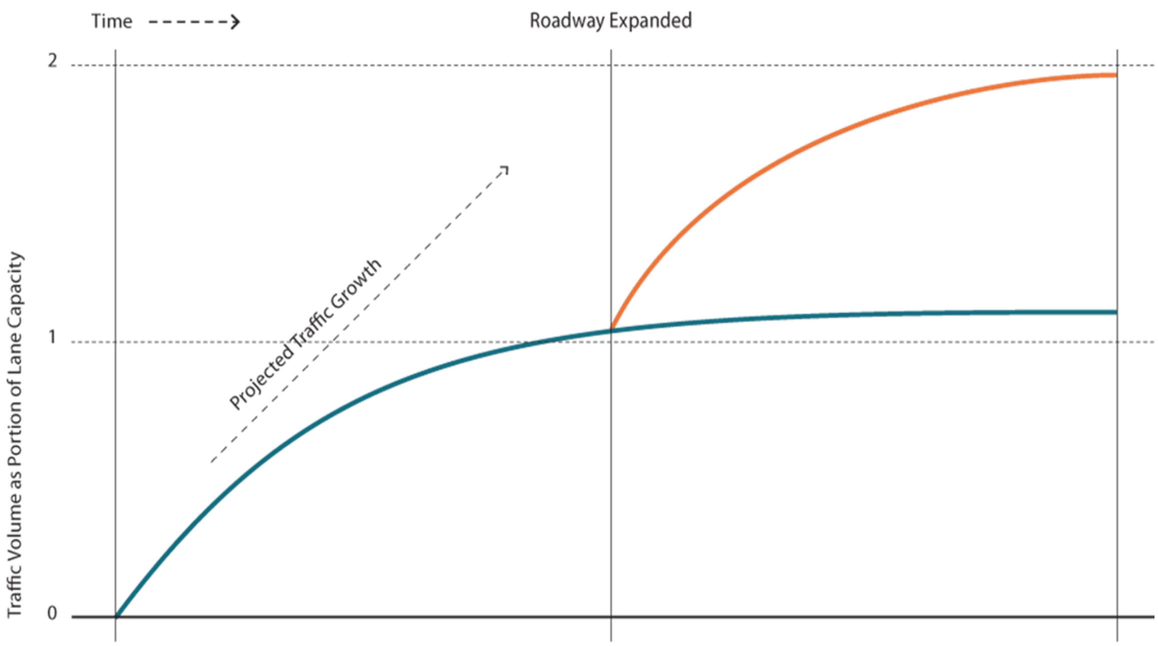
Background

Understanding Congestion

The Greater Des Moines population is expected to grow by approximately 280,000 people over the next 30 years to more than 822,000. This growth will have an impact on the regions streets and highways, and will inevitably lead to increased levels of congestion. How we choose to address this challenge will have a significant impact on the financial, economic, and environmental sustainability of the region.

The most common method of addressing congestion over the past few decades has been to add capacity to the system. However, based on numerous studies, it is well known that adding capacity often leads to more drivers on the road and more congestion. This phenomenon is called induced traffic, and is demonstrated in the figure below:

FIGURE I1: INDUCED TRAFFIC DEMAND

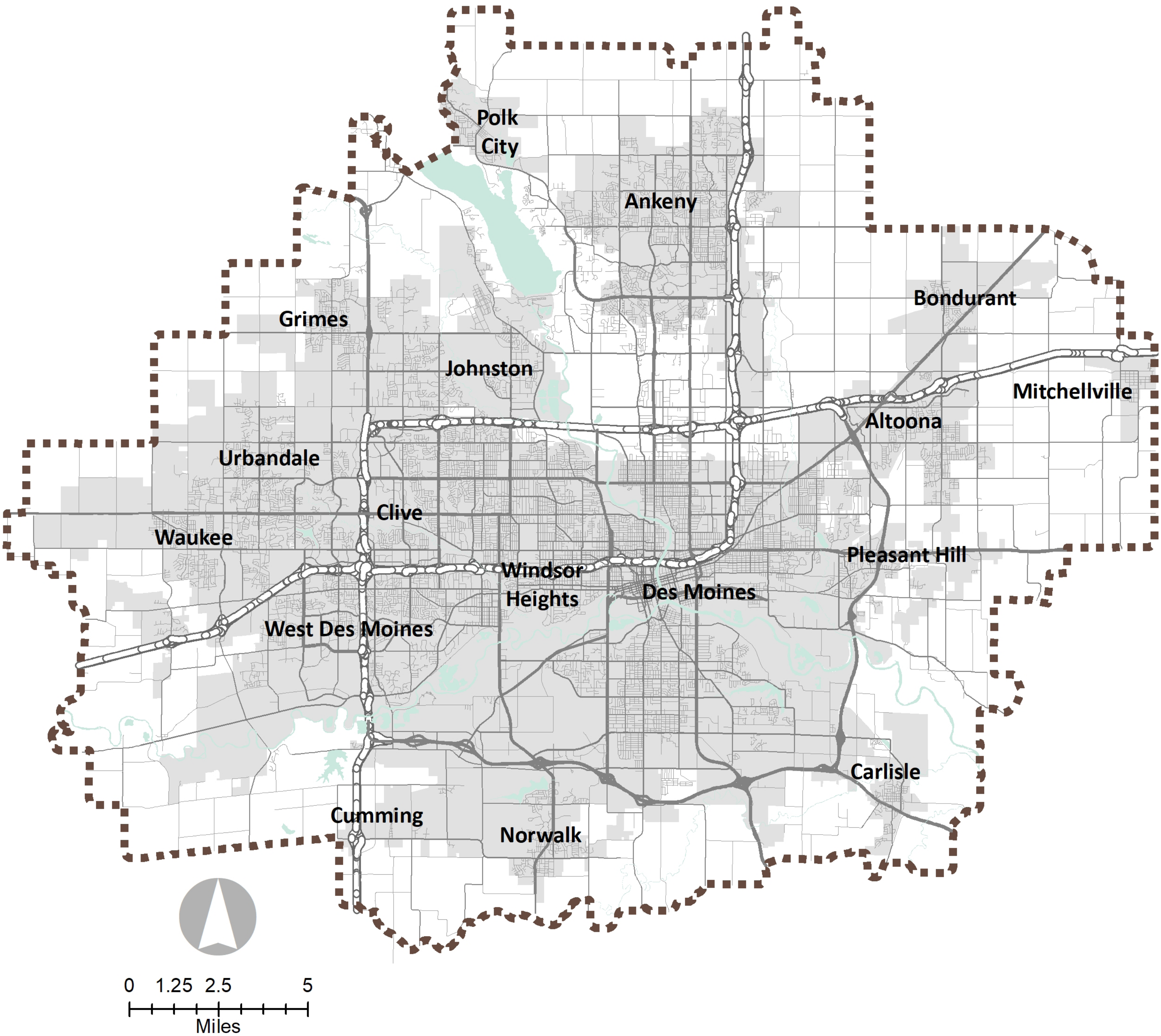


It is clear that expansion won't solve all congestion challenges. Therefore, it is important for the region to consider alternative strategies to address the traffic that will be generated due the projected growth we are anticipating over the coming decades.

Des Moines Area Metropolitan Planning Organization

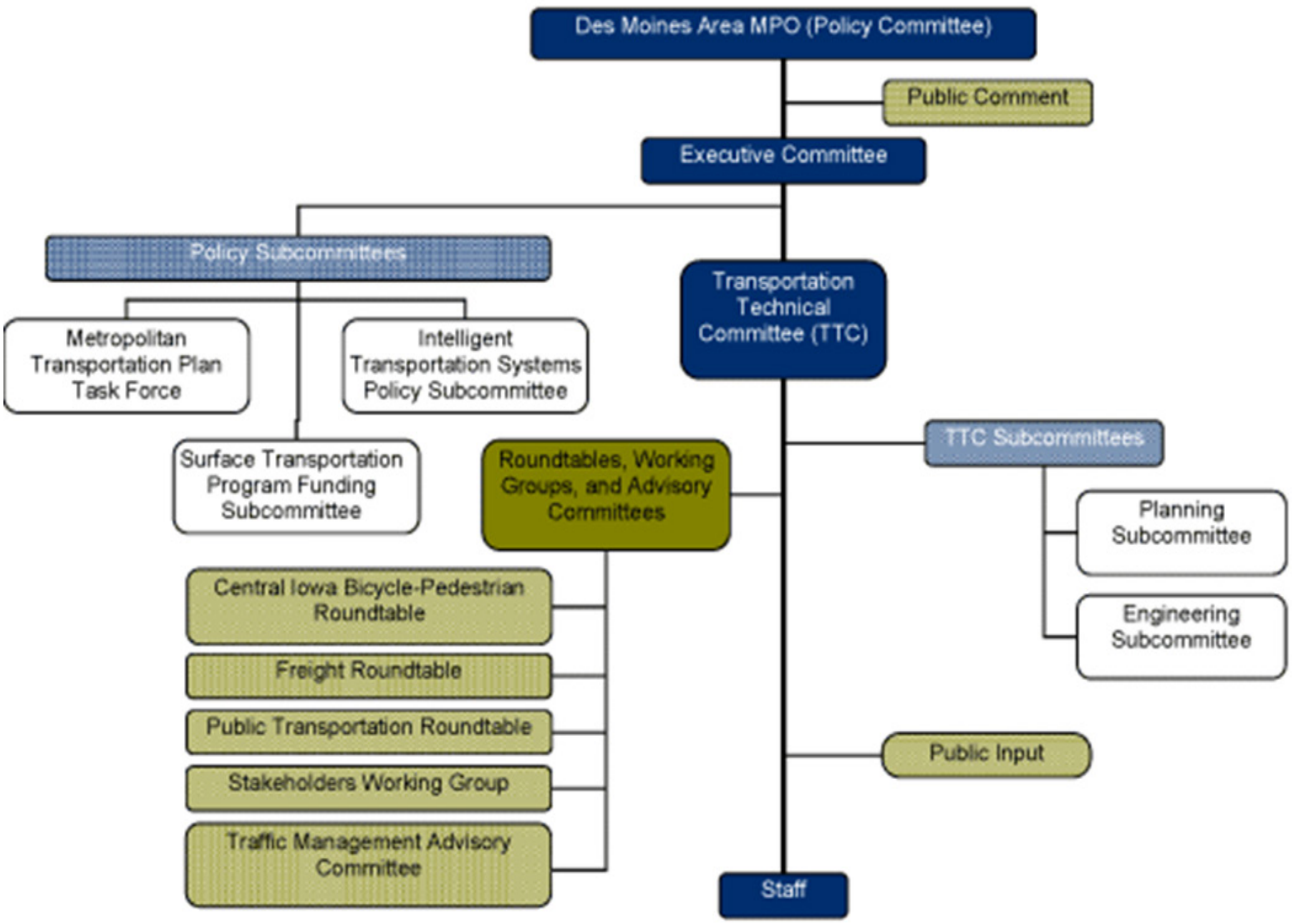
The MPO acts as the formal transportation body for the Greater Des Moines metropolitan area (see **Figure I2**). The MPO exceeds the population threshold of 200,000 qualifying the area as a Transportation Management Area (TMA). The MPO is committed to implementing a comprehensive and coordinated continuing multimodal transportation planning process for the Greater Des Moines metropolitan area.

FIGURE I2: MPO PLANNING AREA



The MPO provides a regional forum to ensure coordination between local, state, and federal agencies regarding planning issues to prepare transportation plans and programs. The MPO develops both long- and short-range multimodal transportation plans, selects and approves projects for federal funding based upon regional priorities, and develops methods to reduce traffic congestion. The MPO structure is comprised of three committees: the Executive Committee, the Transportation Technical Committee (TTC), and the MPO, which functions as the policy committee (**Figure I3**). The TTC is comprised primarily of technical staff members, including planners, engineers, and city administrators, representing member governments and participating agencies. The MPO includes elected officials, such as county supervisors, mayors, and city council members, as well as city managers. The MPO elects officers and at-large representatives to form the Executive Committee. MPO staff provides support to these three committees.

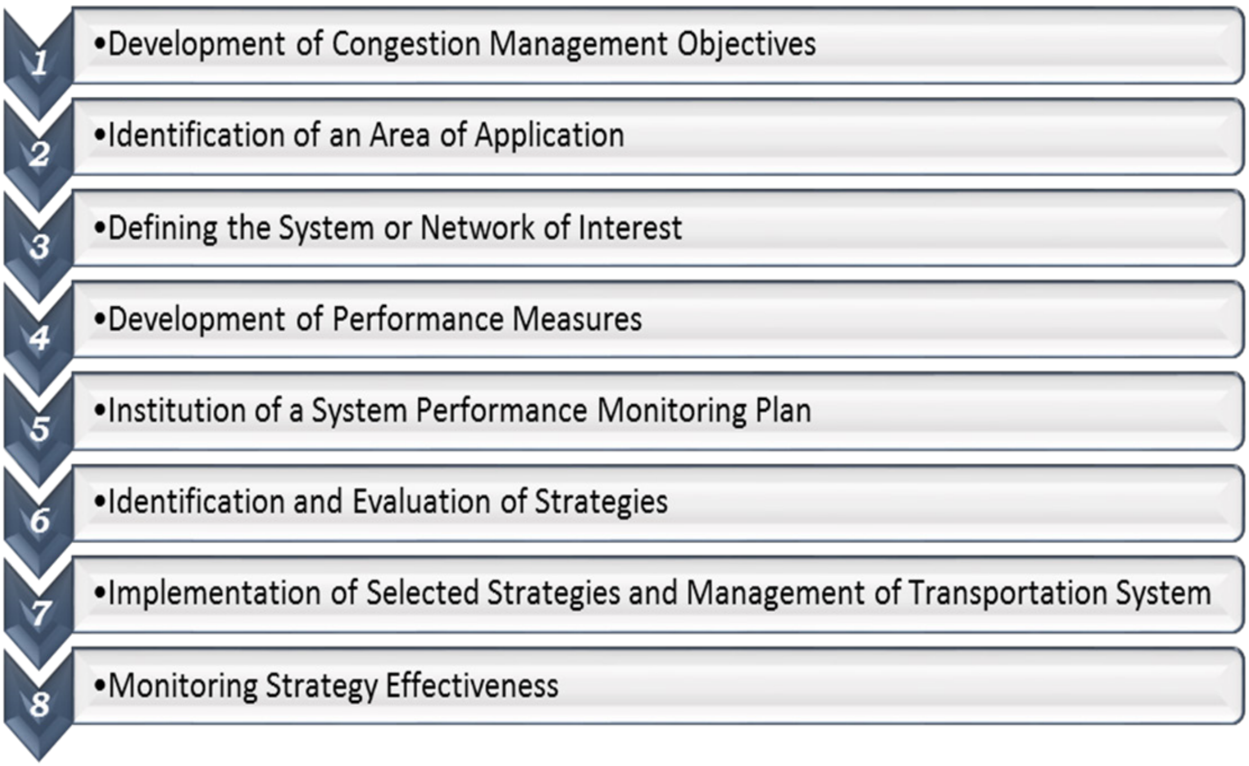
FIGURE I3: MPO OGANIZATIONAL CHART



Congestion Management Process

The Congestion Management Process (CMP) is a systematic approach, collaboratively developed and implemented throughout a metropolitan region that provides for the safe and effective management and operation of new and existing transportation facilities through the use of demand reduction and operational management strategies. The CMP is required to be developed and implemented as an integral part of the metropolitan planning process within a TMA. The CMP is a multi-step process that typically includes:

FIGURE I4: CONGRESTION MANAGEMENT PROCESS



Congestion Management Objectives

Mobilizing Tomorrow Vision Statement and Goals

Mobilizing Tomorrow identifies a vision, goals, and objectives for the Metropolitan Planning Area (MPA). The vision, goals, and objectives establish the framework for achieving the desired transportation system.

Mobility is often closely tied to travel times and congestion, and is commonly defined as the ease with which a user is able to make a trip. Mobilizing Tomorrow identified a number of goals and objectives to maintain and/or improve the performance and/or mobility of the transportation system through efficient congestion management. In order to accomplish these goals and objectives, the CMP provides additional analytical methods to monitor and evaluate system performance in dealing with congestion.

Mobilizing Tomorrow identified the following vision statement:

Our region has a well-coordinated multi-modal transportation system that leverages our unique attributes in order to ensure a high-quality of life and economic success.

Mobilizing Tomorrow outlined four high-level goals that works as a system to direct Greater Des Moines toward a more vibrant and diverse transportation system. When realized, these goals will ensure the region continues to support a strong economy while protecting the environment. Fulfilling these goals also will enhance the great quality of life residents already enjoy in Greater Des Moines. The four goals are:

1. Manage and optimize transportation infrastructure and services;
2. Enhance multimodal transportation options;
3. Improve the region's environmental health; and,
4. Further the health, safety, and well-being of all residents in the region.

Mobilizing Tomorrow Performance Measures and Targets

The current conditions, measures, and targets associated with each goal were identified by the plan's steering committee and through public involvement. They will allow the region to understand the progress made in achieving our goals between now and 2050. These goals will not be achieved over night. Rather, they will be achieved by continual collaborative efforts in which all stakeholders take an active role. **Figure I**5 shows the performance measures and targets that relate to the congestion management process.

The MPO staff will monitor the performance measures and targets on an annual basis and provide reports on the progress being made to achieve the goals of the Long-Range Transportation Plan.

FIGURE I5:CONGESTION MANAGEMENT RELATED GOALS

MEASURE	CURRENT	5-YEAR TARGET	2050 TARGET
Bicycle System On-Street			
Miles of On-Street Facilities	39.18	118	400
Miles of Protected Bicycle Lanes	0	5	25
Mode Chice/Split (%) - Work Trips			
Single Occupancy Vehicles	77	72	50
Carpool	19	21	25
Transit	1	2	15
Walk/Bike/Other	3	5	10
Mode Chice/Split (%) - All Trips			
Single Occupancy Vehicles	42	38	26
Carpool	46	47	54
Transit	1	2	5
Walk/Bike/Other	11	13	15
Transit			
Total Ridership	4,400,000	5,500,000	8,800,000
Level of Service - Peak Hour			
% of person miles travel on interstate that are reliable	100	Maintain	95
% of person miles traveled on non-interstate NHS that are reliable	66	Maintain	75
Freight Impediments			
Truck Travel Time Reliability Index	1.28	Maintain	Maintain
Person Miles Traveled			
% of non-SOV travel (all trips)	58	60	70

Certain measures included in the chart do not have 2050 targets. These measures help give a clearer understanding of the current system without setting a goal for the future.

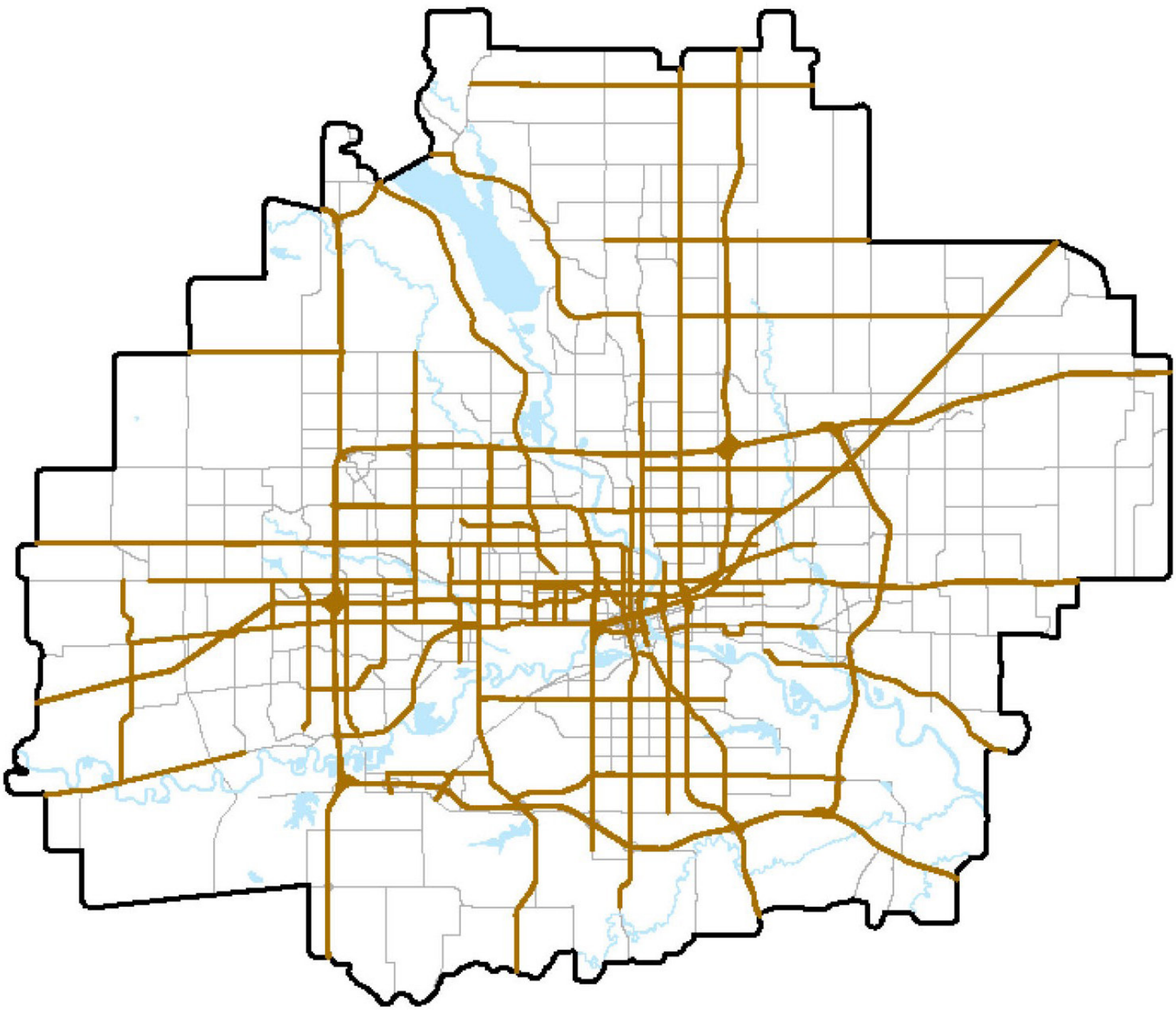
Defining the Network

The Congestion Managment Network

The MPO's CMP system includes two entities. One entity is the MPA's Principal Arterial System as defined by the MPO's Federal Functional Classification System (FFCS). The FFCS establishes a classification hierarchy among streets and highways in the MPA. Interstate Highways and Principal Arterials are situated atop the hierarchy, and tend to carry the major portion of trips and serve the major centers of activity.

The CMP network consist of FFCS roadways that are included in the INRIX database, which is data that is collected through GPS enabled devices, including cell-phones. The CMP network is depicted in **Figure I6.**

FIGURE I6:CONGESTION MANAGEMENT NETWORK MAP



Identification and Evaluation of Congestion

Defining Congestion

In order to focus transportation planning efforts, the CMP identifies where congestion occurs and what are its causes. Federal regulation 23 CFR 500.109 defines congestion as "the level at which transportation system performance is unacceptable due to excessive travel times and delays." According to the Federal Highway Administration (FHWA), roadway congestion is comprised of three key elements: severity, extent, and duration. The blending of these elements will determine the overall effect of congestion on roadway users. Three dimensions of congestion include the following:

- Severity - refers to the magnitude of the congestion problem at its peak. Severity has been traditionally measured through indicators such as volume/capacity (V/C) ratios or Level of Service (LOS) measures;
- Extent - describes the number of system users or components (e.g. vehicles, pedestrians, transit routes, lanes miles) affected by congestion; and,
- Duration - describes the length in time that users experience congested conditions.

Because these elements have a direct relationship, any increase in one will subsequently result in an increase in the others. Therefore, as roadway congestion continues to build (increased severity), more travel will occur under congested conditions (increased duration) affecting an increasing number of motorists and roadway facilities (increased extent). Congestion occurs due to a number of planned and unplanned events either in isolation or in tandem. Congestion can be generally classified as either recurring or non-recurring.

Recurring Congestion which include:

Peak period, freight, intersection, freeway corridor, non-freeway corridor, school related, Central Business District, bottleneck or hot spot, railroad crossing, or parking related.

Non-Recurring Congestion which include:

Incident related, weather, work zones, fluctuations in normal traffic flow, or special event traffic

The CMP will focus on the routes that make up the CMP network. The CMP network is made up of those FFCS routes that have INRIX data available. Efforts to improve traffic conditions in the region will begin on the CMP network, and the level of congestion on the network will serve as a gauge for overall congestion in the area.

Performance measures allow the MPO to define, measure, and communicate levels of congestion based on both spatial and time-oriented criteria. Many of the measures are segment-or site-specific, such as level of service, and intersection delay. Congested roadways were mapped in the Horizon Year (HY) 2050 Mobilizing Tomorrow Plan (MTP) using this type of data.

The MPO will use the following performance measures within a points based system to identified congestion:

- Travel Time Index
- Planning Time Index

Identifying Congestion

In order to efficiently use existing data collection programs when possible, the MPO will use real-time data and model outputs based on real-time data to identify areas of congestion.

Point-Based System

The performance measures used to identify congestion included Travel Time Index and Planning Time Index. The data for this analysis will be collected using INRIX data. INRIX collects information from mobile phones, connected cars, trucks, delivery vans, and other fleet vehicles equipped with GPS locator devices.

The analysis will be based on a point system to determine if a roadway is considered congested. Using the tables below, if a roadway or intersection has a combine 7 points or more, then it is considered congested. If it receives 6 points or less, the roadway is considered not congested. The congested roadways or intersections that score 7 points or higher are listed in **Figure 10** and shown in **Figure 11**.

FIGURE I7: TRAVEL TIME INDEX POINTS

TRAVEL TIME INDEX	POINTS
0 – 1.30	0
1.301 – 1.50	2
1.501 – 2.00	4
2.001 – 3.00	6
>3.000	8

FIGURE I8: PLANNING TIME INDEX POINTS

PLANNING TIME INDEX	POINTS
0 – 1.30	0
1.301 – 1.50	1
1.501 – 2.00	2
2.001 – 3.00	3
>3.000	4

Source: Travel Time Study 2013, Mid-America Regional Council Transportation Department

FIGURE I9: CURRENTLY CONGESTED ROADWAYS AND INTERSECTIONS THAT SCORED 7 POINTS OR HIGHER (BASED ON 2018 ROADWAY DATA)

TMC CODE	NAME	MILES	TT POINTS	PT POINTS	TOTAL POINTS
118N16904	US-69	0.014	8	4	12
118-10808	HUBBELL AVE	0.331	6	4	10
118N11740	IA-160/ORALABOR RD	0.009	6	4	10
118N16973	UNIVERSITY AVE	0.010	6	4	10
118N17010	UNIVERSITY AVE	0.007	6	4	10
118N16939	74TH ST/JORDAN CREEK PKWY	0.019	6	4	10
118N16881	I-80 (WEST)	0.257	6	4	10
118N17100	DOUGLAS AVE	0.012	6	4	10
118N17097	UNIVERSITY AVE	0.010	6	4	10
118P16901	HUBBELL AVE	0.161	6	4	10
118P16939	74TH ST/JORDAN CREEK PKWY	0.019	6	4	10
118P17091	US-6	0.017	6	4	10
118P17137	I-35	0.094	6	4	10
118P17143	I-35	0.136	6	4	10
118N16880	IA-141/141ST ST	0.018	6	3	9
118+11730	E PARK AVE	0.135	4	4	8
118+13447	HICKMAN RD/MERLE HAY RD	0.308	4	4	8
118+16895	MERLE HAY RD	0.308	4	4	8
118-04653	35TH ST (UNDERPASS)	0.088	4	4	8
118-04654	31ST ST	0.296	4	4	8
118-04655	MARTIN LUTHER KING JR PKWY/EXIT 7A	0.200	4	4	8
118-04652	42ND ST	0.209	4	4	8
118-11729	INDIANOLA AVE (DES MOINES) (NORTH)	0.135	4	4	8
118-13444	GRAND AVE	0.129	4	4	8

FIGURE I9: CURRENTLY CONGESTED ROADWAYS AND INTERSECTIONS THAT SCORED 7 POINTS OR HIGHER (BASED ON 2018 ROADWAY DATA)

TMC CODE	NAME	MILES	TT POINTS	PT POINTS	TOTAL POINTS
118N07520	I-80/I-35	0.475	4	4	8
118N07565	I-235	0.111	4	4	8
118N10804	US-65	0.176	4	4	8
118N10809	I-235	0.143	4	4	8
118N11727	E ARMY POST RD	0.009	4	4	8
118N11733	I-235	0.074	4	4	8
118N16833	ARMY POST RD	0.012	4	4	8
118N16825	FLEUR DR	0.010	4	4	8
118N16891	156TH ST	0.008	4	4	8
118N16921	US-6/HUBBELL AVE	0.050	4	4	8
118N16967	35TH ST	0.008	4	4	8
118N16982	IA-28/63RD ST	0.008	4	4	8
118N17038	FLEUR DR	0.019	4	4	8
118N16948	US-6/MERLE HAY RD	0.041	4	4	8
118N17041	I-235/SCHOOL ST/DAY ST	0.074	4	4	8
118N17061	I-35	0.117	4	4	8
118N16996	MILLS CIVIC PKWY	0.011	4	4	8
118N17099	US-6	0.008	4	4	8
118N17007	UNIVERSITY AVE	0.008	4	4	8
118N16937	US-69/E 14TH ST	0.012	4	4	8
118N17103	NW 62ND AVE	0.012	4	4	8
118N17142	US-69/N ANKENY BLVD	0.005	4	4	8
118N17144	US-69/S ANKENY BLVD	0.027	4	4	8
118P07563	ARMY POST RD	0.012	4	4	8

FIGURE I9: CURRENTLY CONGESTED ROADWAYS AND INTERSECTIONS THAT SCORED 7 POINTS OR HIGHER (BASED ON 2018 ROADWAY DATA)

TMC CODE	NAME	MILES	TT POINTS	PT POINTS	TOTAL POINTS
118P07565	I-235	0.111	4	4	8
118P07545	IA-28	0.109	4	4	8
118P10804	US-65	0.171	4	4	8
118P10810	E UNIVERSITY AVE	0.040	4	4	8
118P11727	E ARMY POST RD	0.009	4	4	8
118P16825	FLEUR DR	0.009	4	4	8
118P16978	UNIVERSITY AVE	0.019	4	4	8
118P16891	156TH ST	0.008	4	4	8
118P16948	US-6/MERLE HAY RD	0.041	4	4	8
118P16892	I-35	0.127	4	4	8
118-16822	IA-5	0.115	4	4	8
118-17040	COTTAGE GROVE AVE	0.068	4	4	8
118-16982	IA-28/63RD ST	0.495	4	4	8
118-17039	INGERSOLL AVE	0.597	4	4	8
118-19314	SE DELAWARE AVE	0.167	4	4	8
118N04652	42ND ST	0.412	4	4	8
118N04657	KEOSAUQUA WAY/EXIT 7B/EXIT 7	0.488	4	4	8
118N04654	31ST ST	0.358	4	4	8
118P17007	UNIVERSITY AVE	0.008	4	4	8
118P17061	I-35	0.117	4	4	8
118P16999	I-235	0.079	4	4	8
118P17144	US-69/S ANKENY BLVD	0.019	4	4	8
118P17045	US-6/DOUGLAS AVE/ EUCLID AVE	0.019	4	4	8
118P17099	US-6	0.008	4	4	8

FIGURE I9: CURRENTLY CONGESTED ROADWAYS AND INTERSECTIONS THAT SCORED 7 POINTS OR HIGHER (BASED ON 2018 ROADWAY DATA)

TMC CODE	NAME	MILES	TT POINTS	PT POINTS	TOTAL POINTS
118P17013	US-6	0.008	4	4	8
118P17100	DOUGLAS AVE	0.012	4	4	8
118P17016	I-235/CENTER ST	0.153	4	4	8
118+16822	IA-5	0.092	4	3	7
118+16823	SW ARMY POST RD	0.115	4	3	7
118+16973	UNIVERSITY AVE	0.490	4	3	7
118+16989	2ND AVE	0.063	4	3	7
118+17032	6TH AVE	0.193	4	3	7
118+16991	PENNSYLVANIA AVE	0.116	4	3	7
118+17064	CR-R56/NW 16TH ST/SW IRVINEDALE DR	1.115	4	3	7
118+17040	COTTAGE GROVE AVE	0.578	4	3	7
118-04651	56TH ST	0.520	4	3	7
118N07562	IA-92	0.048	4	3	7
118N16818	SW 98TH CT/S 35TH ST	0.017	4	3	7
118N16844	FLEUR DR	0.008	4	3	7
118N16941	I-35	0.222	4	3	7
118N16978	UNIVERSITY AVE	0.019	4	3	7
118N16965	74TH ST/JORDAN CREEK PKWY	0.012	4	3	7
118N16943	NW 86TH ST/22ND ST	0.010	4	3	7
118N16924	I-235/12TH ST	0.184	4	3	7
118N17011	I-235/CENTER ST	0.127	4	3	7
118N17147	US-65/IA-330/HUBBELL RD	0.018	4	3	7
118N17143	I-35	0.136	4	3	7
118N17195	I-35	0.161	4	3	7

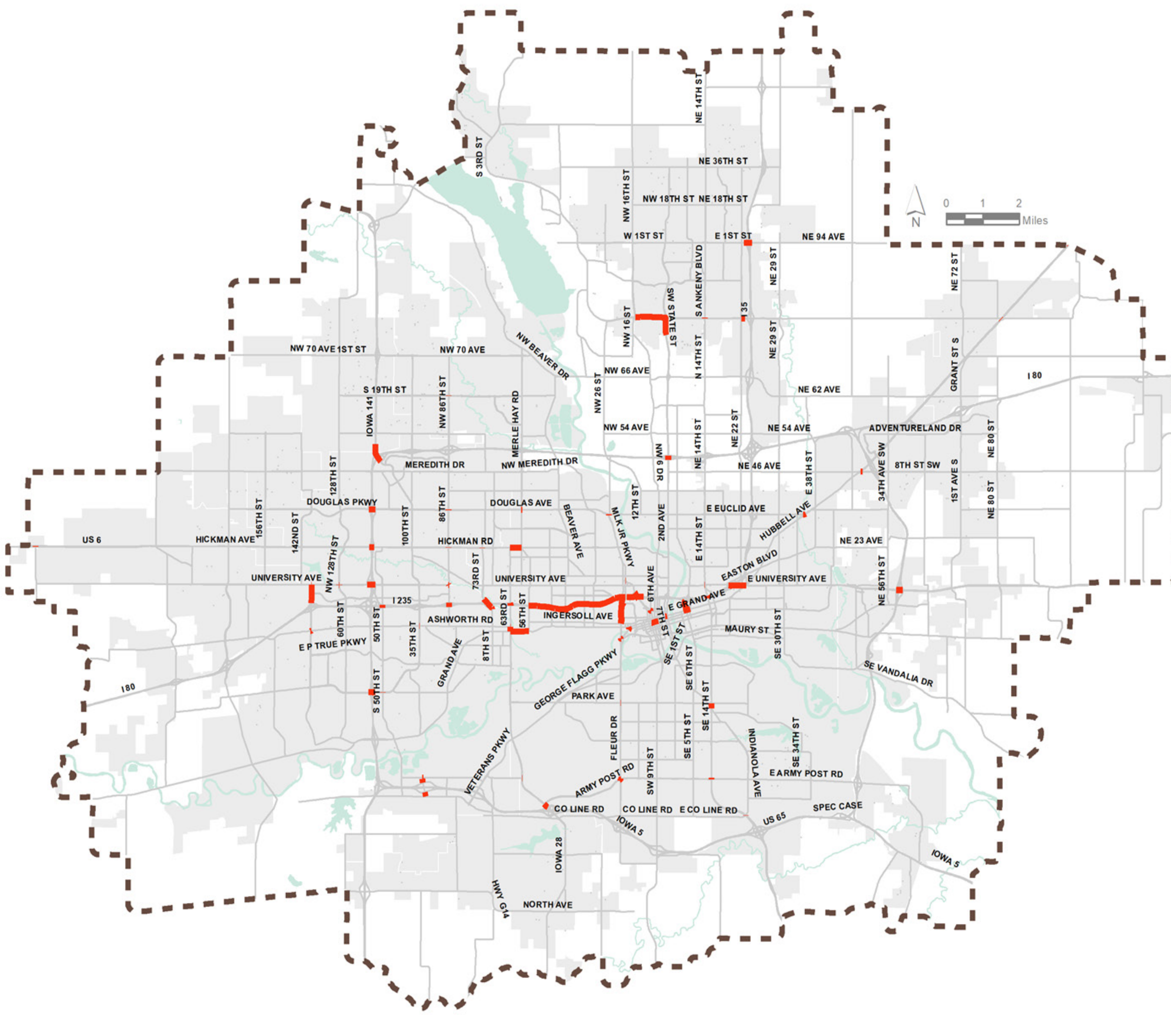
FIGURE I9: CURRENTLY CONGESTED ROADWAYS AND INTERSECTIONS THAT SCORED 7 POINTS OR HIGHER (BASED ON 2018 ROADWAY DATA)

TMC CODE	NAME	MILES	TT POINTS	PT POINTS	TOTAL POINTS
118N17177	INDIANOLA AVE	0.006	4	3	7
118N17137	I-35	0.094	4	3	7
118N17163	IA-163/E UNIVERSITY AVE	0.015	4	3	7
118P16838	LOCUST ST/GRAND AVE/18TH ST	0.068	4	3	7
118P16820	IA-28	0.009	4	3	7
118P16942	NW 100TH ST/35TH ST	0.008	4	3	7
118P16866	INDIANOLA AVE	0.011	4	3	7
118P16926	19TH ST	0.009	4	3	7
118P16944	I-35	0.186	4	3	7
118P16967	35TH ST	0.008	4	3	7
118P16970	IA-28/63RD ST	0.007	4	3	7
118P16923	8TH ST/9TH ST	0.079	4	3	7
118P16940	60TH ST	0.008	4	3	7
118P16965	74TH ST/JORDAN CREEK PKWY	0.012	4	3	7
118P16973	UNIVERSITY AVE	0.010	4	3	7
118+07563	ARMY POST RD	0.126	4	3	7
118-16807	I-35	2.926	4	3	7
118-16881	I-80 (WEST)	0.122	4	3	7
118-17181	E GRAND AVE/LOCUST ST	0.153	4	3	7
118N04651	56TH ST	0.274	4	3	7
118P17021	I-235	0.125	4	3	7
118P17028	I-235/CROCKER ST	0.057	4	3	7
118P16996	MILLS CIVIC PKWY	0.011	4	3	7
118P17064	CR-R56/NW 16TH ST/SW IRVINEDALE DR	0.204	4	3	7

FIGURE I9: CURRENTLY CONGESTED ROADWAYS AND INTERSECTIONS THAT SCORED 7 POINTS OR HIGHER (BASED ON 2018 ROADWAY DATA)

TMC CODE	NAME	MILES	TT POINTS	PT POINTS	TOTAL POINTS
118P17163	IA-163/E UNIVERSITY AVE	0.015	4	3	7
118P17139	US-65/IA-330/NE HUBBELL RD	0.017	4	3	7
118P17009	I-235	0.116	4	3	7
118P17177	INDIANOLA AVE	0.006	4	3	7

FIGURE I10:CONGESTED ROADWAY AND INTERSECTION MAP



Identification and Evaluation of Strategies

Types of Strategies

Data collected in the monitoring phase of the congestion management process will be evaluated. The evaluation process for this data will utilize the strategies described in this section on a case by case basis. The strategies to address congestion include demand management, operational management, and capital intensive strategies. These strategies will be considered when determining improvements to address these congested roadways and intersections.

Hierarchy of Congestion Strategies

When choosing congestion management strategies, the region should follow a least cost planning methodology. Least cost planning is defined as, "a process of comparing direct and indirect costs of demand and supply options to meet transportation goals, policies or both, where the intent of the process is to identify the most cost-effective mix of options." In a time when limited resources impact the decision-making process, it is pertinent to address congestion in a cost effective manner. Therefore, the following hierarchy of congestion strategies should be considered:

- Demand Management Strategies (least expensive);
- Operational Management Strategies (moderately expensive); and,
- Capital Intensive Strategies (most expensive).

When congestion is identified the first step should be to determine what demand management strategies might be implemented to address the issue. If an appropriate demand management strategy is identified, it should be implemented and evaluated prior to considering an operational management or capital intensive strategy. Capital intensives strategies to relieve congestion should only be considered as a last resort.

Land Use Policies

Integrating transportation and land use decision is the best long-term strategy for dealing with congestion. When working to integrate land use and transportation more effectively, communities should focus infill development that is compact, mixed-use, and built using human-scale principles. Land use polices should focus on providing a highly connected system of streets that are design to accommodate a variety of user. A high level of emphasis should be place on creating an attractive public realm, and priority should be placed on designing pedestrian- and trainsit-oriented places. What this achieves is a built environment that creates a higher level of accessibility by places residents in closer proximity to the activities people frequent. This proximity coupled with the high quality public realm, incentivizes people to use alternative modes of transportation includes walking, biking, and public transit. This removes vehicles from the streets helping to alleviate congestion.

Demand Management Strategies

Ridesharing programs and employer provided transit opitons reduce the number of single-occupancy vehicles on the road. This can be achieved through carpooling programs where the participants use their own vehicles. Vanpools are typically organized by employers, non-profit organizations, or transit agencies. Ridesharing programs are typically self-supporting, and are especially effective in areas with poor access to public transit.

Flexible Work Hours

This strategy allows employees to have flexibility in their work schedules. If a normal work schedule is 8:00 a.m. to 4:30 p.m., an employer would allow employees to work from 7:30 a.m. to 4:00 p.m. and others to work from 9:00 a.m. to 5:30 p.m. This shifts the number of employees leaving work at peak-hour, spreads traffic out over longer time period, and helps to reduce peak-hour congestion.

Telecommuting

Telecommuting allows people to work remotely from home or other locations. Companies can offer this option to employees who don't physically need to be at the office to perform their duties, and therefore removes vehicles from the road.

Parking Management

Parking supply and price are effective measure to reduce automobile travel and congestion. The right supply and pricing can lower traffic congestion, ensure that some on-street parking is available at peak-hours, and incentivize some drivers to shift to other modes of transportation.

Operational Management Strategies

Traffic Operational Improvements

Traffic Operational Improvements, which include improvements in traffic signalization, channelization, and highway geometrics, have been used extensively by MPO member governments, especially at intersections. Such projects can provide significant congestion-related benefits with only small investments in time, money, and labor.

Access Management

Access management principles, which typically involve standards for driveway spacing and median openings, have customarily been incorporated into the design for construction of new streets and highways and improvements to existing streets. In 2004, the Center for Transportation Research and Education (CTRE) at Iowa State University completed the Development of the Des Moines Access Management Plan, which provided recommendations for possible improvements and best access management practices. The results of this study were shared with MPO member governments and agencies. Iowa DOT and MPO member governments created an access management agreement along U.S. Highway 6 (Hickman Road) to limit access along the corridor. Similar access management agreements have been reviewed for other corridors in the MPA.

Incident Management

Incident management includes various activities that help mitigate non-recurring congestion, such as rapid detection and response to accidents and stalled vehicles, provision of congestion-related information to drivers, management of construction and maintenance activities, and management of traffic for special events. In conjunction with the widening of I-235, the Iowa DOT implemented a freeway incident management system that includes a traffic management center (TMC), variable message signs, a Highway Advisory Radio station, a Highway Helper program, and video and communications equipment. The MPO's Transportation Management Advisory Committee (TMAC), a multi-disciplinary inter-agency group, provides coordination for the deployment and operation of the region's incident management plans and programs.

Intelligent Transportation System

Intelligent Transportation System programs provide user services such as travel planning, traveler information, emergency management, and advanced vehicle control. Many of the activities associated with ITS also may fall into the Incident Management and Traffic Operational Improvements categories of the MTP. A Regional ITS Architecture was developed and the necessary infrastructure was put into place, prior to the reconstruction and widening of I-235. Currently, the Iowa DOT maintains an interactive traveler information website, where users can find updated information about traffic conditions on major travel corridors in the region. The TMAC provides coordination for the deployment and operation of the MPA's ITS programs. In 2006, the MPO programmed STP funds to assist in funding the Iowa DOT's TMC.

Signal Timing and Interconnectedness

Traffic signal operations strategies can be placed into two broad categories: Isolated or Coordinated. Isolated signal timing is generally designed to minimize delay at the intersections that are not in close proximity to other traffic signals. Coordinated operations strategies promote the smooth flow of traffic between along an arterial to minimize stops, avoid congestion, fuel consumption and air quality impacts resulting from the acceleration and idling of vehicles. Operational strategies consistent with the objectives of coordination include Adaptive Signal Control Technology (ASCT) and Traffic Responsive. Currently several western suburbs in the Des Moines Metro are working together to implement coordinated signal timing activities to ensure the smooth flow of traffic across jurisdictional boundaries.

Ramp Metering

Ramp metering is an effective strategy to control the number of vehicles entering a highway from an on-ramp. This maintains a smoother flow of traffic onto the highway and helps to ease congestion. This strategy could be implement on I-235 to help smooth access during peak-hours.

Roundabouts

Congestion on urban streets is often caused by queuing at signalized or stop controlled intersections. Modern roundabouts provide a solution to congestion created at intersections. A modern roundabout's capacity is 30 percent greater than a signalized intersection and can reduce major injury and fatal accidents by as much as 90 percent.

Complete Streets

Ensuring that lane addition/widening projects consider integrating Complete Street practices in the design process can assist in congestion mitigation through providing additional opportunity for users to choose alternative modes of transportation.

Traffic Signal Priority

Transit vehicles can be equipped with traffic signal priority technology that limits the amount of time buses have to wait at signalized intersections. This improves the travel time of transit trips and helps to promote mode shift.

Capital Intensive Strategies

Lane Additions

Objective 3.2 of the Mobilizing Tomorrow Plan (MTP) states that prior to consideration of capital improvements to alleviate congestion the MPO will consider the utilization of ITS and other operation improvements. However; when alternative methods are not feasible, adding through travel lanes has continued to be a widespread practice in the MPA for alleviating congestion and encouraging economic development.

Transit Capital Improvements

Transit capital improvements in the MPA mainly consist of the replacement of older buses in the DART fleet and procurement of additional buses for expanded DART services. Few, if any, roadway projects have been constructed with the intent of minimizing the impact of vehicle congestion for buses. No rapid transit services currently operate in the MPA. However, DART currently is studying the feasibility of Bus Rapid Transit (BRT) as part of the DART Forward 2035 Plan and is constructing a multimodal transit hub in the Des Moines CBD. As noted in Chapter 5 of the 2035 Metropolitan Transportation Plan, the MPO did commission a commuter rail feasibility study in 1999, which concluded the service was technically feasible, but economically impractical at that time.

The Iowa DOT began undertaking an ICM concept study within the MPO area in 2018. While the study will not conclude until 2020, some initial strategies have been identified. These strategies, grouped into the categories listed below, are undergoing further analysis and refinement.

- Arterial Traffic Management Strategies
- Event Management Strategies
- Freeway Traffic Management Strategies
- Infrastructure Enhancement Strategies
- Public Transportation Management Strategies
- Travel Demand Management Strategies
- Traveler Information Stategies

Performance Monitoring Plan

System Monitoring Data Sources

The MPO will monitor system performance through various means based on the following data sources:

INRIX

The MPO has access, through the Iowa DOT, to traffic data available through the company INRIX. INRIX offers real time and historic traffic flow data for most of the major roads in the MPO area. Data is collected through cell phones and cataloged for analysis. Information is available at the 1, 5, 15, and 30 minute and 1 hour time segments. Time periods can be selected manually for any time in a year, including up to a year although yearly data is available at the hour time segment. Types of information available include vehicle speed, percent of travel of free flow speed, travel time index, planning time index, and buffer index. INRIX uses a unique set of Traffic Message Channel (TMC) codes and segments exclusive to the company. In the event that the Iowa DOT stops using INRIX, the MPO will use whatever service provider is hired by the DOT to provide the same type of data.

Travel Time Survey

The MPO periodically performs a travel time survey to gauge the level of congestion, in terms of delay or reduction in free flow travel speeds, on the Principal Arterial System. The MPO performs the Travel Time Survey (TTS) by utilizing Global Positioning System (GPS) equipment to actively survey a designated corridor. The recorded GPS data is analyzed and summarized into an annual report. The annual report documents the findings and compares the survey’s results to historic survey results to gauge changes in travel speeds. The TTS is conducted on an annual basis in the fall.

Vehicle Occupancy Survey

The MPO periodically performs a Vehicle Occupancy Survey (VOS) to assist in evaluating both the number of people per vehicle and the percentage of people utilizing various modes of transportation. This data is collected manually by MPO staff at various pre-determined key areas throughout the area. The annual report documents the findings and compares the survey’s results to historic survey results to evaluate changes in occupancy and mode. The VOS is conducted on an annual basis in the fall.

Traffic Management Center

The MPO summarizes and analyzes traffic data from the Iowa Department of Transportation's (DOT) Traffic Management Center (TMC) on a quarterly basis. The Iowa DOT's TMC monitors the Intelligent Transportation System (ITS) infrastructure. This ITS infrastructure is comprised of a series of cameras, sensors, and digital message signs. The data is processed and relayed to a website, www.iowa511.org. The TMC collects traffic data from the numerous sensors along the freeway system, and includes traffic speeds and volumes. The data is summarized into 15-minute intervals at each sensor location.

Travel Demand Modeling

The Travel Demand Model (TDM) is operated and maintained by the MPO on an ongoing basis. The TDM is utilized to provide data related to volume and capacity of the transportation network. The TDM undergoes periodic reviews to ensure that the data collected is the most accurate available.

Traffic Counts

Each jurisdiction in the MPO boundary conducts traffic counts on an independent basis. There is a need in the region to engage in a more coordinated effort with traffic counts and other related data, such as traffic signal timing that have significant impacts on the regional traffic patterns.

DART Ridership

DART ridership is compiled and reported to the MPO each spring. The MPO uses this data in the TDM.

Monitoring Data Sources

The following guidelines provide examples of the monitoring that can be performed for common types of improvement strategies.

Demand Management Strategies

It is fairly difficult to monitor the effects of many transportation demand management strategies. Unless strong area-wide measures are taken and enforced, the existing CMP performance measures may not be sensitive enough to measure the benefits of demand strategies. A procedure to assess the effectiveness of each strategy should therefore be determined individually. Examples include: the number of people participating in ridesharing, and spreading of traffic volume over non peak-periods (K-factors). The MPO will use the following monitoring strategies:

- Establish an inventory of companies and agencies that practice transportation demand management and track annually;
- Track the participation in Des Moines Area Regional Transportation Authority (DART) vanpool on an annual bases;
- Monitor DART ridership and track over time;
- Monitor parking management strategies and track over time; and,
- Monitor community land use plans and track changes over time.

Traffic Operational and System Capacity Strategies

Most capacity and traffic operational improvements will be measured and assessed through the CMP's standard data collection and evaluation process. Additionally, before and after analyses are being completed for retiming projects.

In the year following implementation of a recurring congestion roadway or intersection improvement, the improved roadway segment will be included in the annual data collection efforts. For most improvements, performance of the facility will be compared with data from previous years, and the resulting benefits will be identified in terms of the performance measures identified in section 5 of the CMP. The process for evaluating the benefits of ITS technologies, as related to the regional ITS architecture, should be developed case-by-case.

Implementation and Management

Evaluation of Effectiveness

Evaluation of strategy effectiveness is an essential, required element of the CMP. The primary goal of this action is to ensure that implemented strategies are effective at addressing congestion as intended, and to make changes based on the findings as necessary. Two general approaches are used for this type of analysis is:

1. System-level performance evaluation: Regional analysis of historical trends to identity improvement or degradation in system performance, in relation to objectives; and,
2. Strategy effectiveness evaluation: Project-level or program-level analysis of conditions before and after the implementation of a congestion mitigation effort.

Findings that show improvement in congested conditions due to specific implemented strategies can be used to encourage further implementation of these strategies, while negative findings may be useful for discouraging or downplaying the effectiveness of similar strategies in similar situations. The information learned from evaluation should be used to inform the TIP and MTP, as well as other steps within the CMP, notably the identification and assessment of strategies.

The periodic and ongoing data gathering efforts required under the congestion management process provides a two-fold benefit including: the provision of up to date network performance data, while also confirming the efficacy or failure of implemented congestion management strategies in achieving system performance improvement. Thus, at its core, the CMP incorporates a feedback loop which provides local decision makers with a valuable mechanism for measuring the success of previously implemented congestion management strategies.

Complete a Regional Analysis of ITS Infrastructure

The MPO should develop an update to the regions ITS Infrastructure inventory. This will allow the MPO to analysis the effectiveness of the existing ITS Infrastructure and identify areas where improvements are needed. This update should be complete prior to any additional funding being spent on capacity expansion as a way to address identified congestion.

CMP and the Surface Transportation Block Grant Program

Congestion is one of the components used to score STBG project applications. STBG projects are scored on a 100-point scale, and eight of the total points are awarded based on congestion. STBG projects are evaluated based on current and future levels of congestion. There are four points available for projects that are located on an area that is identified as being currently congested. These points will be awarded if the submitted project includes any part of a segment that meets or exceeds seven points. Points awarded for future congestion will be based on level of service until the MPO model is capable of using real-time data to project Travel Time Index and Planning Time Index for future years. When using LOS, any project that includes a segment with a LOS of E or F will receive points for future congestion.

CMP and the Iowa Clean Air Attainment Program (ICAAP)

Congestion also contributes to air pollution, a key component of the Iowa DOT ICAAP program, which seeks to help meet the national ambient air quality standards in Clean Air Act nonattainment areas for ozone, carbon monoxide, and particulate matter. ICAAP is a statewide competitive application-based program and awards federal funds to projects with the highest potential for reducing transportation-related congestion and air pollution. Des Moines metro communities periodically apply for such funding and moving forward communities will be able to use this document by targeting the most congested areas in the metro and as a resource when ICAAP applications are submitted.

Technological Advances

In the coming years, advances in transportation technology are likely to have a significant impact on congestion and how it is addressed. These technologies included things like autonomous cars and vehicle-to-vehicle communication that are predicted to greatly reduce the main causes of congestion. It is important to consider the impact of these technologies when considering what strategies to employ to address identified congestion. As part of the CMP process, the MPO will continue to monitor these changes in technology to ensure that the region is employing the most cost-effective strategies to address congestion.

Integrated Corridor Managment

An opportunity to implement many of the concepts discussed in this chapter is through Integrated Corridor Management (ICM). The ICM concept provides a framework for coordination among various modes of transportation and jurisdictions to deliver a safer, more reliable, and more convenient transportation system for all users in a more cost-effective manner compared to adding more lanes. The ICM approach is based on proactively managing and operating the regional transportation system as an integrated network rather than individual roadways.

ICM strategies that promote integration among freeways, arterials, and transit systems can help balance traffic flow and improve performance of the entire corridor. The benefits of ICM include:

- Fewer traffic incidents, particularly ones that occur as a result of another event, also called secondary incidents.
- Reduced amount of time an incident has the potential to impact traffic, in turn increasing safety and mobility.
- More predictable travel times.
- The ability to more quickly make incident information available on traveler information sources.
- Increased or more complete information about other routes or travel options if an incident or traffic congestion does occur.
- Increased use of other routes or travel options to meet the demand of traffic.
- Reduced vehicle emissions and fuel consumption resulting from congestion.

The MPO will continued to be involved in the Iowa DOT's ICM effort and will update this plan, as necessary, to incorporate the final strategies that result from the effort. Additional information about the ICM project can be found at https://iowadot.gov/desmoinesicm/.