# Wichita-Sedgwick County Metropolitan Planning Organization
# Congestion Management System Policy

## Introduction

This policy document of the Wichita Sedgwick County Metropolitan Planning Organization (MPO) provides the framework to carryout the CMS in the Wichita metropolitan urbanized area. All Transportation Management Areas (TMAs greater than 200,000 population) must develop, establish and implement a Congestion Management System (CMS) as part of the metropolitan planning process in accordance with 23 CFR 450.320(c) and 23 CFR 500.109. The primary function of a CMS is to develop a systematic and consistent process for identifying locations of congestion on the multi-modal transportation system, and to identify and evaluate potential actions that can effectively reduce congestion. Another function of a CMS is to ensure that traffic flow problems do not result in air quality issues.

The two primary causes of congestion are:

(a) Recurring Congestion, that tends to be concentrated in short time periods, such as "rush hours," and is caused from excessive traffic volumes resulting in reduced speed and flow rate within the system, and
(b) Non-recurring Congestion, caused from unforeseen incidents (road accidents, spills, and stalls), which affects driver behavior to a considerable extent.

It is estimated that more than 60 percent of traffic delay is caused from incidents in an urban area. However, research has also shown that properly applied measures to manage the existing components of the system can have a profound positive effect. These measures, called congestion management or mitigation strategies, are designed to improve the operating efficiency of the existing transportation infrastructure. The Congestion Management System (CMS) Plan identifies areas of congestion and provides a framework for developing congestion mitigation strategies that can be implemented in the short term. A successful congestion management program should address both these types of congestion.

The CMS Plan provides useful information to decision makers on where to invest public money in order to improve mobility on the transportation network. The CMS allows these decisions to be analyzed on a “network” level rather than a project-by-project level. The information from the CMS can be used to support the project selection processes of future Long Range Transportation Plans and Transportation Improvement Programs. The primary purpose of the CMS is to provide for a more informed decision-making process that will be used to make the most effective and efficient use of limited resources to address congestion problems.

## Area of Application and System Coverage

The CMS coverage area will include the FHWA Adjusted Urbanized Area (Appendix 1). The transportation network that will be monitored within the coverage area includes roadways classified as Interstate, Freeways and Expressways and all other paved arterial streets. Appendix 2 shows the CMS network based on mid-block Annual Average Daily Traffic (AADT) criteria of 20,000 or more on all paved arterial streets, 10,000 or more on two-lane arterials, and the state/interstate highway system within the urbanized area.

## Performance Measures

There are numerous ways to measure congestion. Examples include roadway and transit level of service (LOS), crash rates, transit headways, vehicle miles traveled, vehicle hours traveled and travel delay. Some of these measures require intricate data collection efforts, model simulations, or traffic analysis software to develop accurate measurements. Historically, the Wichita Metropolitan Area has had a traffic counting program administered by the Wichita Public Works Department, the Sedgwick County Public Works, and the KDOT for Interstate, state highway system, and some selected arterials. As a part of CMS, all small cities in the metropolitan urbanized area will be required to provide existing traffic counts, at least once in a three-year cycle. The principal guide to evaluate congestion will be traffic volume divided by roadway capacity (v/c Ratio). Travel time performance measures will also be used to identify congestion locations on selected routes with v/c ratio of 0.85 or higher. The length of headways will be used as the transit performance measure.

The following performance measures are being considered for evaluation of the transportation system:

1. Volume to Capacity Ratio
2. Travel Times (peak/off peak, mid-block, % below posted speed limit)
3. Length of Headways (Transit)
4. Incident Response Time

1. The v/c ratio provides a good indication whether the facility is congested, if “excess” capacity is available, or if saturation conditions exist. A v/c ratio equal to 1.0 or greater indicates a Level of Service (LOS) "F" operation where the demand volume exceeds the available capacity of the roadway, inevitably resulting in forced flow conditions. The other categories vary slightly depending on the particular methodology from the Highway Capacity Manual that is being deployed, but in general the following v/c ratios and their corresponding LOS will be used:
    1) v/c < 0.85 = LOS A,B,C (Not Congested)
    2) 0.85 < v/c < 0.95 = LOS D (Marginal Congestion)
    3) 0.95 < v/c < 1.00 = LOS E (Moderate Congestion)
    4) v/c > 1.00 = LOS F (Serious Congestion)

2. Travel time is another performance measure that will be used to identify congestion. Travel time study will provide diagnostic evaluation of a critical roadway segment experiencing major delays. A Global Position System (GPS) unit capable of collecting real-time position and speed data is placed on a probe vehicle that would be driven along with the regular traffic stream on each of the identified roadways to measure travel time and amount of delay in relation to the posted speed limit.

3. Length of Headways refers to the time interval between two buses (or trolley) moving in the same direction on a particular route. The Wichita Transit believes that currently this is the most appropriate performance standard to evaluate transit mobility for the CMS.

4. Incident Management is defined as a sequence of pre-planned and integrated activities that, applying both human and technological resources, remove incidents as quickly and safely as possible and restore capacity of the highway. It basically applies some of the same resources that are already being used to respond to incidents. The difference is that these resources are used more effectively. Time is essential since about four minutes are needed to unblock a road for each minute an incident remains obstructing a portion of the roadway. The secondary source data of 911-call center **(**for Incident Response Time**)** may be used to analyze such situation, and will be researched (data sources and application) in coordination with emergency service providers.

**Performance Monitoring Plan**

The primary purpose of compiling data is to identify recurring congestion and document the magnitude of this congestion. Traffic counts are compared to capacity and expressed as a level of service. Traffic counts (and traffic volume forecasts) can serve as an initial screen to locate congested routes and future problems. Travel time or speed studies are conducted by field study and are the most useful in locating "bottlenecks" and causes of congestion.

The MPO currently maintains a database of Annual Average Daily Traffic (AADT) by collecting AADT data from multiple organizations (the Wichita Public Works Department, the Sedgwick County Public Works, small cities, and the KDOT). The cycle of updating AADT mainly depends on the source agencies. It may be possible to have V/C ratio analysis carried out once in a three-year cycle. However, initially v/c ratio analysis will be carried out in the 2005 in conjunction with the LRTP update. Thereafter, it will be carried out once every three years.

The travel time study provides a diagnostic measure of actual speeds and delays on selected routs of the CMS monitoring network. Arterials with v/c ratio equal or greater than 0.85 will be studied using the “ floating car” method to locate the causes and degree of delay/congestion. These routes will be traveled three times in each direction during peak hours to compute a directional average speed.

The following table outlines the frequency and responsibilities of the CMS performance measures.

**Performance Measures Details**

| **Data** | **Source of Data** | **Coverage** | **Frequency of Data Collection** |
|---|---|---|---|
| Traffic Count Data | City of Wichita, Sedgwick County & KDOT | Depends on respective authority | Every other year |
| Traffic Count Data for Small Cities | All Small Cities of Urbanized Area | Growth Area of Small Cities | Once in a three year cycle |
| Travel Speed Data | MPO staff | v/c ratio >=0.85 | Once in a three year cycle |
| Length of Headways (Transit) | Wichita Transit | All transit routes | Every year |
| Incident Management | Sedgwick County 911 call center | CMS coverage area | All reported incidences in two years |

The Wichita Transit believes that currently length of headways is the most appropriate performance standards to evaluate transit mobility. This will be done for each transit routes and possible to track every year.

**Identification & Evaluation of Strategies**

As a part of the CMS implementation, specific strategies will be developed for the following broad congestion mitigation strategies.

1. Transportation Demand Management Measures
2. Traffic Operational Improvements
3. Public Transportation Improvements
4. ITS Technologies
5. Additional System Capacity

A "toolbox" will be developed in consultation with local and regional stakeholders, and with the assistance of a consultant. There may be more than one appropriate strategy for a particular congested location, and there can be synergistic effects that multiply the benefits of two or more strategies that are implemented simultaneously.

**Implementation & Management**

The MPO would implement selected strategies that address congestion as identified. The process to address those problems of congestion is described below:

1. Needs Assessment: Identification of overall system performance and congestion management needs is performed at the regional level. CMS assessment will be

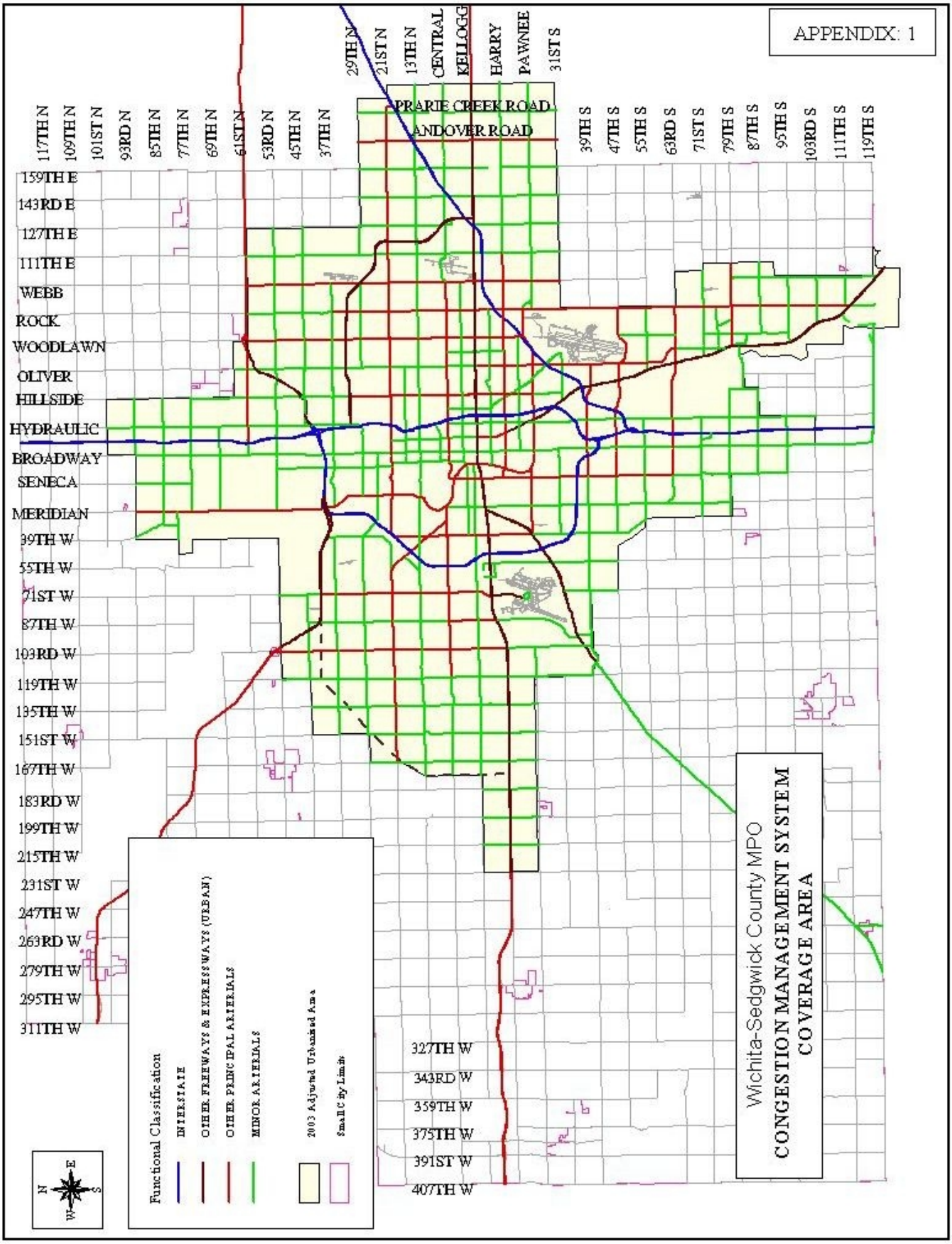
conducted in this context as part of development of all capacity projects to be included in the Long-Range Transportation Plan (LRTP) and the Transportation Improvement Program (TIP).

2. Prioritization of Street and Highway Improvements: The project selection process for TIP and LRTP will include results from the CMS. The categories of projects subjected to the priority analysis may include:
    - Arterial streets widening projects
    - Intersection Improvements/signalization projects
    - New arterial street projects
    - Freeway segment widening

3. Transportation Demand and System Management Analysis: The following transportation demand and system management projects may be included in the priority analysis of LRTP and promoted as part of CMS implementation if that helps to reduce congestion in the planning region.
    - Regional Rideshare/Employer Trip Reduction Program
    - Signal Coordination Improvements
    - Park and Ride Signage

**Monitoring Strategy Effectiveness**

The implementation of CMS strategies will be tracked through the development of the TIP. Evaluation of implemented CMS strategies may be conducted as before and after studies for individual CMAQ funded projects, through modeling exercise, or other statistical or operational analysis software. Special review of CMS policy will be conducted one year after the adoption of CMS (2006), and every three years thereafter, and in some case as a project based analysis.


APPENDIX: 1
Wichita-Sedgwick County MPO
CONGESTION MANAGEMENT SYSTEM
COVERAGE AREA
Functional Classification
INTERSTATE
OTHER FREEWAYS & EXPRESSWAYS (URBAN)
OTHER PRINCIPAL ARTERIALS
MINOR ARTERIALS
2003 Adjusted Urbanized Area
Small City Limits
N
E
S
W
PRAIRIE CREEK ROAD
ANDOVER ROAD
29TH N
21ST N
13TH N
CENTRAL
KELLOGG
HARRY
PAWNEE
31ST S
117TH N
109TH N
101ST N
93RD N
85TH N
77TH N
69TH N
61ST N
53RD N
45TH N
37TH N
39TH S
47TH S
55TH S
63RD S
71ST S
79TH S
87TH S
95TH S
103RD S
111TH S
119TH S
159TH E
143RD E
127TH E
111TH E
WEBB
ROCK
WOODLAWN
OLIVER
HILLSIDE
HYDRAULIC
BROADWAY
SENECA
MERIDIAN
39TH W
55TH W
71ST W
87TH W
103RD W
119TH W
135TH W
151ST W
167TH W
183RD W
199TH W
215TH W
231ST W
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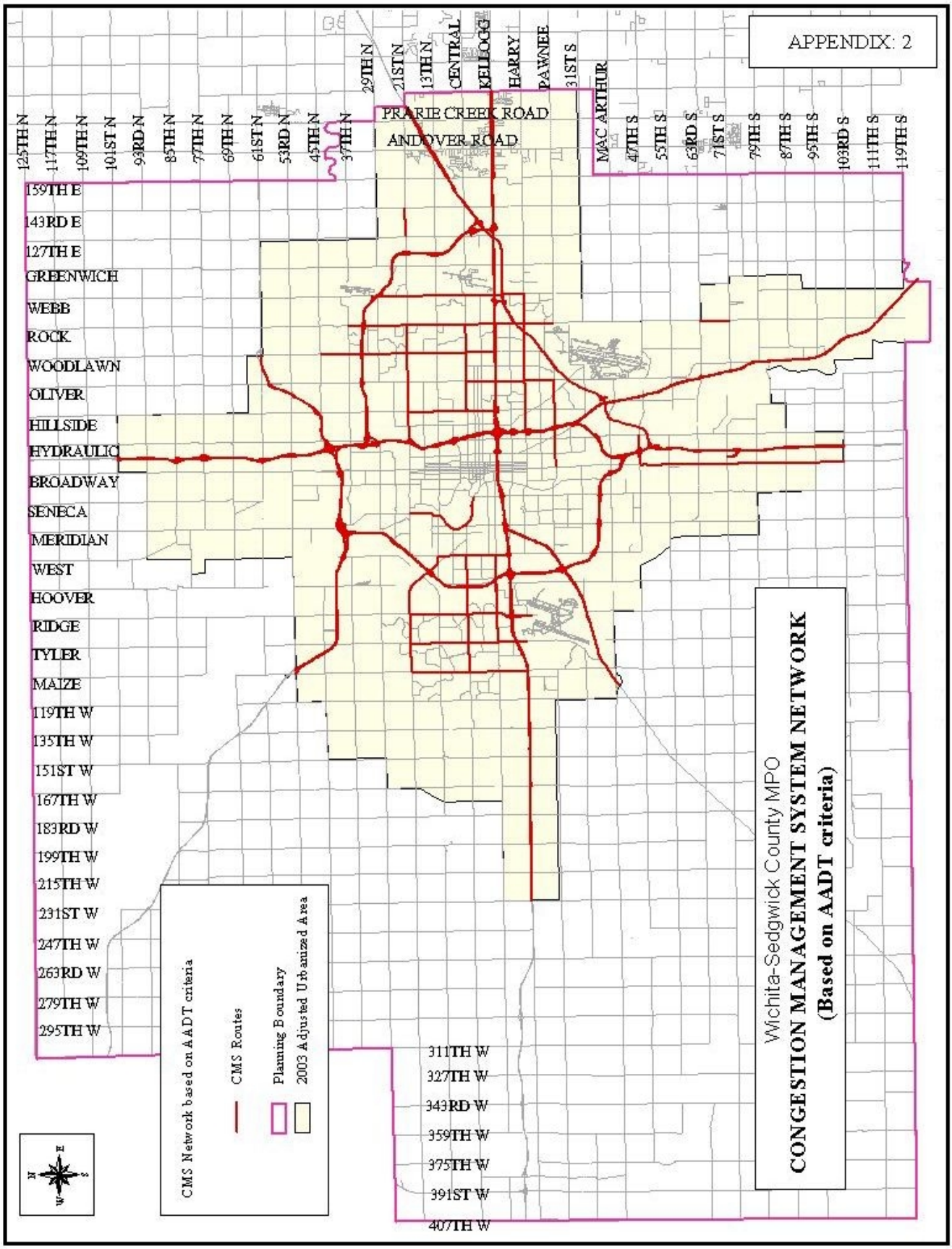
359TH W
375TH W
391ST W
407TH W


APPENDIX: 2
125TH N
117TH N
109TH N
101ST N
93RD N
85TH N
77TH N
69TH N
61ST N
53RD N
45TH N
37TH N
29TH N
21ST N
13TH N
CENTRAL
KELLOGG
HARRY
PAWNEE
31ST S
MAC ARTHUR
47TH S
55TH S
63RD S
71ST S
79TH S
87TH S
95TH S
103RD S
111TH S
119TH S
PRAIRIE CREEK ROAD
ANDOVER ROAD
159TH E
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127TH E
GREENWICH
WEBB
ROCK
WOODLAWN
OLIVER
HILLSIDE
HYDRAULIC
BROADWAY
SENECA
MERIDIAN
WEST
HOOVER
RIDGE
TYLER
MAIZE
119TH W
135TH W
151ST W
167TH W
183RD W
199TH W
215TH W
231ST W
247TH W
263RD W
279TH W
295TH W
311TH W
327TH W
343RD W
359TH W
375TH W
391ST W
407TH W
CMS Network based on AADT criteria
CMS Routes
Planning Boundary
2003 Adjusted Urbanized Area
Wichita-Sedgwick County MPO
CONGESTION MANAGEMENT SYSTEM NETWORK
(Based on AADT criteria)