

# CONGESTION MANAGEMENT SYSTEM

for Northeastern Illinois

Technical Supplement

October 1997



Chicago Area Transportation Study

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*CATS was formed in 1955 to develop the first comprehensive long-range transportation plan for the northeastern Illinois region. Since then the CATS Policy Committee has been designated by the governor of Illinois and northeastern Illinois local officials as the metropolitan planning organization (MPO) for the region. MPOs have been mandated by federal legislation to provide additional opportunities for public participation in transportation planning. This public involvement plan was developed in the fall of 1994 and endorsed by CATS Policy Committee October 1994.*

*The Policy Committee is the metropolitan planning organization for northeastern Illinois. It plans, develops and maintains an affordable, safe and efficient transportation system for the region, and provides the forum through which local decision makers develop regional plans programs.*

*The Work Program Committee reviews and makes recommendations to the Policy Committee on transportation matters presented to CATS and carries out any other duties the Policy Committee shall assign to it. It coordinates the activities of the committees, subcommittees and task forces reporting to the Work Program Committee.*

*The Regional Transportation Plan Committee provides overall guidance for the RTP development and ensures that the plan meets the needs of northeastern Illinois within the constraints of federal, state and local policies. It provides a mechanism for participation in the plan process by agencies, organizations and persons interested in long range transportation planning for the region.*

*Prepared by the Chicago Area Transportation Study sponsored by the agencies on the Policy Committee. The report has been financed in part by the U.S. Department of Transportation, Federal Highway Administration and the Federal Transit Administration and authorized by the State of Illinois.*

# **Congestion Management System for Northeastern Illinois**

## **Technical Supplement**

**October 1997**

*Prepared by:*

Chicago Area Transportation Study

*and*

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## **List of Acronyms**

<b>ADA</b>	Americans With Disabilities Act
<b>APTS</b>	Advanced Public Transportation Systems Systems established to increase the cost-effectiveness and usage of public transportation systems; examples include electronic fare systems, bus priority systems and transit management systems.
<b>ATIS</b>	Advanced Traveler Information Systems Systems created to provide travelers with pre-trip or en-route travel information about alternative modes and routes, incidents, and travel delays; examples include information kiosks, traffic flow maps, variable message signs, highway advisory radio, and commercial radio or television travel reports.
<b>ATMS</b>	Advanced Traffic Management Systems A collection of techniques established for improving traffic flow on expressways and surface street networks; examples include ramp metering, traffic signal improvements, traffic surveillance methods, and incident management activities.
<b>AVO</b>	Average Vehicle Occupancy
<b>CAAA90</b>	Clean Air Act Amendments of 1990
<b>CATS</b>	Chicago Area Transportation Study The Metropolitan Planning Organization for northeastern Illinois identified as the lead agency in developing a CMS for the region.
<b>CDOT</b>	Chicago Department of Transportation
<b>CFR</b>	Code of Federal Regulations
<b>CMAQ</b>	Congestion Mitigation and Air Quality Improvement Program A program created by ISTEA to fund transportation projects that improve air quality.
<b>CMS</b>	Congestion Management System A systematic process for managing congestion and enhancing the mobility of people and goods in a region.
<b>CTA</b>	Chicago Transit Authority

<b>CVO</b>	Commercial Vehicle Operations A class of actions that applies ITS technologies to goods movement; examples include weigh-in-motion systems, electronic credential checking or purchase, global positioning systems, and weigh station pre-clearance.
<b>EIS</b>	Environmental Impact Statement A study that must be done when a proposed project is likely to have significant environmental impacts.
<b>FHWA</b>	Federal Highway Administration
<b>FTA</b>	Federal Transit Administration
<b>GIS</b>	Geographic Information System Generic term for a system for storing, accessing, and manipulating data with a spatial component.
<b>HCM</b>	Highway Capacity Manual
<b>HOV</b>	High Occupancy Vehicle
<b>IDOT</b>	Illinois Department of Transportation
<b>IEPA</b>	Illinois Environmental Protection Agency
<b>IFR</b>	Interim Final Rule A principle set of guidelines, issued by USDOT, used to implement the requirements of transportation management systems, prior to the publication of the Final Rule.
<b>IRIS</b>	Illinois Roadway Information System Roadway database maintained by IDOT.
<b>ISTEA</b>	Intermodal Surface Transportation Efficiency Act of 1991 Legislation that established six management systems, including the CMS, to guide the optimization of the transportation infrastructure.
<b>ISTHA</b>	Illinois State Toll Highway Authority
<b>ITS</b>	Intelligent Transportation Systems Collection of technology and information-based strategies implemented to improve the operation of the transportation system.



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<b>LOS</b>	Level-of-Service A system of performance measures divided into six letter categories (A-F) used to describe operating conditions in a traffic stream.
<b>MIS</b>	Major Investment Study A study of the transportation needs and alternatives of a corridor or subarea, undertaken once the need for a major transportation investment has been identified.
<b>MPO</b>	Metropolitan Planning Organization
<b>NEPA</b>	National Environmental Protection Act
<b>NHS</b>	National Highway System A system consisting primarily of existing interstate routes and major arterial routes including most of the SRAs in northeastern Illinois; its creation was called for by ISTEA.
<b>NIPC</b>	Northeastern Illinois Planning Commission A regional agency responsible for land use planning and employment and population forecasting for northeastern Illinois.
<b>OGL</b>	Operation GreenLight A multi-agency program designed to address traffic congestion and mobility issues in northeastern Illinois.
<b>RTA</b>	Regional Transportation Authority The oversight agency for CTA, Pace and Metra systems.
<b>RTP</b>	Regional Transportation Plan The long-range transportation plan for the region typically covering a 15 to 25 year planning horizon.
<b>SCAT</b>	Signal Coordination and Timing Program IDOT's traffic management program involving the implementation of advanced signal control systems along selected arterial segments throughout northeastern Illinois. These control systems utilize signal interconnects with closed-loop detectors to optimize signal timing.
<b>SEDP</b>	Strategic Early Deployment Plan A strategy-specific study that examines the potential of non-capacity enhancing ITS strategies whose goal is to meet the user services needs and optimize the benefits of ITS technologies for their users.
<b>SRA</b>	Strategic Regional Arterial(s)

A system of arterial roads designated in the 2010 RTP to supplement the expressway system in accommodating long distance, high volume, regional travel.

- TCM**      Transportation Control Measure  
A collection of strategies with the primary goal of improving air quality; examples include land use management strategies, parking controls, and campaigns to increase non-motorized modes of transportation; they are used to manage existing congestion and prevent it in the future.
- TDM**      Transportation Demand Management  
Category of strategies to relieve congestion by affecting travel demand by reducing the need for travel, increasing vehicle occupancy, and shifting trip timing; examples include rideshare programs, guaranteed ride home programs, parking management, and alternative work arrangement programs.
- TDR**      Travel Demand Reduction Program  
Program developed by CATS and IDOT under which the Transportation Management Division of CATS performs reviews and site-screenings of add-lanes projects to identify opportunities for TDR strategy applications in project corridors; TDR strategies seek to reduce the number of automobile trips from a roadway in order to extend design life and enhance the effectiveness and efficiency of roadway improvements; examples include rideshare information signing, expansion of bus and rail transit service and facilities, and long-run monitoring and evaluation of commuter rail systems.
- TIP**      Transportation Improvement Program  
The five year program listing transportation projects to be implemented which consists of the Annual Element (AE) for the current year and separately designated subsequent years.
- TMA**      Transportation Management Area  
Any urbanized area with a population of at least 200,000.
- USDOT**    United States Department of Transportation
- UWP**      Unified Work Program  
Annual program explaining how a region utilizes federal transportation planning funds.
- V/C**      Volume to Capacity Ratio  
Performance measure used by the CMS as an initial measure of congestion.

## **EXECUTIVE SUMMARY**

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 introduced the concept of establishing a variety of monitoring and management systems to guide the optimization of the transportation infrastructure. The regulations governing the management systems state that the Congestion Management System (CMS) shall be part of the metropolitan planning process in all transportation management areas (TMAs). A TMA is defined as any urbanized area over 200,000 in population. ISTEA's planning regulations also require that any federally-supported project that significantly increases the capacity for single-occupant vehicles in air quality nonattainment TMAs must be derived from a CMS. Northeastern Illinois is currently designated as a non-attainment area for ozone.

The CMS is defined as “a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs (23 CFR 500.109).” To meet this objective, the CMS is to include processes or methods to monitor and evaluate performance, identify alternative actions, assess and implement cost-effective actions, and evaluate the effectiveness of implemented actions. The purpose of this report is to identify those activities, tools, and processes that constitute the CMS for northeastern Illinois.

To guide development of the CMS, the CMS Task Force, at its meeting on January 18, 1995, approved the following goals and objectives:

- Lessen congestion on the region's transportation network through multimodal solutions with priority given to alternatives to adding traffic lanes.
- Improve the traveling public's mobility and accessibility to goods and services through multimodal choices, especially for the elderly, disabled and economically disadvantaged.
- Improve the movement of goods on multiple modes and access to origins and destinations through consideration of multimodal solutions.

## **CMS STRUCTURE**

For northeastern Illinois, an emphasis has been placed on viewing congestion management as a process involving a number of connected activities, rather than as an isolated system. Furthermore, it was

recognized that there are a significant number of existing programs and activities within the region that fall under the congestion management umbrella. These programs and activities serve as a solid foundation for the region's CMS. As such, the northeastern Illinois CMS is a combination of existing and new activities.

The congestion management process is structured to include four primary components: system monitoring, strategy consideration, project selection, and effectiveness evaluation. A general description of each of these components is provided below.

## **SYSTEM MONITORING**

The CMS must have in place a process to obtain data that will be used to monitor the performance of the transportation system. System monitoring provides the information needed to identify existing and potential problems, identify potential solutions, and evaluate the effectiveness of those solutions. A CMS monitoring system must be multimodal in nature, due to the infeasibility of relying on a single mode of transportation in mitigating the impacts of congestion.

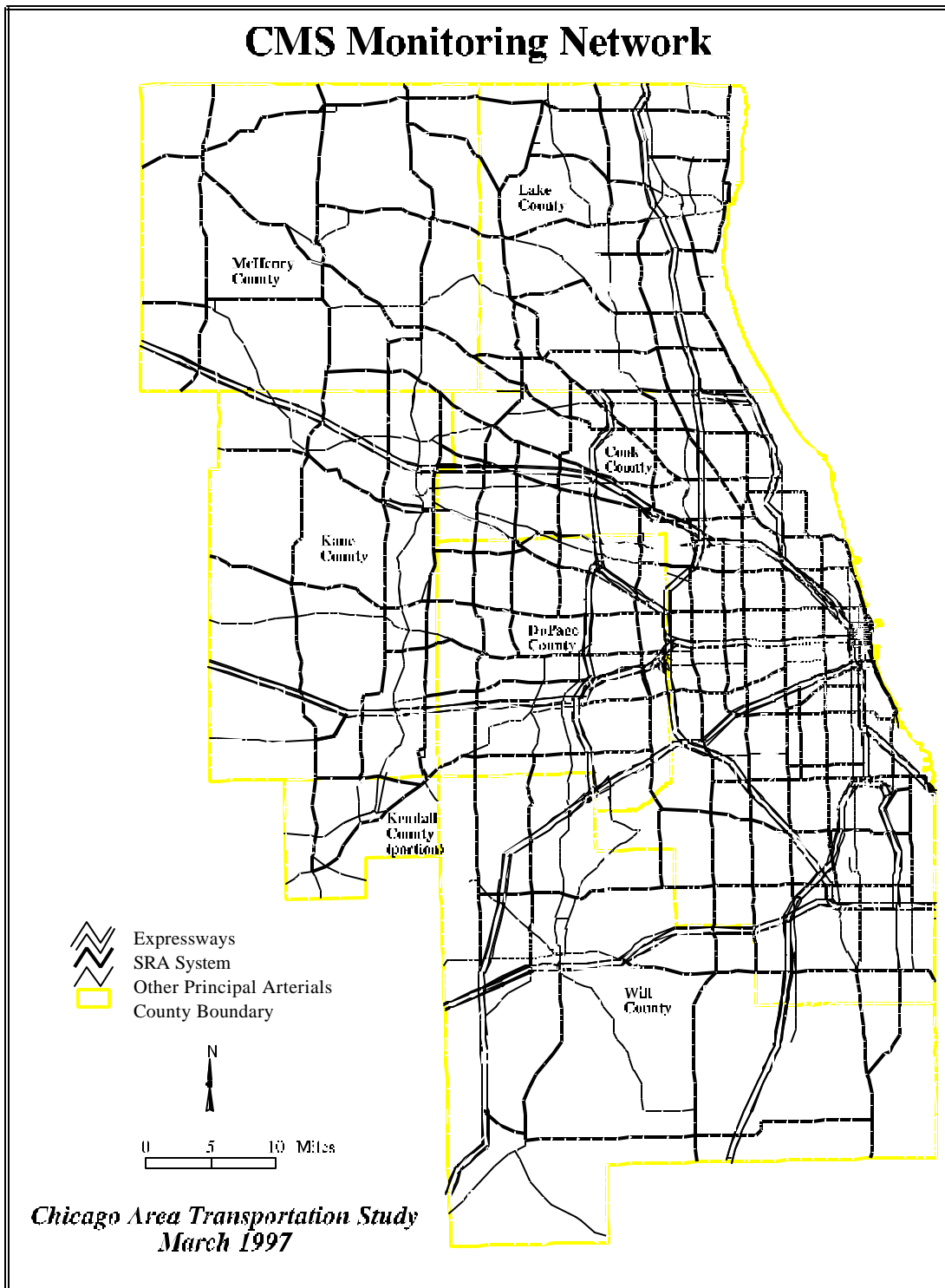
### **CMS Monitoring Program**

To fully meet the monitoring needs and requirements related to the CMS, a CMS Monitoring Program has been established. This monitoring program includes the definition of a monitoring network, the establishment of performance measures, the identification of data sources, the development of a data management process, and the definition of a reporting procedure. The northeastern Illinois CMS Monitoring Program integrates several existing, on-going activities into a regional, systematic performance assessment function. Key elements of the CMS Monitoring Program are described below.

#### ***Monitoring Network***

The northeastern Illinois CMS Monitoring Network is displayed in Map E-1. The monitoring network covers all expressways, tollways and highways with a functional classification of arterial or higher located in the Chicago metropolitan planning area. This monitoring network was formally adopted at the March 31, 1997 meeting of the CMS Task Force. The definition of a CMS Monitoring Network does not preclude other roads from being included in the CMS at a future date.

Map E-1



### ***Performance Measures***

The CMS Task Force has identified a set of performance measures that will be used to assess the condition of the monitoring network. Measures were selected based upon: the availability of data from existing sources, the applicability of those measures in quantifying system performance, the ability of the performance measure to help forecast future system deficiencies and the feasibility of measuring system performance for the Regional Transportation Plan (RTP). While a number of different performance measures were selected, not all of them will be applicable to each type of facility. Also, availability of data for some of the measures is limited at the current time, thus some will be phased in at a future time as the data becomes available. The performance measures selected for northeastern Illinois are as follows:

- Travel Time and Travel Speed
- Volume-to-Capacity Ratio
- Traffic Density
- Intersection Level of Service
- Duration of Time Delay at Congested Conditions
- Percentage Truck Traffic
- Percentage of Households and Employment within “X” miles of a Bus Route
- Percentage of Households and Employment within “X” miles of a Rail Station
- Percentage of Households and Employment within “X” miles of an Expressway Interchange
- Transit System Measures
- Modal Shares
- Person Throughput
- Vehicle Occupancy
- Incident Measures

In addition to these analytical measures, the CMS will incorporate an assessment of system performance based on perceived sites of congestion.

### ***Data Sources***

The CMS will integrate a number of data collection and monitoring activities currently in place into a seamless system for monitoring the performance of the transportation system. Different levels of monitoring will apply to the various highway classifications in the CMS Monitoring Network. Current northeastern Illinois data collection efforts that will be integrated into the CMS Monitoring Program include:

- CATS travel time runs;
- IDOT expressway surveillance;

- CATS simulation models;
- Strategic Regional Arterial (SRA) activities;
- Information from other committees;
- Transit agency monitoring programs; and
- IDOT's Illinois Roadway Information System (IRIS).

In addition to the monitoring activities currently in use in northeastern Illinois, the CMS will attempt to integrate additional existing data sources into the process. Some examples of this follow:

- IDOT's Signal Coordination and Timing (SCAT) Program;
- Intelligent Transportation Systems (ITS); and
- Council of Mayors Perception Surveys.

### ***Data Management***

Implementation of the CMS will create new data management issues and opportunities. While CATS will have the lead role in conducting the CMS Monitoring Program, much of the data needed for the program will come from other agencies. For this reason, procedures for the sharing or transfer of relevant data must be established. For the most part, these procedures are in place for existing data sources. However, new avenues of data-sharing may also be necessary as new forms of data collection are introduced. Data will be managed using CATS' geographic information system (GIS). The GIS will also be used for analysis and presentation purposes.

### ***Reporting Procedure***

The product of the CMS Monitoring Program will be a periodic report describing the performance of the transportation system using the performance measures identified earlier. The report will also include an analysis of key performance trends, changes in performance brought about by the implementation of major projects, and system deficiencies. This report will be provided to implementors and decision-makers for use in problem identification and project development. Project, corridor, and subarea reports may also be generated, as needed.

## **STRATEGY CONSIDERATION**

A key intent of the CMS is the consideration of alternative strategies for relieving congestion and enhancing mobility. For northeastern Illinois, which is a nonattainment TMA, the related requirements may be summarized as follows:

- that serious consideration be given to traditional and nontraditional strategies that provide the most efficient and effective use of existing and future transportation systems;
- that all reasonable alternatives be appropriately analyzed before a project that involves adding general purpose lanes to an existing highway or constructing a new highway can be advanced for federal funding;
- that consideration be given to strategies that reduce single-occupant-vehicle travel and improve existing transportation system efficiency; and
- that where the addition of general purpose lanes is deemed most appropriate, the project must incorporate all reasonable and appropriate operational and demand management elements to ensure that the facility may be effectively managed in the future.

In addition, other travel demand reduction and operational management strategies appropriate for the corridor, but not appropriate for incorporation in the facility itself, shall also be identified through the CMS.

Several steps are currently being taken to promote consideration and implementation of alternative strategies. For example, CATS has established a number of committees, task forces and working groups to address a variety of regionally-significant transportation issues and challenges. The general purpose of these committees is to help establish policy and make general recommendations related to specific strategies or issues. Other examples include the Operation GreenLight (OGL) program, the SRA program, and the SCAT program. The current RTP, the *2010 Transportation System Development Plan*, also reflects the importance that the region places on alternative strategies. Among other things, the 2010 Plan encourages demand and system management techniques.

To enhance the region's consideration of alternative strategies in response to the ISTEA and CMS regulations, a number of new activities have been or will be implemented. These include activities whose primary function is to provide guidance in this step of the planning process to those who conduct studies and develop project proposals. Each of these activities is described below.

### **Interim Congestion Management System**

The interim CMS for northeastern Illinois was approved by CATS' Policy Committee in October 1993. The interim CMS included a description of the existing planning and programming processes, and their role in meeting the interim requirements. The interim CMS also contained a discussion of regional transportation management strategies. Finally, the interim CMS included a commitment to the review and



documentation of the viability of all reasonable regional and subregional/corridor alternatives to add-lanes projects.

### **Travel Demand Reduction (TDR) Report Program**

As part of the interim CMS, CATS and IDOT developed a procedure for identifying and evaluating TDR strategies for application with roadway add-lanes projects. This procedure has been formalized as the TDR Report Program. Under this program, the Transportation Management Division of CATS performs reviews and site-screenings of add-lanes projects to identify opportunities for TDR strategy applications in project corridors. The resulting TDR reports are incorporated into the CMS or environmental assessment documents for the project. CATS currently analyzes the TDR potential for selected IDOT add-lanes projects, and does so for local add-lanes projects on request.

### **CMS Alternatives Review Guidelines**

The CMS Alternatives Review Guidelines, published in May 1995, provide background on the requirements related to the consideration of alternatives, and outline a suggested process for conducting a CMS alternatives review. In support of this process, the guidelines identified nine alternative strategies that were considered to be “reasonable.” The guidelines indicated that other alternatives may also be considered. The guidelines did not define a specific approach or methodology for the evaluation of alternatives, nor did they include a reporting requirement.

### **Congestion Mitigation Handbook**

To further promote the identification, assessment and implementation of alternatives, CATS, through the CMS Task Force, has developed a Congestion Mitigation Handbook. This handbook is intended to be a resource or reference guide used by project planners. It is intended to provide guidelines on identifying and analyzing strategies, and conducting post-implementation evaluations. The handbook includes an overview of alternative strategies, detailed descriptions of individual strategies, a description of the TDR Report Program, and a discussion of approaches for evaluating strategies after they are implemented.

### **Corridor/Subarea Screening Studies**

To assist project planners, CATS, through the CMS Task Force, will conduct preliminary corridor or subarea screening studies. The purpose of these studies will be limited to identifying those strategies

that appear most reasonable for the particular location. Project planners may use these results to define the strategies to be examined in more detail as part of subsequent studies. Corridors or subareas will be selected by the CMS Task Force based upon a combination of performance monitoring results, knowledge of other studies, and coordination with affected jurisdictions and agencies. The selected locations will be prioritized and matched to available resources.

## **PROJECT SELECTION**

The project selection or programming process leads to the development of the region's Transportation Improvement Program (TIP) and builds upon numerous activities including long range transportation planning, ITS deployment planning, project generation, and program integration, review and approval. Development of the TIP is a cooperative metropolitan process, directed by CATS' Policy Committee and involving federal, state and local officials; transportation providers; citizens; and planning organizations in the region.

To ensure that congestion management strategies are appropriately considered, congestion relief should be a factor within the project selection process. Furthermore, an implementation schedule must be developed, implementation responsibilities must be defined, and potential funding sources must be identified for each proposed strategy. The current programming process for northeastern Illinois, in large part, already incorporates these elements.

The TIP process coordinates and programs the implementation of plans and projects. Potential projects are identified through various long range transportation planning efforts, such as the RTP. From these planning efforts, specific project proposals are initiated by local governments, public transportation operators, and the state of Illinois. It is in this stage that implementation plans meeting the CMS requirements are developed. These project proposals are then put forward for programming consideration at the subregional, regional and/or state level. In each case, the process of ranking or prioritizing proposals involves consideration of many factors, including that of congestion relief. The resulting programs are submitted to CATS for consideration in the TIP.

It is not the intent of the CMS to replace the existing process, but rather to organize and supplement information necessary to develop strategies for alleviating congested conditions. The CMS is to be a tool which integrates and enhances existing activities by instituting a systematic approach to the

development and analysis of information useful to establishing the region's five year improvement program, thus assuring that congestion management strategies continue to be considered in a reasonable manner.

## **EFFECTIVENESS EVALUATION**

The Federal regulations on congestion management systems call for a "process for periodic assessment of the efficiency and effectiveness of implemented strategies in terms of the area's established performance measures." Evaluating the effectiveness of strategies after they have been implemented is important so that it can be determined if the strategies have had their expected impacts. This evaluation can be used to modify how similar strategies are implemented in the future, to improve the estimation of impacts as part of subsequent studies, and to provide guidance to decision-makers on the selection of effective strategies for future implementation.

Generally, transportation agencies in the region do relatively little effectiveness evaluation. To enhance the region's capability to assess the effectiveness of implemented strategies, a number of new activities have been or will be implemented. Each of these activities is briefly described below.

### **CMS Monitoring Program**

The primary effectiveness evaluation element of the northeastern Illinois CMS will be the CMS Monitoring Program. The monitoring program will provide regularly updated performance information. This information will assist in determining whether significant transportation improvement projects or strategies have resulted in a change in congestion. As appropriate, the monitoring system will be modified or enhanced to accommodate additional evaluation capabilities.

### **SRA Monitoring Program**

As part of the continuing implementation of the SRA system, a monitoring program is being designed. This program is intended to sample portions of the SRA system annually and will focus on measuring three specific items: 1) system throughput, 2) congestion and effectiveness of movement, and 3) safety. The details of this program are still being developed.

### **Evaluation Study Guidelines**

The CMS Task Force has developed guidelines to assist project planners in defining when and

how to conduct effectiveness evaluations. These guidelines include criteria for identifying when additional effectiveness evaluation beyond that provided by the monitoring program is warranted. The criteria include current knowledge of benefits, expected frequency of future implementation, importance of knowing the benefits, and cost of evaluation. An annual determination will be made of which regionally-significant transportation improvements, if any, should be evaluated beyond the monitoring program. The guidelines also include a discussion of the tools, measures, and methods that may be used to empirically measure the impacts of implemented strategies.

### **CMS Evaluation Studies**

CATS and the CMS Task Force will take an active role in conducting effectiveness evaluations and in encouraging individual project sponsors to do so. The task force will make an annual determination of which regionally-significant improvements warrant evaluation beyond that provided by the monitoring program. Working with the project sponsor, the CMS Task Force and CATS will encourage the sponsor to conduct a study or will take a lead role in doing so.

### **Effectiveness Evaluation Library**

An inventory of evaluation information from federal, state, and local agencies regarding the benefits of various types of strategies will be maintained by CATS. This inventory will be made accessible to those considering implementing various strategies. The library will serve as a regional clearinghouse of evaluation information. This information could be used to support the planning and decision-making process.

## **RELATIONSHIP TO THE PLANNING PROCESS**

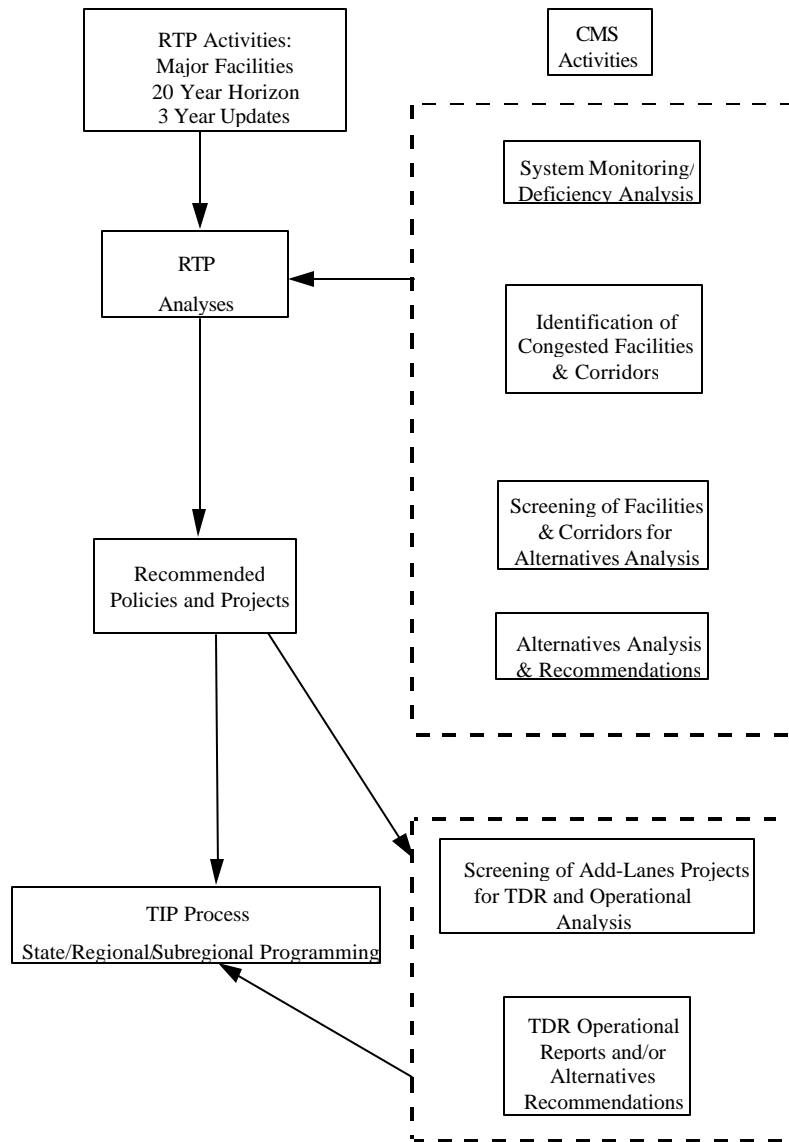
Several of the activities identified as components of the CMS are currently being accomplished as part of the continuous, comprehensive and cooperative transportation planning process. It is intended that the CMS enhance these activities by instituting a systematic approach to the development and analysis of information useful for both the RTP and TIP.

As shown Figure E-1, CMS activities focus primarily on the relationship with the RTP and the TIP. Clearly, efforts such as data collection and deficiency analyses have always been conducted in support of the development of long range transportation plans. One function of the CMS is to incorporate these functions and expand them into a systematic identification, screening and analysis of congested

facilities

will

**FIGURE E-1  
RELATIONSHIP OF CMS TO THE RTP AND TIP**



be used in two primary areas: first as information to feed into the RTP update which is conducted on a three year cycle; and, second as additional information to be used by various programmers responsible for developing the annual TIP.

Another function of the CMS is to examine those projects that entail the addition of general purpose lanes in terms of how TDR activities could enhance and extend the useful life of the proposed

project. Information from these analyses is provided to the programmers of the add-lanes project for consideration. This activity of the CMS has been an integral part of the interim CMS currently in use in northeastern Illinois.

## **ROLES AND RESPONSIBILITIES**

The on-going functioning of the CMS will require the support of all agencies in the region. It will require that individual agencies fulfill, either directly or indirectly, a number of specific roles and responsibilities. CATS will have primary responsibility for the northeastern Illinois CMS, however IDOT, local agencies (both municipal and county), and the region's transit agencies (RTA, CTA, Metra and Pace) will also play important roles. Public participation is also necessary as part of the transportation planning process including the CMS.

The functions or tasks that support the CMS, and the roles for these agencies are summarized in Table E-1. The roles for various agencies are defined as being either directly or indirectly related to the CMS. A direct role is one that is derived specifically from the functioning of the CMS. An indirect role is one where the task is currently performed, but is now guided by or used to support other CMS activities.

**Table E-1  
ROLES AND RESPONSIBILITIES MATRIX**

Task/Function	CATS	IDOT	Local City & County Agencies	Transit Agencies	ISTHA/Chicago Skyway
<b>MONITORING</b>					
Collect Data	X	y	y	y	y
Submit Data		X	X	X	X
Compile Data	X	y	y	y	y
Prepare Performance Assessment	X	y	y	y	y
Identify Deficiencies and Establish Need for Further Study	X	y	y	y	y
Review and Update CMS Network	X				
Review and Update CMS Performance Measures	X				
<b>STRATEGY SCREENING AND EVALUATION</b>					
Distribute and Update Congestion Mitigation Handbook	X				
Conduct CMS Corridor/Subarea Screening Studies	X				
Conduct Alternatives Analysis	y	y	y	y	y
Prepare TDR Reports	X	y	y	X	
<b>PROJECT SELECTION AND IMPLEMENTATION</b>					
Set Project Priorities	y	y	y	y	y
Implement Projects	y	y	y	y	y
<b>POST-IMPLEMENTATION</b>					
Maintain Library of Effectiveness Evaluation Results	X				
Distribute and Update Study Guidelines as part of the Congestion Mitigation Handbook	X				
Conduct Effectiveness Evaluation Studies	X	y	y	y	y

Key: X Role performed directly as part of the CMS  
y Role or task currently performed that is related to the CMS

## 1. INTRODUCTION

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 introduced the concept of establishing a variety of management systems to guide the optimization of the transportation infrastructure. ISTEA identified six such management systems: congestion, intermodal, public transportation, safety, bridge, and pavement. The purpose of this technical supplement is to detail those activities, tools, and processes that constitute the Congestion Management System (CMS) for northeastern Illinois. This document is intended as a reference guide for those desiring a detailed explanation of the CMS and its components. Other CMS documents include the *Congestion Management System for Northeastern Illinois* and the *Congestion Mitigation Handbook*.

The CMS is defined as "a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs (23 CFR 500.109)." To meet this objective, the CMS should include processes or methods to monitor and evaluate performance of the multimodal transportation system, identify the causes of congestion, identify and evaluate alternative actions, assess and implement cost-effective actions, and evaluate the efficiency and effectiveness of implemented actions. The regulations governing the management systems state that the CMS shall be part of the metropolitan planning process in all transportation management areas (TMAs). A TMA is defined as any urbanized area over 200,000 in population.

The Chicago Area Transportation Study (CATS), as the Metropolitan Planning Organization (MPO) for northeastern Illinois, was identified as the lead agency in developing a CMS for the region. To meet the requirements and to ensure that the resulting tool added value to the region's transportation planning process, CATS established a task force to oversee development of the CMS. The task force served as the forum for obtaining the necessary input from other local, regional and state agencies. Members of the CMS Task Force include representatives from the Illinois Department of Transportation (IDOT), Illinois State Toll Highway Authority (ISTHA), Chicago Department of Transportation (CDOT), Counties, Regional Transportation Authority (RTA), Chicago Transit Authority (CTA), Pace, Metra, Northeastern Illinois Planning Commission (NIPC), Council of Mayors, Federal Highway Administration (FHWA), Federal Transit Administration (FTA), Illinois Environmental Protection Agency (IEPA), environmental and public interest groups, and private carriers and business groups.



Support for this effort was provided by IDOT through its Illinois Congestion Management System Project. This project provided technical support to CATS, as well as the other MPOs in Illinois.

In developing the CMS, it was recognized that there are a significant number of existing programs and activities within northeastern Illinois that fall under the congestion management umbrella. These programs and activities serve as a solid foundation for the region's CMS. As such, the CMS, as defined in this technical supplement, is a combination or packaging of existing and new activities.

The second chapter of this technical supplement summarizes the key legislation related to and requirements of the CMS. Chapter 3 provides an overview of the northeastern Illinois CMS, including its structure and relationship to the overall transportation planning process. Descriptions of the four CMS components are provided in Chapters 4 through 7. The system monitoring component is discussed in Chapter 4, the strategy consideration component is discussed in Chapter 5, project selection and implementation is discussed in Chapter 6, and effectiveness evaluation is discussed in Chapter 7. The relationship between the CMS and the transportation planning process is described in Chapter 8. Roles and responsibilities related to the on-going implementation of the CMS are summarized in Chapter 9.

## **2. CMS REGULATIONS**

### **2.1 LEGISLATIVE BACKGROUND**

The concept of transportation-related management systems, including the CMS, was introduced in ISTEA. The requirements for the CMS were further stipulated in several subsequent legislative statements from the U.S. Department of Transportation (USDOT). Each piece of legislation that is relevant to the CMS is briefly described in this section.

#### **2.1.1 ISTEA**

ISTEA was signed into law on December 18, 1991. It identified federal transportation programs and reauthorized spending on these programs through fiscal year 1997. ISTEA contained a mixture of new and continuing programs and represented a shift in federal transportation policy. As part of this shift, state and local governments were given a stronger role in determining how transportation funds are spent.

The shifting of many of the transportation decision-making responsibilities was accompanied by new planning responsibilities for state, regional and local agencies. For example, ISTEA required that states institute a statewide planning process, develop a statewide transportation plan, and prepare a statewide transportation improvement program. Another requirement within ISTEA was that all states develop, establish, and implement six transportation management systems, including the CMS.

ISTEA's metropolitan planning regulations required that each MPO prepare a regional transportation plan (RTP) and a transportation improvement program (TIP). Furthermore, ISTEA designated any urban area with a population of at least 200,000 as a TMA. The regulations require that the transportation planning process in both attainment and nonattainment TMAs include a CMS. ISTEA's planning regulations also require that any federally-supported project that significantly increases the capacity for single-occupant vehicles in nonattainment TMAs must be derived from a CMS. Such a project may include adding general purpose lanes to an existing highway or constructing a new highway. This requirement is relevant to northeastern Illinois because it is currently designated as a nonattainment area for ozone.

### **2.1.2 Interim Final Rule**

While ISTEA specifically mandated the need for the management systems, guidelines regarding their structure and content were not developed as part of the legislation. To remedy this situation, the USDOT issued the Interim Final Rule (IFR) on Management and Monitoring Systems in December 1993. The IFR has served as the principal set of guidelines for implementing the requirements of the management systems, including specific guidelines on the components of the CMS. Also, the IFR included the original deadlines for each required stage of CMS development. The IFR stated that the CMS was required to be completed in nonattainment TMAs by October 1995 and by October 1996 in all other areas. Details regarding the IFR requirements for the CMS are presented in Section 2.2.

### **2.1.3 Memorandum Update**

In a memorandum dated July 20, 1995, the FHWA and FTA issued further guidance on the continued development of the management systems. With respect to the CMS, the memorandum indicated that continued development could be limited to TMAs. The memo also indicated that the deadline for the CMS to be fully operational had been extended to October 1997 for all TMAs.

### **2.1.4 National Highway System Bill**

As part of the National Highway System Designation Act of 1995 (NHS Bill) signed into law in December 1995, the implementation of the management systems by the states became voluntary. However, as noted in a memorandum from USDOT dated March 7, 1996, “the legislation does not affect the requirement in 23 U.S.C. 134 (i) (3) that the metropolitan planning process in all transportation management areas (TMAs) include a congestion management system (CMS).” Furthermore, the memorandum states: “the legislation also does not affect the requirement in 23 U.S.C. 134 (1) that federal funds may not be programmed in a carbon monoxide and/or ozone nonattainment TMA for any highway project that will result in a significant increase in single-occupant vehicle capacity unless the project is based on an approved CMS.” The NHS Bill formalized the October 1997 deadline for implementation of the CMS in nonattainment TMAs.

### **2.1.5 Final Rule**

The Final Rule for Management and Monitoring Systems was published by FHWA and FTA in December 1996. The final rule contained revisions to the IFR to reflect the requirement changes contained in the NHS Bill. The rule removed the management system certification and sanction requirements and

made the systems optional for states. The rule reiterated the position that the NHS Bill did not affect the CMS requirements for TMAs.

## **2.2 CMS REQUIREMENTS**

The CMS is intended to be a continuous and systematic activity that provides the information needed to support transportation investment decisions. The CMS-related requirements, as stated in the final rule, are that :

- a) the metropolitan transportation planning process in TMAs shall include a CMS (23 CFR 500.105[a]).
- b) consideration be given to strategies that reduce single-occupant vehicle travel and improve existing transportation system efficiency. Where the addition of general purpose lanes is determined to be an appropriate strategy, explicit consideration shall be given to the incorporation of appropriate features into the project to facilitate future demand management and operational improvement strategies to maintain the functional integrity of those lanes (23 CFR 500.109[a]).
- c) the CMS shall be developed, established and implemented as part of the metropolitan planning process in accordance with 23 CFR 450.320(c) (23 CFR 500.109[b]).
- d) in a TMA designated as a nonattainment for carbon monoxide and/or ozone, the CMS shall provide an appropriate analysis of all reasonable (including multimodal) travel demand reduction and operational management strategies for the corridor in which a project that will result in a significant increase in capacity for single-occupant vehicles is proposed. If the analysis demonstrates that travel demand reduction and operational management strategies cannot fully satisfy the need for additional capacity in the corridor and additional general purpose capacity is required, then the CMS shall identify all reasonable strategies to manage the roadway facility effectively (or to facilitate its management in the future). Other travel demand reduction and operational management strategies appropriate for the corridor, but not appropriate for incorporation into the roadway facility itself shall also be identified through the CMS. All identified reasonable travel demand reduction and operational management strategies shall be incorporated into the proposed project or committed to by the state and MPO for implementation (23 CFR 500.109[c]).
- e) compliance with the requirement that the metropolitan planning process in all TMAs include a CMS will be addressed during the metropolitan planning process certification reviews (23 CFR 500.109[d]).

In addition to presenting these requirements, the final rule defined a potential structure for the CMS. The final rule describes the components of a CMS as follows:

1. **Monitoring Methods** - Methods to monitor and evaluate the performance of the multimodal transportation system shall be established. These methods must allow for

identification of the causes of congestion, identification and evaluation of alternative actions, provision of information supporting the implementation of actions, and evaluation of implemented actions.

2. ***Performance Measures*** - Parameters shall be defined that will provide a measure of the extent of congestion and permit the evaluation of the effectiveness of congestion reduction and mobility enhancement strategies for the movement of people and goods. Since acceptable system performance may vary among local communities, performance measures and thresholds should be tailored to the specific needs of the affected area and established cooperatively by state, MPO and local officials in consultation with the operators of major modes of transportation.
3. ***Data Collection and System Performance Monitoring*** - A program of data collection and system performance monitoring shall be established to determine and monitor the duration, magnitude and causes of congestion and to evaluate the effectiveness of implemented actions. To the extent possible, existing data sources should be used, as well as the real-time monitoring capabilities available through Intelligent Transportation Systems (ITS) technologies.
4. ***Identification and Evaluation of Proposed Strategies*** - The CMS must include the capability to evaluate the anticipated performance and expected benefits of traditional and nontraditional congestion management strategies. The types of strategies to be considered include:
  - transportation demand management (TDM) measures
  - traffic operational improvements
  - measures to encourage high occupancy vehicle (HOV) use
  - public transit capital improvements
  - public transit operational improvements
  - measures to encourage the use of non-motorized modes
  - congestion pricing
  - growth management
  - access management
  - incident management
  - ITS
  - addition of general purpose lanes.
5. ***Implementation of Strategies*** - For each strategy (or combination of strategies) proposed for implementation, an implementation schedule, implementation responsibilities and possible funding sources shall be identified.
6. ***Evaluation of Implemented Strategies*** - A process for periodically evaluating the efficiency and effectiveness of implemented strategies shall be included in the CMS. The results of this evaluation shall be provided to decision makers to provide guidance on selection of effective strategies for future implementation.

While the final rule describes the general requirements for the CMS, it does not stipulate a singular approach to developing and implementing a system. This combination of guidance and flexibility is evident in many ways. For example, the rule requires that performance measures be established, but does not specify what these measures should be. This flexibility allows agencies to tailor the CMS to meet their own needs. In short, the final rule outlines the desired results and minimum requirements of the CMS, but provides flexibility in how these requirements are met.

The CMS should not be viewed as an isolated system that must be constructed from the ground up. The primary purpose is to develop tools that may be used in the regional planning and decision-making processes. The regulations recognize that most planning agencies have processes and procedures that parallel the basic requirements for the CMS. Thus, the intended effect of the regulations is to strengthen these processes and procedures by emphasizing the collection and analysis of data to support better informed transportation investment decision-making. A final principle for the CMS is for it to emphasize the implementation of selected strategies through cooperative, coordinated, and concerted action in developing a strong implementation plan.

The CMS described in this report is designed as a tool to be used within the overall decision-making process, not as a replacement for this process. It is intended to provide the tools and organizational structure for a systematic assessment of the transportation system's operating conditions and deficiencies. The CMS will also emphasize strategies to address deficiencies, with a particular focus on evaluating and implementing multimodal solutions. In this way, it will help to focus efforts while allowing flexibility in the project selection process.

### 3. CMS OVERVIEW

#### 3.1 CMS GOALS AND OBJECTIVES

To guide development of the CMS, the CMS Task Force, at its meeting on January 18, 1995, approved the following goals and objectives:

- Lessen congestion on the region's transportation network through multimodal solutions with priority given to alternatives to adding traffic lanes.
- Improve the traveling public's mobility and accessibility to goods and services through multimodal choices, especially for the elderly, disabled and economically disadvantaged.
- Improve the movement of goods on multiple modes and access to origins and destinations through consideration of multimodal solutions.

To support these goals and objectives, the following definitions were established:

- A) *Congestion*. The level at which transportation system performance is no longer acceptable due to traffic interference. The definition may vary by type of transportation facility, geographic location, or time of day. (IFR 500.503). The CMS Task Force approved use of this definition at its meeting on January 18, 1995.
- B) *Mobility and Accessibility*. People and goods are mobile if they can travel/be moved with ease to their destination via a variety of choices. Mobility and accessibility are complementary terms that attempt to measure an individual's or commodity's ability to access a particular transportation system and once access to the system has been gained, to also efficiently arrive at the desired destination. A definition of accessibility supported by the FHWA states that accessibility is a quality of a destination in that the destination may be reached by people and goods within acceptable time, cost, safety and comfort limits. At its March 23, 1995 meeting, the CMS Task Force agreed to adopt a functional definition of mobility/accessibility:
1. can you get to the system - any system, or a particular system, such as the transit system;
  2. will the system get you where you want to go; and
  3. is the cost (time, money, safety and comfort) of travel reasonable.

#### 3.2 CMS COMPONENTS

For the Chicago region, an emphasis is placed on viewing congestion management as a process involving a number of connected activities, rather than as an isolated system. This congestion management

process is structured to include the following four primary components: system monitoring, strategy consideration, project selection, and effectiveness evaluation. Secondary components within system monitoring are data collection and interpretation/reporting. Strategy consideration is subdivided into identification and screening, and analysis. This structure varies slightly from that presented in the regulations, but incorporates the same concepts. A general description of each of these components is provided in the following sections.

### **3.2.1 System Monitoring**

The first key component of congestion management is the monitoring of transportation system performance, referred to here as system monitoring. System monitoring consists of two primary elements: the collection and management of data, and the interpretation and reporting of performance results. These elements are interrelated because the data to be collected is in part defined by the reporting needs, and the performance measures used to interpret operating conditions are selected in part based on the data that are available. System monitoring provides the information needed to identify existing and potential problems, identify potential solutions, and evaluate the effectiveness of these solutions.

Although the natural emphasis is on monitoring congestion, it is important to recognize that there are many other types of information that are valuable in understanding the performance of the region's transportation system. These may include information on land use and development patterns and on the use of alternative modes.

#### **3.2.1.1 Data Collection and Management**

To effectively monitor system performance, data describing the supply and demand of the transportation system and its operation should be collected. Supply-related data include the number of lanes on a roadway, traffic control characteristics, and the location and amount of transit service. Examples of transportation demand data include traffic volumes, travel time, speed, and transit ridership. Some demand data (e.g., travel time, speed) may be used to directly assess system operation, while others are inputs into the calculations of performance measures. Land use data is also valuable in examining the demand for transportation.

The specific data needs are determined by the measures that are used to indicate system performance. In turn, a key consideration in selecting performance measures is the availability of necessary data. To minimize the burden created by the CMS process, an emphasis has been placed on selecting



measures that use data from existing sources or, at a minimum, require limited new data collection.

There are a large number of existing data sources that may be used as part of a congestion management monitoring program. These sources may include established programs whose purpose is the collection of specific data, as well as fixed surveillance systems that automatically record a variety of transportation data. Other valuable sources include the transportation-related databases maintained by various agencies within the region. These databases often contain a variety of data, and rely upon a combination of new data collection and the compilation of data from other programs or systems. Because system monitoring is intended to be a regional and on-going activity, it is important to emphasize those sources that cover facilities and services throughout the region and provide regularly updated information. However, data from local sources or individual studies may also be valuable.

### ***3.2.1.2 Interpretation and Reporting***

The second element of system monitoring is the interpretation and reporting of the performance information. This element requires the definition of performance measures, the calculation of the measures using existing data or forecasts, and the preparation of products that document and interpret the results.

Defining and selecting performance measures is a very important piece of the congestion management process. The performance measures impact the scope of data that need to be collected, the types of congestion issues that are identified, the types of strategies identified to solve problems, and the structure of evaluation procedures. There are many options for performance measures, including level-of-service on roadways and at intersections, average vehicle delay, average travel time, and percent mode shares. The selection of performance measures for a particular region should take into account the existing and future priorities for congestion monitoring and relief. In addition, more than one measure is likely to be needed to present a full picture of the transportation system.

The evaluation of system performance requires periodic analyses using available data and forecasts. Maintaining consistency in the types of data used and in the definition of the performance measures is important to be able to assess congestion issues over time. The step of reporting performance results consists primarily of compiling results into a format that may be easily presented and understood. Typical formats include maps or plots, tables, and descriptive summaries.

### **3.2.2 Strategy Consideration**

A required component of the CMS is one that encompasses the identification and evaluation of proposed strategies. With respect to the planning and design of these improvements, CMS regulations may be summarized as requiring the consideration of traditional and nontraditional strategies that will contribute to the more efficient use of existing and future transportation systems. In this regard, ISTEA mandates that consideration be given to strategies that reduce single-occupant-vehicle travel.

This component of the congestion management process has been broken into two elements. The first element, strategy identification and screening, refers to the initial consideration of alternative strategies. This element may also reflect the extent to which alternative strategies are being applied within a region, or whether a particular strategy is considered "reasonable" for the specific region. The second element, strategy analysis, focuses on the methods and procedures used to estimate the benefits and impacts of alternative solutions.

#### ***3.2.2.1 Identification and Screening***

A key intent of ISTEA and the CMS is the consideration of alternative strategies for relieving congestion and improving mobility. A sample listing of strategies, broken into twelve classes, is provided in Table 3-1. The legislation intended that "explicit consideration and appropriate analysis" of "reasonable travel demand reduction and operational management strategies" be included, but that an exhaustive study was not necessary. The key terms are "appropriate analysis" and "reasonable strategies"; the FHWA and FTA suggest that each MPO determine the most appropriate approach for their analysis. "Appropriate consideration" may mean that some strategies are not applicable in certain areas, subareas, or corridors.

The potential reasonable strategies that are evaluated in a particular situation will vary depending upon the specific characteristics of location and problem being addressed, as well as upon the general characteristics and policies of the region. It is important, however, that a range of strategies be identified that can solve the identified congestion and mobility problems. Sticking to a narrow set of potential solutions, or only considering those options that have already been determined to be desirable, is not consistent with the intent of implementing the CMS process. As part of this element, it is important to understand that in some instances alternatives can be examined on a project-by-project basis, while in other cases strategies may require consideration at a more regional level.

**Table 3-1  
POTENTIAL CMS STRATEGIES**

Strategy Class	Representative Strategies/Measures
Transportation Demand Management (TDM) Measures	<ul style="list-style-type: none"> <li>• Ridesharing (carpool/vanpool)</li> <li>• Alternative Work Arrangements (telecommuting, flex-time, compressed work week)</li> <li>• Transit and/or Shared Ride Subsidies</li> <li>• Parking Management</li> <li>• Guaranteed Ride Home Programs</li> </ul>
Traffic Operational Improvements	<ul style="list-style-type: none"> <li>• Traffic Signal Improvements (timing improvements, demand-responsive signals, coordinated systems, computerized systems)</li> <li>• Roadway Geometric Improvements (turn lanes, acceleration/deceleration lanes, channelization)</li> <li>• Time-of-Day Restrictions (turn restrictions, truck restrictions)</li> <li>• Ramp Metering</li> <li>• Commercial Vehicle Improvements</li> <li>• Construction Management</li> </ul>
High Occupancy Vehicle (HOV) Measures	<ul style="list-style-type: none"> <li>• HOV Lane Priority</li> <li>• HOV Signal Priority</li> <li>• HOV Access Priority (ramp by-pass)</li> <li>• Support Facilities and Services (park-and-ride facilities)</li> </ul>
Public Transit Capital Improvements	<ul style="list-style-type: none"> <li>• Exclusive Rights-of-Way (rail, busways, bus lanes)</li> <li>• Bus By-Pass Ramps</li> <li>• Fleet Expansion</li> <li>• Vehicle Replacement/Upgrades</li> <li>• Transit Vehicle Management Systems</li> <li>• Park-and-Ride Facilities</li> <li>• Mode Change Facilities (transit centers, transit rail stations)</li> </ul>
Public Transit Operational Improvements	<ul style="list-style-type: none"> <li>• Transit Service Improvements (frequency, stop frequency, vehicle type, operating hours)</li> <li>• Transit Routing Changes (modifications, expansion)</li> <li>• Transit Coordination/Marketing</li> <li>• Transit Information Systems</li> <li>• Fare Reductions or Packages</li> <li>• Traffic Operations (signal preemption, turnouts, rail crossing coordination)</li> </ul>
Non-Motorized Modes Measures	<ul style="list-style-type: none"> <li>• Infrastructure Improvements (bike lanes, paths, sidewalks)</li> <li>• Support Services (bike racks and lockers, bike route maps)</li> </ul>
Congestion Pricing	<ul style="list-style-type: none"> <li>• Road User Fees</li> <li>• Parking Fees</li> </ul>
Growth Management	<ul style="list-style-type: none"> <li>• Land Use Policies/Regulations</li> <li>• Design Standards</li> </ul>
Access Management	<ul style="list-style-type: none"> <li>• Driveway Control</li> <li>• Median Control</li> <li>• Frontage Roads</li> </ul>
Incident Management	<ul style="list-style-type: none"> <li>• Detection</li> <li>• Response</li> <li>• Clearance</li> <li>• Information/Routing</li> </ul>
Intelligent Transportation Systems (ITS)	<ul style="list-style-type: none"> <li>• Advanced Traffic Management Systems (ATMS)</li> <li>• Advanced Traveler Information Systems (ATIS)</li> <li>• Advanced Public Transportation Systems (APTS)</li> <li>• Commercial Vehicle Operations (CVO)</li> </ul>
General Purpose Lanes	<ul style="list-style-type: none"> <li>• Expressway Lanes</li> <li>• Arterial Lanes</li> </ul>

This element of the congestion management process includes identification of the steps or procedures taken to identify the range of potential strategies. It also highlights those actions that have been or are being taken to address and implement, if appropriate, alternative strategies.

### **3.2.2.2 Strategy Analysis**

The assessment of alternative strategies can take many forms. This is in part due to the fact that different types of strategies may require different evaluation methods and procedures. An additional factor is that individual studies vary greatly in their scope, geographic coverage, goals and level of detail. These characteristics greatly influence not only the type of strategies that may be examined, but the means by which the analysis is conducted. As a result of these factors, it is impossible to designate a single methodology for evaluating potential congestion management strategies.

There have been, however, many steps taken at the regional, state and federal levels to provide greater guidance on the analysis of alternative strategies as part of larger studies. This guidance has included recommendations or requirements related to study format, content and analysis techniques. These guidelines include federal requirements related to Environmental Impact Statements (EISs) and Major Investment Studies (MISs). The purpose of this guidance is to provide for greater consistency in results and to provide guidance to analysts. Within a study, this consistency allows for easier comparison of alternatives. Consistency also allows for the results from one study to be compared to those from another.

The CMS regulations do not identify specific measures or indicators to be used in the analysis of alternatives, nor do they specify the level of analysis that must be performed. In general, state, regional and local entities are given the flexibility to select an evaluation system applicable to their area. In turn, this element of the Chicago area congestion management process does not specify a singular evaluation methodology. Rather, it identifies tools and procedures that are or can be used in the analysis of a range of alternatives. These tools and procedures are described in Chapter 5 of this report.

### **3.2.3 Project Selection**

One inferred intent of ISTEA's CMS requirements is that of ensuring that congestion management strategies are implemented in a reasonable manner. It is recognized, particularly in this time of budgetary constraint, that not all proposed projects can necessarily be implemented. Rather, hard decisions are often required to identify which projects receive funding in a given cycle. Thus, this requirement is most

appropriately met by ensuring that congestion management strategies and projects are properly considered within the project selection process.

### **3.2.4 Effectiveness Evaluation**

The CMS regulations reflect the importance of incorporating a "feedback loop" in the congestion management process. Evaluating the effectiveness of strategies after they have been implemented is important so that it can be determined if the strategies have had their expected impacts. This evaluation can be used to modify how similar strategies are implemented in the future, to improve the estimation of impacts as part of subsequent studies, and to provide guidance to decision-makers on the selection of effective strategies for future implementation. A regular performance monitoring program can provide a foundation for evaluating the effectiveness of strategies. In some instances, this may be supplemented by a more detailed assessment; one that focuses on the specific area of the improvement or uses measures that are more reflective of the strategy but are not part of the regular program.

## **4. SYSTEM MONITORING**

The final CMS must have in place a process to obtain data that will be used to monitor the transportation system. This monitoring system has a threefold purpose: 1) to locate congestion and mobility/accessibility deficient locations, and then to determine the magnitude and nature of the deficiency; 2) to collect data to screen alternative options for improving the deficient situation; and 3) to assess the effectiveness of the actions implemented to mitigate the deficiencies. The CMS monitoring system must be multimodal in nature, due to the infeasibility of relying on a single mode of transportation in mitigating the impacts of congestion.

### **4.1 EXISTING SYSTEM MONITORING ACTIVITIES**

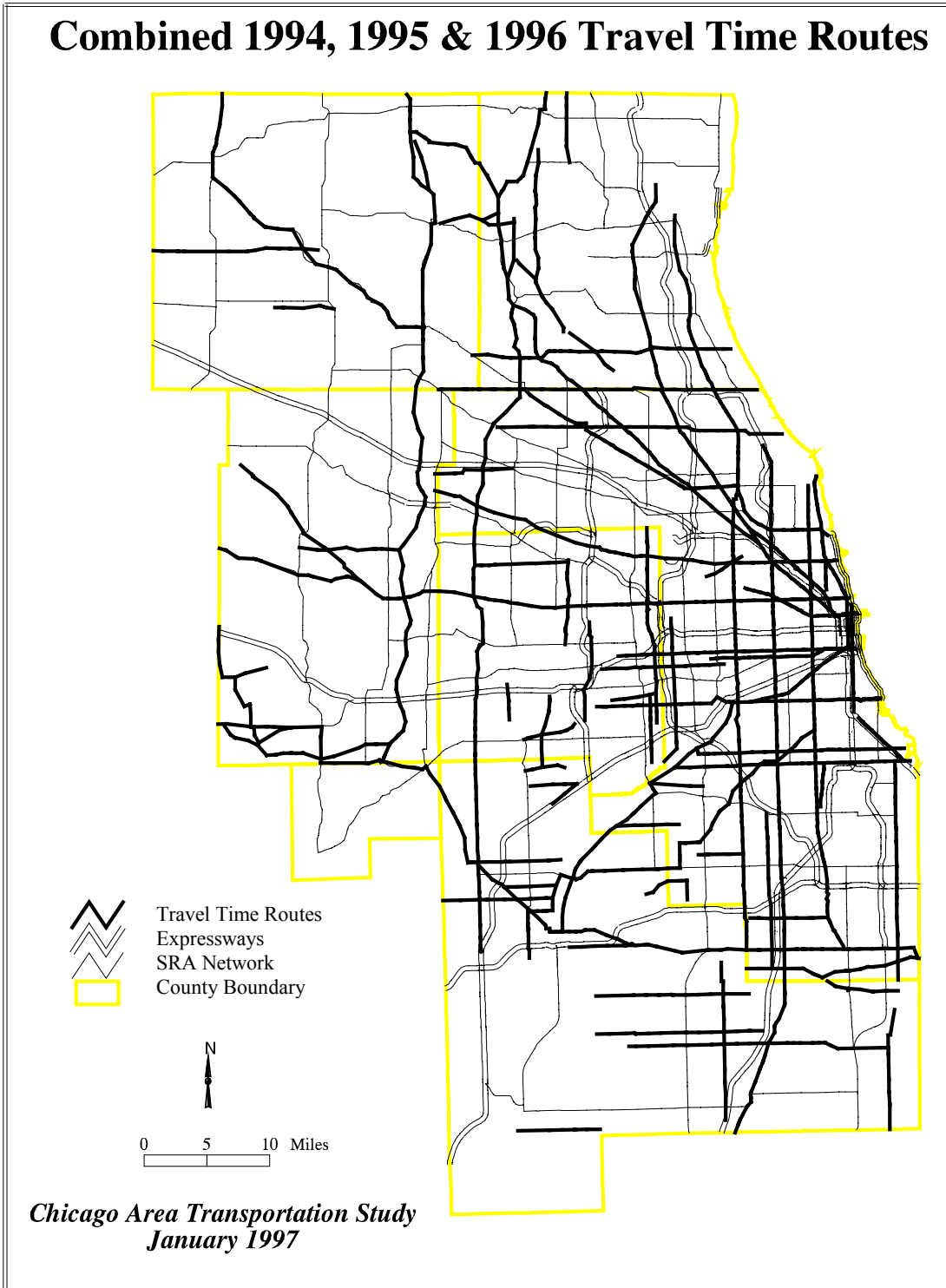
There are a large number of current data collection or monitoring activities that may be used as part of a monitoring program for the CMS. Potential data sources include established programs whose purpose is the collection of specific data, as well as fixed, surveillance systems that automatically record a variety of transportation data. Other valuable sources include the transportation-related databases maintained by various agencies within the region. Current northeastern Illinois data collection efforts relevant to the CMS are described in the following sections.

#### **4.1.1 Travel Time Runs**

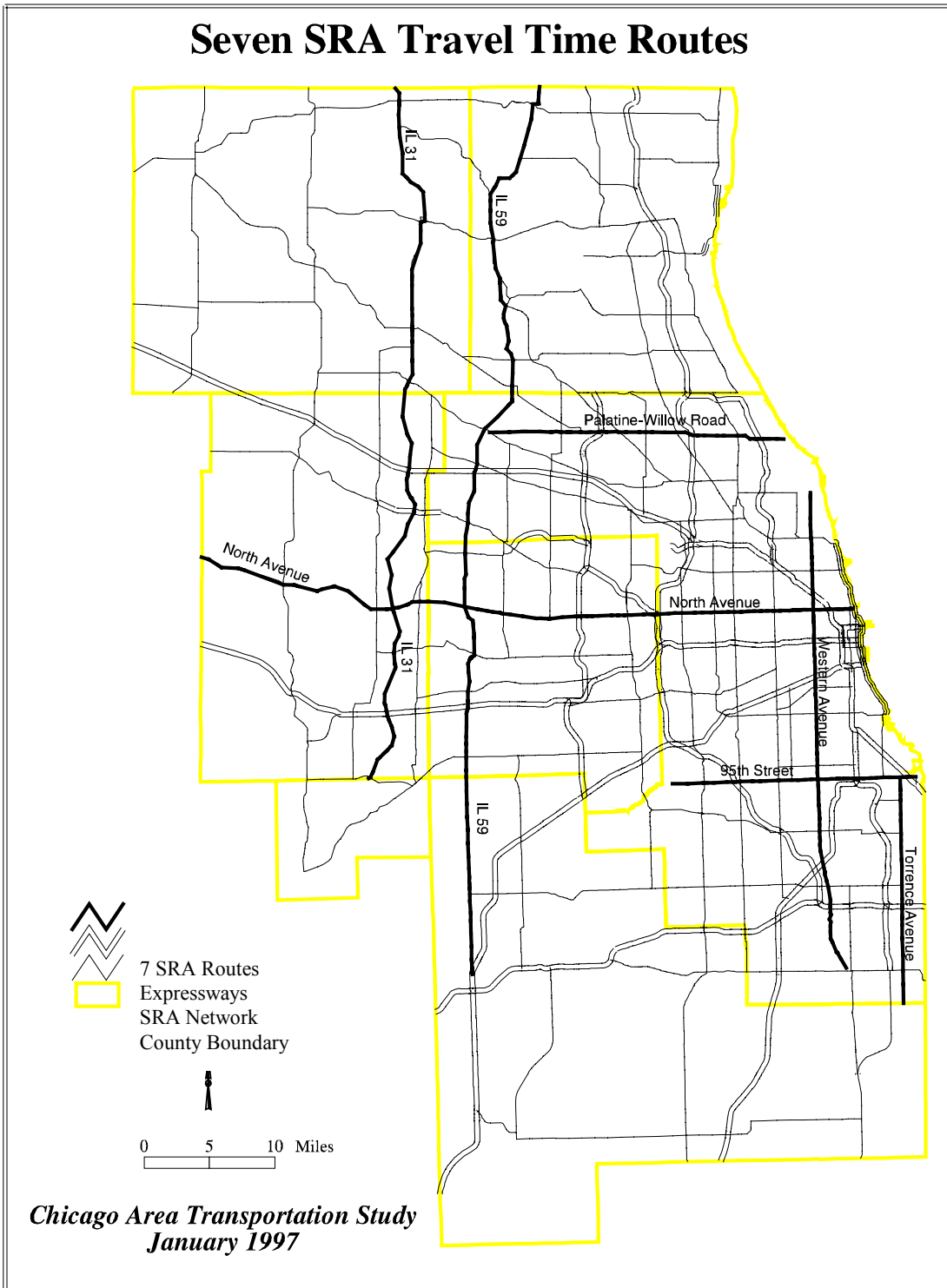
CATS conducts travel time runs on selected high-volume arterials in the Chicago area using the “floating car” method. Approximately 800 - 1,000 miles of roadway are traveled annually, with each route being broken down into roughly one-half mile segments. Travel times are recorded for three passes done in each direction at three different time periods, yielding a total of eighteen observations per segment. The resulting travel time data may be used to calculate average speeds, and to estimate level-of-service (LOS). Travel time runs to date have covered approximately 2,505 unique directional miles out of a total of 18,373 directional miles in the CATS 1990 Base Highway Network.

Map 4-1 displays all of the routes where travel time runs were conducted between 1994 and 1996. While the specific routes run each year changes in order to increase the geographic coverage of field data, seven Strategic Regional Arterial (SRA) routes have been run every year to capture trend data. These routes are displayed in Map 4-2. Travel time runs for 1997 will most likely be limited to the control group of seven SRA routes done previously.

Map 4-1



Map 4-2





### **4.1.2 Expressway Surveillance**

IDOT operates an expressway surveillance system in northeastern Illinois utilizing loop occupancy detectors, ramp metering and changeable message signs. The extent of surveillance system coverage is shown in Map 4-3. The operation is run from the Traffic Systems Center located in Oak Park. The surveillance system is used to generate reports on current traffic conditions, which are used by area radio and television stations, as well as IDOT. Data collected by the expressway surveillance system includes traffic volumes and detector occupancy. These data, along with an assumed average vehicle length, may then be used to calculate vehicle speed.

### **4.1.3 Simulation Model**

CATS has primary responsibility for the development and maintenance of travel forecasting methods for the Chicago region. The CATS travel demand models represent a classical "four-step" process, with considerable modifications used to enhance the distribution and mode choice procedures. The present CATS region, for analysis purposes, includes the counties of Lake, McHenry, Cook, DuPage, Kane, Kendall, Grundy, and Will, in Illinois, and Lake County in Indiana. The model sets contain two network systems: one for highways and one for transit.

#### ***4.1.3.1 Highway Networks***

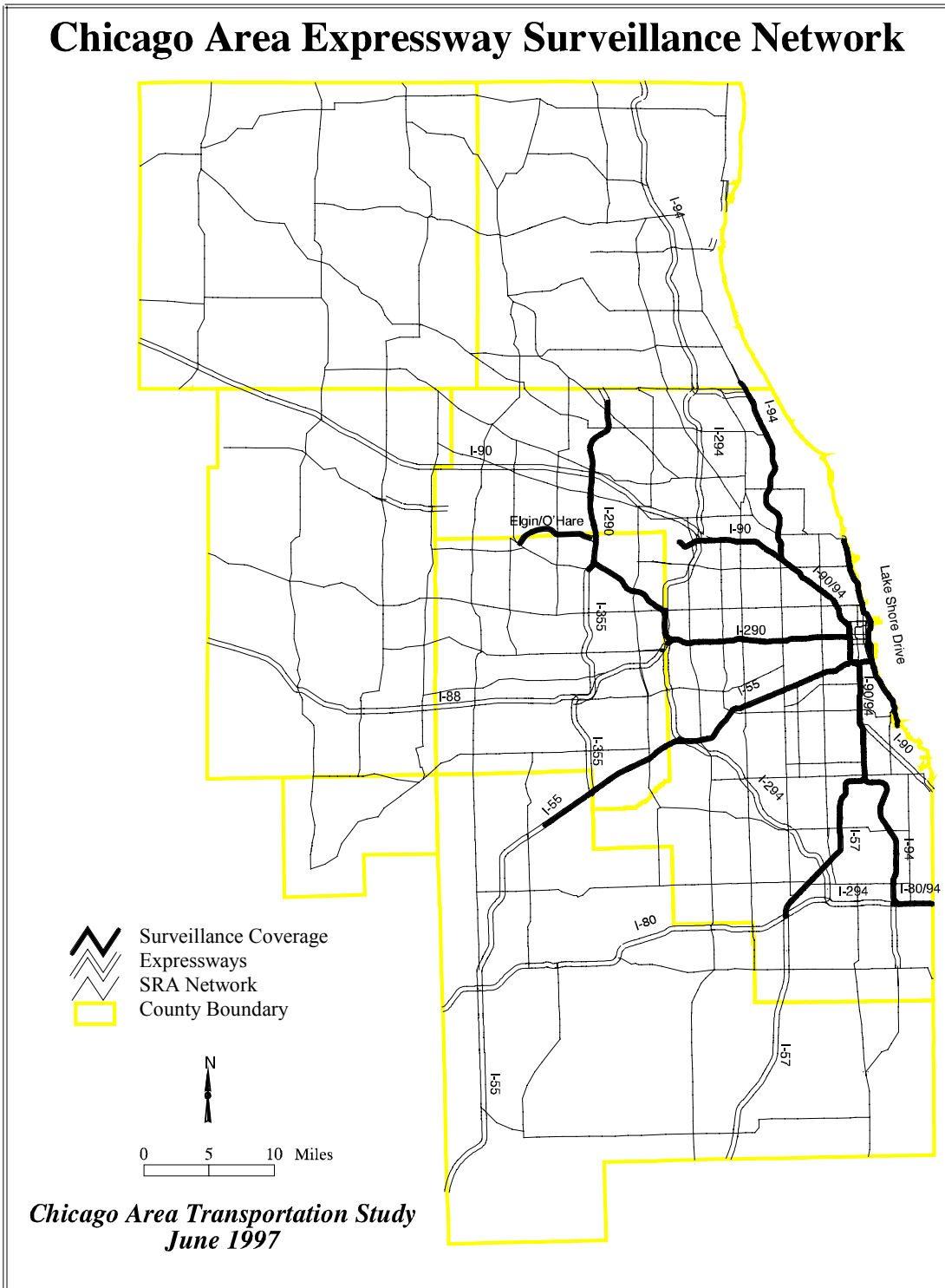
The base highway network used in the models is the 1990 highway network. The information used to build this network is from IDOT computer files (the road file), local data bases, aerial photographs, and field checks. This network is shown in Map 4-4. Pertinent information contained in the highway network file includes speeds, capacities, number of lanes, length of the link, type of parking, and the type and functional class of the link.

Physical and operational attributes of the master network data base are regularly updated and corrected to reflect the current base year, in this case 1990. The variables on the link record are primarily attributes that affect initial demand estimates, specifically: link length, free flow speed, hourly capacity and toll amount.

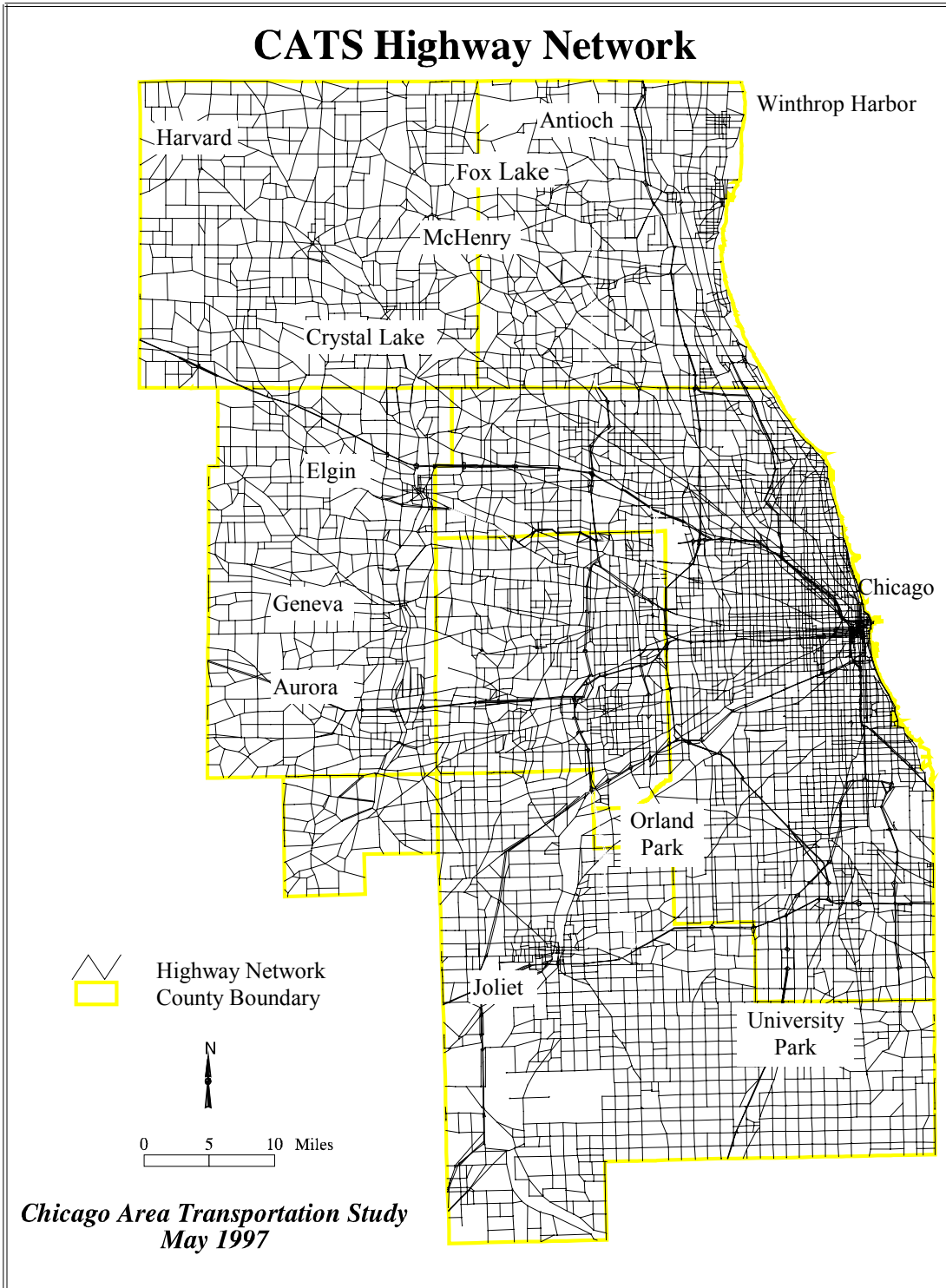
#### ***4.1.3.2 Transit Networks***

CATS has developed a detailed transit network for 1990 including bus, urban rail, and commuter

Map 4-3



Map 4-4



rail. This network includes all of the CTA, Pace and commuter rail (Metra) routes. The transit network was built using the 1990 schedules and information from previous network analyses. The 1990 transit network contains 193 CTA local bus lines, 142 CTA and Pace express bus lines, 235 other Pace bus lines, 24 CTA subway and elevated lines, and 48 Metra commuter lines. Table 4-1 summarizes the transit lines coded in the transit network.

**Table 4-1  
SUMMARY OF TRANSIT ROUTES**

<b>Service/Operator</b>	<b>Number of Lines</b>	<b>Average Speed (MPH)</b>
CTA Local Service	193	11.3
Express Bus Route	142	14.1
Pace Service	235	16.5
CTA Subway and Elevated	24	24.7
Metra Commuter Rail	48	32.0

#### **4.1.3.3 Travel Assignment And Model Outputs**

The final step in regional travel forecasting is that of assigning trips to the model networks. For the highway network, this step allocates vehicle trips to the links and paths in the network providing estimates of travel on individual road facilities. These estimates of roadway link usage are the primary input to calculating speeds. From these measures are derived estimates of levels of congestion essential for the evaluation of the effectiveness of the transportation networks. Having volumes and speeds for each vehicle type for each hour of the day enables the congestion management analyst to produce a wide variety of performance measures, taking into account proposed alternatives.

For the transit network, person trips are assigned providing estimates of transit ridership by bus route or rail line. Ridership for individual transit segments or links may also be determined. This information can be used to estimate person throughput, transit load factors, and mode shares for specific locations. The results from the mode choice step of the modeling process are used to provide regional mode shares.

The selection of the performance measures used in the CMS was heavily influenced by the information readily available from the transportation demand estimation modeling process currently used during the development of RTP and the conformity determination process of both the RTP and the TIP.

#### **4.1.4 Strategic Regional Arterial Activities**

The SRA system is a network of over 1,300 miles of high-volume arterials intended to supplement the expressway system in carrying regional traffic. The objectives of the SRA system are: 1) to supplement the expressway system by improving access to it and by offering alternative routes for some travel; 2) to strengthen public transportation and personal mobility by improving access to transit, improving operating conditions for transit vehicles and by maintaining accessibility for pedestrians; and 3) to enhance commercial vehicle operations through strategies such as improving structural clearances. The SRA system was established as part of Operation GreenLight (OGL), a multi-agency plan to relieve congestion and enhance mobility in northeastern Illinois.

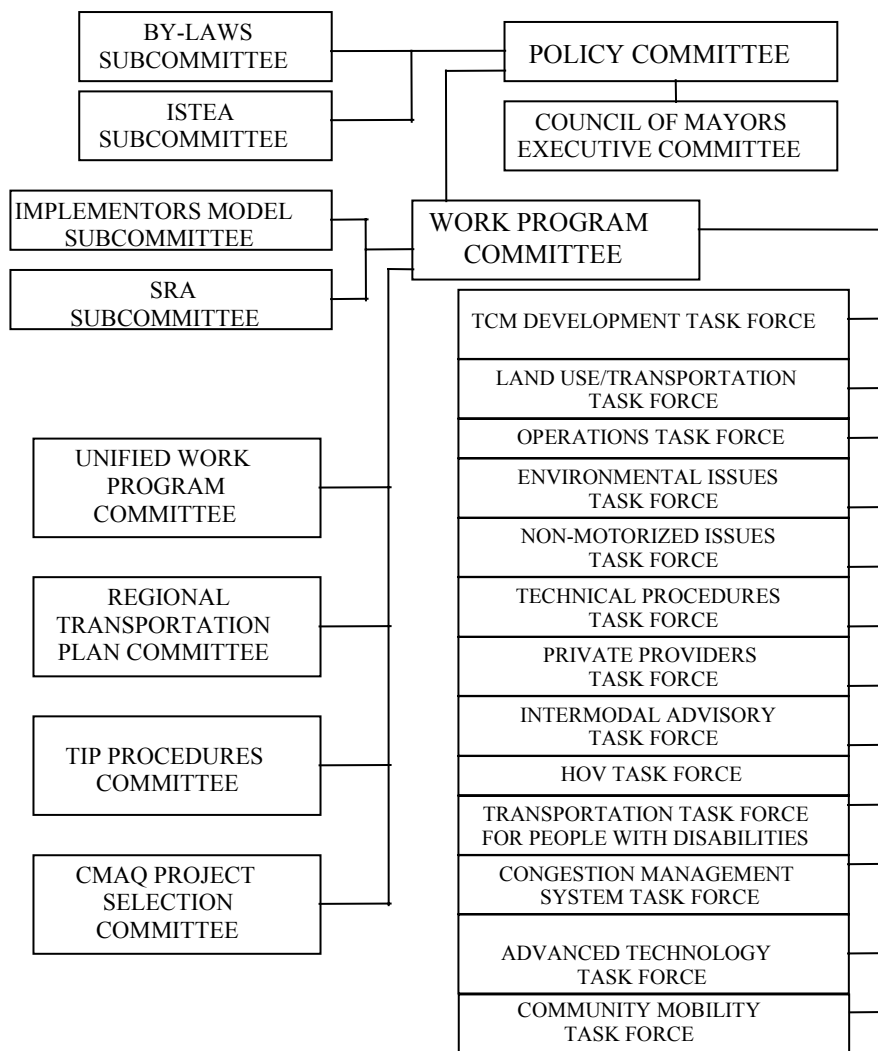
Full implementation of the SRA system is dependent upon development of a comprehensive SRA program that includes long range plans for all SRA corridors. To ensure that these plans are based on comprehensive and consistent analysis, SRA Design Concepts were developed. The SRA Design Concept Report was developed to serve as a comprehensive document of SRA improvement strategies and design features. Issuance of the Design Concept Report completed the first part of the SRA plan. The second part involves the preparation of route studies for each specific SRA route. These route studies include: 1) the collection and evaluation of data to determine current operating conditions and constraints on each route; 2) an analysis to determine the best improvements to the route; 3) a screening process to identify environmental concerns along each route (this does not entail a detailed environmental assessment of the area, rather it acts as an indicator of environmental issues for future design studies); 4) the estimation of construction costs; 5) the involvement of local agencies with jurisdiction; and 6) the completion of a report of findings and recommended improvements for each route. IDOT has divided the SRA routes into six groups and has contracted with different consultants to perform the route studies for each group.

#### **4.1.5 Information from other committees**

One of the first steps taken by CATS to address requirements of ISTEA for increased public involvement, was a complete restructuring of the committees, subcommittees and task forces. A chart of the CATS committees and task forces is shown in Figure 4-1. The new structure was designed both to best address the requirements of the planning and programming process and to provide for expanded public involvement.

Figure 4-1

CHICAGO AREA TRANSPORTATION STUDY  
COMMITTEE STRUCTURE



A CATS staff member is assigned as a contact person for each committee, subcommittee and task force. The contact person's responsibilities are to keep the Work Program Committee informed of their groups' activities. The Work Program Committee receives a report from each committee at each of their meetings where coordination issues are often addressed. In addition, the chairs of committees, subcommittees and task forces meet periodically to review and coordinate their work.

The CMS Task Force has utilized the efforts of several other groups including the RTP Committee, the Congestion Mitigation and Air Quality (CMAQ) Project Selection Committee, the Transportation Control Measures (TCM) Development Task Force, and the Operations Task Force.

#### **4.1.6 Transit Data**

There are three transit operating boards serving northeastern Illinois: the CTA, Pace, and Metra. All three currently collect and analyze system usage and performance data. The CTA operates both bus and rail service in the Chicago area. It annually publishes a report detailing average round trip travel time, average headways and average daily passengers for each bus and rail route. It also collects farebox revenue and cost recovery information.

Pace, the suburban bus company, conducts several monitoring activities on a regular basis. One is monthly ridership reports, which are generated for every route. Another activity is quarterly quality performance reports. These reports examine the recovery ratio and productivity of each route, then rank the routes according to service category (inter-suburban, satellite, rush hour only, etc.). Pace also conducts on-time performance studies for specific routes on an as-needed basis.

Metra, the commuter rail system, also collects monthly ridership statistics. These are based on ticket sales and passenger load counts performed by conductors. Periodically, a census of ridership is conducted for the whole Metra system; the last census was completed in Autumn 1995. These ridership counts yield a host of information, including boarding and alighting trends and passenger productivity by station. In addition to ridership counts, Metra performs rail station access and parking availability studies. Metra also conducts various surveys as needed.

The RTA serves as the oversight agency for CTA, Metra and Pace. In addition to the system monitoring activities conducted by the individual service boards, the RTA prepares an annual report of aggregate data that compares northeastern Illinois' transit statistics to those of comparable systems in other areas of the country. This Peer Review report examines cost efficiency, cost effectiveness and service effectiveness for four transit categories: urban bus, suburban bus, commuter rail and CTA rail. The peers vary somewhat for the different transit categories, but as an example, CTA's peers in the urban bus category are Philadelphia, Boston, New York City and Washington, DC.

#### **4.1.7 Illinois Roadway Information System**

IDOT's Illinois Roadway Information System (IRIS) is a statewide database containing a variety of highway-related information. IRIS consists of three primary components: a road file minutely describing all state maintained routes, a structure file describing the engineering and operating characteristics of each state maintained structure, and finally a railroad crossing file describing each and every public-at-grade railroad crossing in the state. Information contained in the IRIS database includes average annual daily traffic, average annual heavy commercial vehicle volume, existing and available right-of-way, speed limit and truck route designation. The agencies involved in data collection vary depending on the type of highway being inventoried. Information for interstate highways comes completely from IDOT agencies. For local roads, information may come from county, municipal or township agencies, as well as from IDOT. IDOT collects data for all public highways to help the agency prioritize rehabilitation needs.

All of this information is being made available in a geographic information system (GIS) environment with the three primary data files residing on the state's mainframe computer and being distributed for data entry, analysis and display utilizing ArcView<sup>®</sup> and ARC/INFO<sup>®</sup>. IRIS provides the fundamental base for the management of all state maintained highway facilities.

#### **4.2 CMS ACTIVITIES**

Although there are many existing monitoring activities conducted in northeastern Illinois, they do not provide for the systematic, regionwide monitoring of performance. Thus, to fully meet the monitoring needs and requirements related to the CMS, a monitoring program has been established.

The CMS will integrate a number of data collection and monitoring activities currently in place into a seamless system for monitoring the performance of the transportation system, while also measuring the ability of an individual to access and utilize the system in a cost-effective manner. The CMS Monitoring Program will use a combination of field data and simulation model results. Different levels of monitoring will apply to the various highway classifications in the CMS Monitoring Network. This reflects the varying levels of data collection or monitoring that is currently in place. For example, automated surveillance systems are limited primarily to the expressway network, whereas speed runs have been and will continue to be conducted on selected SRAs and arterials. Simulation data, however, are available for all roads in the monitoring network. This is consistent with CATS' practice of using



field data to augment and validate simulation data. It is not feasible for CATS to attempt to conduct large-scale sampling of the transportation system, thus any monitoring done to the network in addition to current activities will be implemented on an incremental basis.

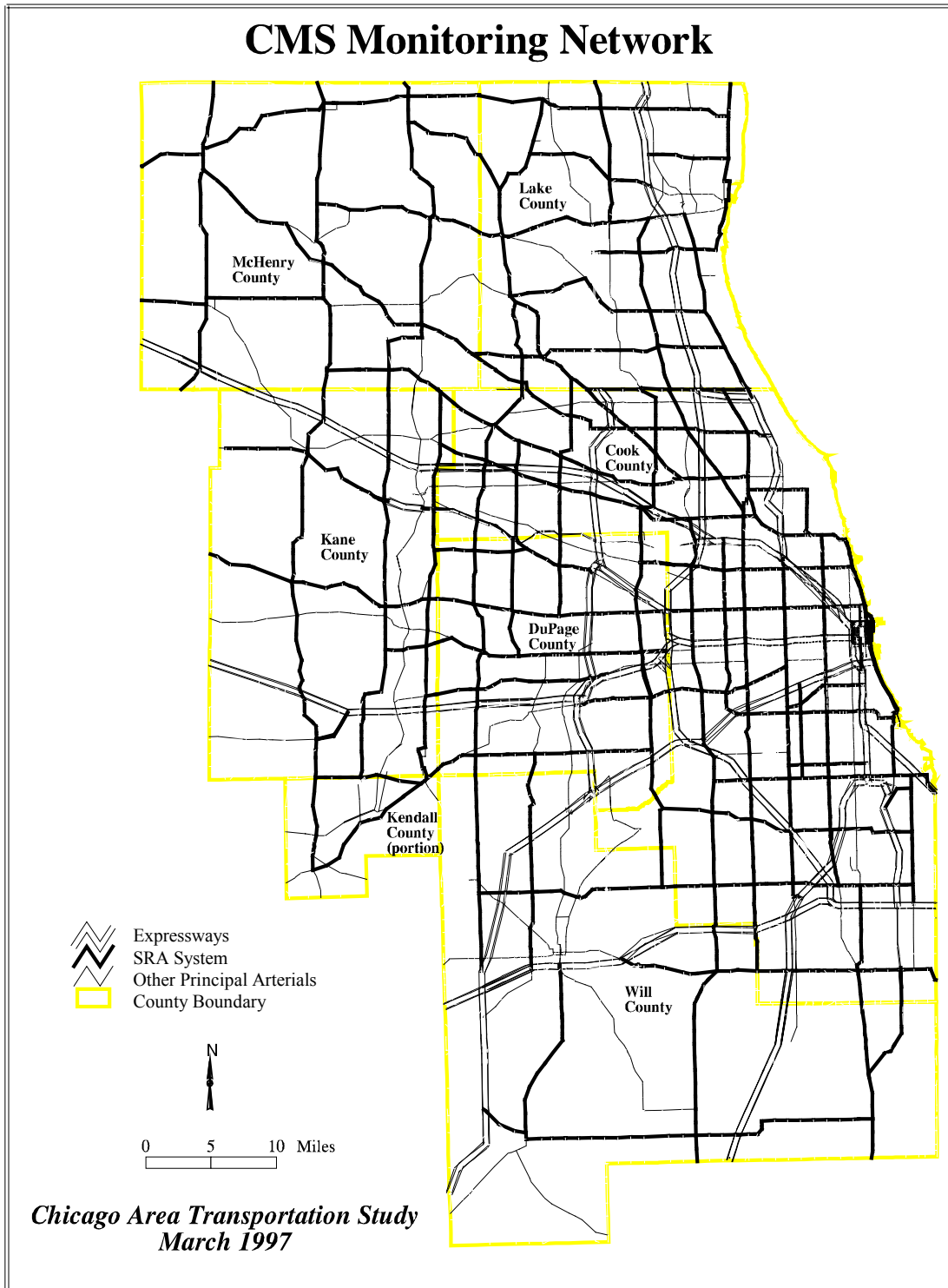
In addition to the coordination and integration of existing monitoring activities in use in northeastern Illinois, creation and implementation of the CMS Monitoring Program has led to the development of new activities. These include the definition of a transportation monitoring network, designation of performance measures to evaluate system performance, incorporation of additional data sources into existing processes, management of new data, and system performance reporting requirements. Each of these activities is briefly discussed in the following sections.

#### **4.2.1 CMS Monitoring Network**

The CMS applies to the following geographic area in northeastern Illinois: Cook County, DuPage County, Kane County, Lake County, McHenry County, Will County and two-and-one-half townships in northeastern Kendall County. The CMS Monitoring Network includes all expressways, tollways and highways with a functional classification of arterial or higher located in the Chicago metropolitan planning area and is displayed in Map 4-5. This network was formally adopted at the March 31, 1997 meeting of the CMS Task Force. The definition of a CMS Monitoring Network at this time does not preclude other roads from being included in the CMS Monitoring Program at a future date.

The philosophy behind establishment of the CMS Monitoring Network was to include all state-maintained roads and all regionally significant roads in the system. Expressways, tollways and the SRA system are included in the monitoring network due to the high traffic volumes they carry, and their importance in regional mobility. All remaining arterials are included in the network to fill in gaps left by the SRA system. It should be noted that the CMS Monitoring Program also incorporates transit and areawide elements consistent with selected performance measures as described in the following section. For example, transit ridership in key corridors will be monitored as input into determination of modal shares, person throughput and other transit measures.

Map 4-5



## 4.2.2 Performance Measures

Once data is collected, it will be used to evaluate system performance and to identify deficiencies in the system. This analysis will be conducted using specific performance measures adopted by the CMS Task Force. Measures were selected based upon: the availability of data from existing sources, the applicability of those measures in quantifying system performance, the ability of the performance measure to help forecast future system deficiencies and the feasibility of measuring system performance for the RTP.

The selected CMS performance measures cover the areas of roadway congestion, accessibility and transit. They reflect a combination of traditional traffic engineering measures such as traffic density, and more customer (traveler) oriented measures such as travel time. For most of the traditional measures, the results will be reported and assessed using the LOS concept, as defined in the 1994 update to the Highway Capacity Manual (HCM). Under the LOS concept, operating conditions in a traffic stream are characterized according to one of six service levels. Each service level is given a letter designation, from A to F, with LOS A representing the best operating conditions and LOS F the worst. In addition to being widely-used by transportation officials, the concept of LOS measurements may be relatively easy to convey to the general public, as they are analogous to school letter grades.

The performance measures selected for northeastern Illinois are as follows:

- **Travel Time and Travel Speed**  
Travel time and travel speed are closely-related measures that can be used to illustrate the reduction in mobility people experience during congestion. Travel time and speed experienced under congested conditions can be compared to those found in free flow operating conditions to assess the magnitude of congestion. The duration of congestion can also be determined by measuring the reduced travel speeds over a period of time. Travel time and speed are relatively easily obtained from model forecast data and from travel time runs conducted annually by CATS. Some surveillance or signal control detectors can also provide speed data. This data can be produced at any analysis level desired: link, corridor or system. The HCM defines LOS for arterials based on the following minimum percentages of free flow speed: A - 90%, B - 70%, C - 50%, D - 40%, E - 33%, F - <33%. The HCM also provides relationships between speed and LOS for freeways and highways.
- **Volume-to-Capacity Ratio**  
Volume-to-Capacity (V/C) ratio is a widely-used performance measure in the transportation field. This is due to the wide availability of volume and capacity figures for transportation links and the straight-forward nature of the performance measure. The HCM has established relationships between V/C ratio and traffic operation and is a standard guide in the field. The CMS for northeastern Illinois intends to use this as an initial measure of congestion

- because of the availability of data from model forecasts, from count programs conducted by counties and municipalities, and from roadway detectors. V/C ratios can be produced at the link and corridor level for analysis. While LOS threshold values vary somewhat between road classifications, the maximum V/C ratio the HCM establishes for LOS E for all types of roads is 1.00.
- **Traffic Density**  
Traffic Density is measured in passenger cars per mile per lane and is primarily a congestion measure for freeways and multi-lane highways. This data is not readily accessible from forecast models, and can only be obtained through IDOT's expressway surveillance system. Density is the preferred performance measure for expressways, but it is not feasible until procedures for obtaining the necessary data are finalized. The HCM provides the following maximum passenger cars per mile per lane figures for LOS categories: A - 10, B - 16, C - 24, D - 32, E - 44, F - >44.
  - **Intersection Level-of-Service**  
Intersection LOS is a measure of congestion for arterial streets because the traffic operating characteristics of a street with signalized intersections are a function of intersection performance. It is measured in number of seconds of delay per vehicle. The ability to quantify intersection LOS is dependent upon accessing data from IDOT's Signal Coordination and Timing Program (discussed in section 4.2.3.1), and the capability of the program to capture the required data, as it is not readily available from the model forecasts. Currently it is not clear that the SCAT system will be able to provide the necessary data to determine LOS for intersections, however CATS is undertaking a pilot program to study the issue. The HCM establishes a threshold for LOS E beginning at more than 40 seconds of delay per vehicle and a threshold for LOS F beginning at more than 60 seconds of delay per vehicle.
  - **Duration of Time Delay at Congested Conditions**  
Duration of time delay at congested conditions is a measure of the magnitude and severity of congestion. It quantifies the decreased mobility on the system. This information is available from expressway surveillance data and possibly from SCAT data.
  - **Percentage Truck Traffic**  
The amount of heavy truck traffic on the system is a measure of the use of the system. This is especially important in an area such as Chicago, which has a long history of being a major freight transportation hub. Trucks occupy more physical space than automobiles, have slower acceleration and deceleration rates, and have special safety concerns. All of these factors can create a less-than-optimal use of the transportation network. The usefulness of this performance measure could be increased with the inclusion of designated truck route information. Information on commercial vehicle traffic will be obtained from traffic counts conducted by IDOT and available through the IRIS.
  - **Percentage of Households and Employment within "X" miles of a Bus Route**
  - **Percentage of Households and Employment within "X" miles of a Rail Station**
  - **Percentage of Households and Employment within "X" miles of an Expressway Interchange**  
These three measures examine how accessible the transportation system in northeastern Illinois is to the populace and help address the multimodal monitoring aspects of the CMS. Information for these measures is available from population and employment forecasts

prepared by the Northeastern Illinois Planning Commission and from the transportation network in CATS' Combined Model. The performance measures themselves can be derived from this data within a GIS environment. Due to the different characteristics of the three transportation modes being examined, the distance measures should vary between the modes. Distance may also vary between urban and suburban locales.

- **Transit System Measures**  
Transit system measures examine performance of the transit modes. These will be included in the CMS following consideration by RTA, CTA and Pace. It is expected that the selected measures will be derived from information currently collected as part of the operators existing monitoring programs.
- **Modal Shares**  
Modal shares is one measure of the overall efficiency of a multimodal system by assessing the relative use of its component parts. This information is available through forecast models for both present and future conditions. Modal shares for present conditions may also be derived through surveys, or by collecting traffic volume, average vehicle occupancy (AVO) and transit ridership data for a corridor.
- **Person Throughput**  
Person throughput is another measure of the efficiency of the multimodal system. It measures the number of people using the transportation system that pass through a particular corridor. Person throughput can be determined using field data consisting of traffic volumes, AVO and transit ridership. Due to the difficulty in and cost-intensive nature of collecting this data, it will not be an initial performance measure for the CMS. As corridor studies are conducted in northeastern Illinois, the results will try to be integrated into the CMS monitoring activities.
- **Vehicle Occupancy**  
Vehicle occupancy is a subset of information acquired from the person throughput measure. It measures the average number of people per vehicle to identify how efficiently or inefficiently the network is being used. This information is not available from forecast models, but may be obtained through field surveys. Because of the cost-intensive nature of collecting this data, it will be phased in at some future date. Police accident reports may be one potential source of this type of information.
- **Incident measures**  
Incident measures differ from the other performance measures which all attempt to measure recurring congestion. An attempt should be made to measure incident congestion, which is estimated to account for more than half of the congestion in northeastern Illinois. Incident measures could examine such things as accident location and frequency, the delay resulting from incidents, and the duration of incidents. Due to the nature of incidents, this information is very difficult to obtain in a systematic way and may be phased in at some later date as the data become more readily available.

While a number of different performance measures were selected, not all of them will be applicable to each type of facility. Also, availability of data for some of the measures is limited at the

current time, thus some will be phased in at a future time as the data becomes available. Table 4-2 summarizes these performance measures and how they will be applied within the CMS.

**Table 4-2  
CMS PERFORMANCE MEASURES**

<b>Measure</b>	<b>Application</b>
Speed/Travel Time	Limited to routes covered by CATS speed run program and/or traffic surveillance systems with speed capabilities
V/C Ratio	To all monitoring network links using field data or model forecasts
Vehicle Density	Limited to expressways with traffic surveillance systems
Intersection LOS	Pilot program to be initiated using data from SCAT Program. Capability of SCAT Program to provide necessary data will be assessed and continued application of this measure determined
Duration of Congestion Conditions	Limited to all facilities (links, intersections) where data is provided by automated surveillance systems and is, therefore, available for multiple hours
Percentage Truck Traffic	To major routes at selected count locations
Percentage of households/employment within "X" miles of bus route, rail station or expressway interchange	Regionwide
Transit System Measures	To be determined depending on measures selected
Modal Shares	To selected major corridors
Person Throughput	To selected major corridors
Vehicle Occupancy	To selected major corridors
Incident Measures	To be determined depending on measures selected

In addition to the analytical measures of congestion, the CMS will include an assessment of the perceived sites of congestion. This differs from other performance measures in that it focuses on the perception of congestion (a powerful public policy tool) rather than on attempting to quantify congestion. A previous survey providing a list of perceived sites of congestion has been conducted through the Council of Mayors Planning Liaison program. This activity can be continued to provide an important source of information on where the public feels the largest congestion and mobility problems are located.

### **4.2.3 Data Sources**

The CMS for northeastern Illinois will focus primarily on using existing data to monitor the system. In an effort to avoid creating an excessive burden on agencies by requiring new forms of data collection, the CMS seeks to use existing sources more effectively by creating new partnerships and new

avenues of data sharing. As new forms of data collection are implemented in northeastern Illinois through the expanding use of ITS, the CMS will seek to integrate them into the monitoring system.

In addition to the current monitoring activities described in the previous section, the CMS will attempt to integrate additional existing data sources into the process. Some examples of this follow:

#### ***4.2.3.1 Signal Coordination and Timing Program***

IDOT's SCAT Program involves the implementation of advanced signal control systems along selected arterial segments throughout the Chicago region. These control systems utilize signal interconnects with closed-loop detectors to optimize signal timing. Presently, there are approximately 160 systems covering over 1,250 intersections in this program. These detectors have the ability to capture traffic volume and occupancy (defined as the percentage of a cycle that a detector is physically occupied) data. Currently, data from these detectors are used to control traffic signal operations on a real-time basis.

CATS, in cooperation with IDOT, is exploring the possibility of establishing a pilot program to study the feasibility of incorporating data received from the SCAT system into the CMS. The purposes of the pilot program would be: 1) to determine exactly what type of information SCAT yields, 2) to determine if the information SCAT provides is meaningful to the CMS and 3) to determine the amount of time and effort required to reduce the data into meaningful statistics. Potential CMS benefits from this empirical data include volume counts on high-volume arterials, determination of intersection LOS and estimation of duration of time delay at congested conditions. CATS is also examining the dual benefit of identifying changes in traffic patterns and developing trend lines of traffic volumes to aid IDOT in determining when the signal timing at specific locations has become less than optimal.

#### ***4.2.3.2 Intelligent Transportation Systems***

Northeastern Illinois is in the forefront of ITS research and deployment. Illustrations of this include: USDOT's designation of northeastern Illinois as part of the Gary/Chicago/Milwaukee ITS Priority Corridor making it eligible to receive ISTEA funding; the preparation of an ITS Strategic Early Deployment Plan by CATS; completion of the ADVANCE project, the largest field operational testing of dynamic route guidance and an Advanced Traveler Information System; and the establishment of CATS Advanced Technology Task Force to coordinate ITS technologies in the region and to plot a course for developing and integrating ITS applications as they become operational. While the goal of ITS

applications is to improve the operating efficiency of the transportation system, most applications also involve significant data collection or surveillance elements. As new ITS-related data collection methods are introduced in northeastern Illinois, the CMS will attempt to integrate them into its monitoring process. As appropriate, this will include information derived from the surveillance and electronic toll collection systems being applied to the region's toll facilities, both the Chicago Skyway and facilities operated by ISTHA.

#### ***4.2.3.3 Perception Surveys***

Northeastern Illinois' Councils of Mayors have previously conducted a survey to determine perceived sites of congestion. This listing of sites can provide additional information to the CMS that may not be available from the other quantitative performance measures. These surveys could be conducted periodically to supplement other CMS monitoring data. There is a great deal to be learned from comparing the public's perception of where deficiencies exist against where the models used to forecast current and future system performance suggest deficient locations exist.

#### **4.2.4 Data Management**

Implementation of the CMS will create new data management issues and opportunities. These include the use of GIS and issues involving the transfer of information between agencies. A brief discussion of these follows:

##### ***4.2.4.1 Geographic Information Systems***

The use of GIS will play a prominent role in the CMS for northeastern Illinois. It will be used for data management activities as well as analysis and presentation purposes. For example, the system accessibility measures (i.e. proximity to transit and expressway interchanges) can be most easily analyzed using a GIS format. Once the analysis is completed, maps of links, corridors or the entire system can be generated to provide a spatial context for the discussion of congestion and mobility.

##### ***4.2.4.2 Transfer of Information***

While CATS will have the lead role in conducting the CMS Monitoring Program, much of the data needed for the program will come from other agencies. For this reason, procedures for the sharing or transfer of relevant data must be established. For the most part, these procedures are in place for existing data sources. However, new avenues of data-sharing may also be necessary as new forms of data collection are introduced in northeastern Illinois. Such tasks include the examination and reduction



of SCAT-generated information and of data obtained from the expressway surveillance system.

#### **4.2.5 Reporting Procedure**

The “product” of the CMS Monitoring Program will be a periodic report summarizing the current operating characteristics of the region’s transportation system using the performance measures discussed earlier. As appropriate, results will be presented in tabular and graphical formats. This report will also include an analysis of these results by: 1) identifying key performance trends; 2) highlighting performance changes resulting from the implementation of major regional or corridor-wide strategies; and 3) identifying system deficiencies or areas of concern. This periodic report will synthesize the performance measure findings and will make use of GIS. The results presented in this report may be used by CATS, implementors and decision-makers for problem identification and project development. For example, CATS may use this report as an input to the development of future RTP updates. Project, corridor and subarea reports may also be generated, as needed.

## **5. STRATEGY CONSIDERATION**

A key intent of the CMS is the consideration of alternative strategies for relieving congestion and enhancing mobility. For northeastern Illinois, which is a nonattainment TMA, the related requirements may be summarized as follows:

- that serious consideration be given to traditional and non-traditional strategies that provide the most efficient and effective use of existing and future transportation systems;
- that all reasonable alternatives be appropriately analyzed before a project involving the addition of general purpose lanes to an existing roadway or the construction of a new roadway can be advanced for federal funding;
- that consideration be given to strategies that reduce single-occupant vehicle travel and improve existing transportation system efficiency; and
- that where the addition of general purpose lanes is deemed most appropriate, the project must incorporate all reasonable and appropriate operational and demand management elements to ensure that the facility may be effectively managed in the future. In addition, other travel demand reduction and operational management strategies appropriate for the corridor, but not appropriate for incorporation into the facility itself, shall also be identified through the CMS.

The remainder of this chapter describes the activities and steps being taken in northeastern Illinois to ensure these requirements are met.

### **5.1 EXISTING ACTIVITIES**

This component of the congestion management process has been broken into two elements. The first element, strategy identification and screening, refers to the initial consideration of alternative strategies. This element also reflects the extent to which alternative strategies are being applied within a region or whether a particular strategy is considered "reasonable" for the specific region. The second element, strategy analysis, focuses on the methods and procedures used to estimate the benefits and impacts of alternative solutions.

#### **5.1.1 Identification and Screening**

Although a formal process governing the consideration of alternatives does not exist, northeastern Illinois has been very proactive in its consideration of alternative strategies for relieving congestion and improving mobility. This fact is reflected by the region's long history of implementing

transportation strategies other than the addition of general purpose lanes. The Chicago area has been a leader in the application of freeway management, arterial operation, public transit, bicycle and pedestrian treatment, and ITS strategies. These and other strategies have been employed throughout northeastern Illinois and are subject to many on-going activities to ensure their future consideration and implementation.

For the most part, individual agencies are given the flexibility to consider the range of strategies they deem appropriate for their particular circumstances. The exception is in those instances that require the preparation of an EIS or MIS. In these instances, the identification and evaluation of alternatives is an established element of the study process.

Several steps, however, are currently being taken to promote consideration and implementation of alternative strategies. For example, CATS has established a number of committees, task forces and working groups to address a variety of regionally-significant transportation issues and challenges. The general purpose of these committees is to help establish policy and make general recommendations related to specific strategies or issues. In addition to the CMS, task forces have been established to address topics such as TCMs, the land use/transportation relationship, operations, non-motorized modes, intermodal issues and HOV strategies.

As a predecessor to some of the current CATS committees, sixteen task forces were established as part of the OGL program in the late 1980s. Indeed, a number of the CATS committees are a spin off of OGL task forces. Each OGL task force addressed a type of strategy, and was charged with helping establish policy and general recommendations. The product from each task force was a report outlining key issues and recommendations; some of the OGL task forces produced legislative proposals.

Although, opportunities have not arisen to implement all of the OGL recommendations, the task forces produced many tangible results. The annual report for the OGL has been used as an example of a good congestion management tool by FHWA. The work of the OGL task forces has led to new policies related to access management, bicycle and pedestrian treatment, and transit coordination. Another major contribution of the task forces was their role in the consensus building process that has led to improved coordination/cooperation between agencies.

One facet of OGL that has also had a significant impact on planning in the region is the SRA program. The purpose of this program is to develop long range plans for all SRA corridors in northeastern Illinois. To ensure that these plans are based on comprehensive and consistent analysis, the SRA Design Concepts were developed. The Design Concepts include guidelines for design (e.g. access & signal spacing), as well as for the consideration and accommodation of alternative modes of transportation.

The SRA program has led to several improvements in the overall planning process. The SRA process has strengthened local coordination and education. The SRA process has also increased local awareness of land use planning issues. A greater emphasis is now being placed on coordinated land use and transportation planning. Local coordination in incident response (e.g. police response) has also benefited from the SRA process.

The SCAT Program, another offshoot of OGL, is a prominent example of the region's commitment to alternatives to add-lanes projects. The SCAT Program emphasizes the application of traffic operational improvements on arterial roadways. Typical improvements include the re-timing of signals, implementation of signal interconnect systems and coordinated timing plans, and minor geometric modifications. The SCAT program is an on-going activity whereby new systems are added each year and previously implemented systems are reviewed periodically to assess the need for updating.

The current RTP, the *2010 Transportation System Development Plan*, also reflects the importance that the region places on alternative strategies. Among other things, the 2010 Plan encourages demand and system management techniques. The update to the 2010 Plan offers a description of regionally supported management strategies in its discussion of TCMs. It includes descriptions of the following TCM type management strategies:

- land use management;
- site planning;
- density management and mixing of complementary land uses;
- parking controls;
- ridesharing;
- variable work hours;
- transportation management associations;
- bicycle use;
- traffic signal timing and coordination;
- traffic surveillance systems;

- traffic engineering tools;
- transit encouragement;
- transit fare policy;
- information programs;
- active management of construction projects; and
- ITS.

The main purpose of these TCMs is to improve air quality. However, these and additional TCMs are promoted as methods to be used to manage existing congestion and to prevent it where it does not already occur.

The prominence of alternative strategies is further exemplified by a number of current or recent studies examining the potential of non-capacity-enhancing strategies. Strategy-specific studies are most useful when examining strategies whose implementation and impacts are of a regional scale, rather than project-specific. Examples include TDM programs, growth management, and ITS. These studies can result in implementation recommendations, as well as provide useful information regarding more localized impacts and evaluation techniques. These studies, and the class of strategy being examined, are listed below:

- the Gary/Chicago/Milwaukee Priority Corridor - ITS;
- the ITS Strategic Early Deployment Plan (SEDP) - ITS;
- IDOT/CATS ridership programs in corridors - TDM;
- I-290 HOV Lane Study - HOV; and
- Park-and-Ride Study - TDM/HOV.

It must also be recognized that in addition to the above, a number of procedures or activities directly related to the CMS and associated regulations have already been initiated. Included in this are the interim CMS and the Travel Demand Reduction (TDR) Report Program. These activities are described in Section 5.2.

### **5.1.2 Evaluation and Analysis**

The assessment of alternative strategies can take many forms. This is in part due to the fact that different types of strategies may require different evaluation methods and procedures. An additional factor is that individual studies vary greatly in their scope, geographic coverage, goals and level of detail. These characteristics greatly influence not only the type of strategies that may be examined, but the

means by which the analysis is conducted. As a result of these factors, it is impossible to designate a single methodology for evaluating potential congestion management strategies.

There have been, however, many steps taken at the regional, state and federal levels to provide greater guidance for the analysis of alternative strategies as part of larger studies. This guidance has included recommendations or requirements related to study format, content and analysis techniques. The purpose of this guidance is to provide for greater consistency in results, and to provide guidance to analysts. Within a study, this consistency allows for easier comparison of alternatives. Consistency also allows for the results from one study to be compared to those from another.

Most major studies conducted in northeastern Illinois follow some form of guidelines. These guidelines include federal requirements related to EISs and MISs. Guidelines have also been developed by IDOT for conducting SRA studies. These guidelines are described within a document entitled SRA Design Concepts Report.

Another key activity involving the analysis of alternative strategies, especially at the regional level, is the development of northeastern Illinois' RTP, which includes an assessment of proposed improvements and strategies. The TIP Conformity process is also an important evaluation tool. As part of this process, the air quality impacts of the entire program are checked for conformity. More focused studies that also often follow more standardized formats include subarea transportation plans, corridor studies, and traffic impact studies.

In addition to activities described above, CATS and the CMS Task Force have developed study guidelines specifically in response to the CMS regulations. These have been incorporated into the interim CMS, the TDR Report Program, and the CMS Alternatives Review Guidelines. Each of these are described in the following section.

## **5.2 CMS ACTIVITIES**

To enhance the region's consideration of alternative strategies in response to the ISTEA and CMS regulations, a number of new activities have been or will be implemented. These include activities whose primary function is to provide guidance in this step of the planning process to those who conduct studies and develop project proposals. These activities include the interim CMS, the Alternatives

Review Guidelines, and the Congestion Mitigation Handbook. A fourth new activity, the TDR Report Program, is a specific element of the development process for add-lanes projects.

### **5.2.1 Interim Congestion Management System**

The metropolitan planning rules associated with ISTEA included the requirement that an interim CMS process be established to cover the period prior to implementation of the full CMS. An interim CMS for northeastern Illinois was approved by the CATS Policy Committee in October 1993. The interim CMS included a description of the existing planning and programming processes and their role in meeting the interim requirements. The interim CMS also contained a discussion of regional transportation management strategies. This discussion included the identification of activities involving the consideration or implementation of transportation management strategies or TCMs. Finally, the interim CMS included a commitment to the review and documentation of the viability of all reasonable regional and subregional/corridor alternatives to add-lanes projects. Furthermore, IDOT and CATS committed to document the planning and implementation of effective project-specific management strategies for affected add-lanes facilities and to implement other management strategies appropriate for the project corridor or subarea. The interim CMS is superseded by the final CMS described in this report.

### **5.2.2 Travel Demand Reduction Report Program**

As part of the interim CMS, CATS and IDOT developed a procedure for identifying and evaluating TDR strategies for application with roadway add-lanes projects. This procedure has been formalized as the TDR Report Program and responds directly to the third CMS requirement highlighted at the beginning of this chapter. Under this program, the Transportation Management Division of CATS performs reviews and site-screenings of IDOT add-lanes projects to identify opportunities for TDR strategy applications in project corridors. The resulting TDR reports are incorporated into the CMS or environmental assessment documents for the project. The application of TDR strategies can potentially reduce the number of vehicle trips on the proposed roadway to extend the effective design life and enhance the efficiency and effectiveness of the improvement in order to meet regional travel needs.

CATS currently analyzes the TDR potential for all IDOT add-lanes projects, and does so for local add-lanes projects on request. The first step in the TDR process is to screen project corridors or areas based on their potential for demand management strategy implementation. The criteria used in this assessment includes project length and location, density and nature of existing and future development,

level of public transportation service, proximity to major roadways, level of traffic congestion, and the presence or potential for local transportation interest group or transportation management association.

For those project locations that pass the screening, the second step involves identifying specific demand management strategies for implementation. TDR strategies that are considered include rideshare information signing, Transportation Management Association development, employer-oriented rideshare programs, expansion of bus and rail transit services and facilities, employee parking management programs, mixed-use development and on-site convenience services, improved pedestrian access, new resident packets containing information on commute alternatives, and interconnection of traffic signals. Long-term strategies recommended for implementation include subregional transportation studies to identify traffic patterns and future transportation infrastructure and service needs, shuttle service provision between residences and transit stations, and the monitoring and evaluation of commuter rail.

CATS will perform these analyses on an on-going and as needed basis and will prepare reports for those corridors having high TDR potential. TDR strategy application will differ according to the characteristics of the project area and the existing transportation services and organizations in the target corridor. A description of the TDR Report Program, and how local agencies may request CATS support and review, is provided in the Congestion Mitigation Handbook.

### **5.2.3 CMS Alternatives Review Guidelines**

In May 1995, the CMS Task Force developed the CMS Alternatives Review Guidelines. The guidelines provided background on the requirements related to the consideration of alternatives, and outlined a suggested process for conducting a CMS alternatives review. The steps in this process included those of identifying and evaluating reasonably available alternatives to adding general purpose lanes, and of defining management strategies to be implemented with an add-lanes project if the analysis demonstrated that additional general purpose capacity was warranted.

In support of this process, the guidelines identified nine alternative strategies that were considered to be “reasonable.” The nine strategies identified were: traffic operational improvements, TDM measures, transit capital improvements, transit operational improvements, access management measures, bicycle and pedestrian measures, HOV measures, incident management, and ITS strategies. The guidelines indicated that other alternatives may also be considered. The guidelines did not define a specific approach or methodology for the evaluation of alternatives, nor did they include a reporting



requirement. Rather, the guidelines simply outlined a suggested approach limited to the recommendation that the alternatives review include a discussion of alternatives and their expected impacts.

#### **5.2.4 Congestion Mitigation Handbook**

To further promote the identification, assessment and implementation of alternatives, CATS, through the CMS Task Force, has developed a Congestion Mitigation Handbook. This handbook is intended to be a resource or reference guide used by project planners. It is intended to provide guidelines on identifying and analyzing strategies, and conducting post-implementation evaluations.

The Congestion Mitigation Handbook is designed to help agency staff meet the challenge of successfully identifying, screening, and analyzing potential alternative strategies that may be appropriate for a particular area and a specific problem. The handbook includes the following:

- an overview of alternative strategies including general features or characteristics, and a discussion of strategy “packaging”;
- detailed descriptions of individual strategies including a discussion of the circumstances under which the strategies are typically most effective, and guidance regarding the tools and methodologies that may be used for more detailed study of specific strategies;
- a description of CATS current TDR Report Program; and
- a discussion of approaches for evaluating strategies after they are implemented.

While the handbook is directed at helping agencies meet the CMS requirements, it is important to recognize that the benefits of a logical and careful strategy evaluation process go far beyond simply meeting the letter or intent of the federal legislation. Implementation of new strategies should result in more cost-effective multimodal solutions and ultimately improved transportation system. State and local agencies all have their own experience with transportation improvement strategies, but there are always new findings and ideas from other places. Strategies such as traffic operations improvements or incident management systems can significantly reduce congestion but must be applied in the right places. Even more benefit can be achieved by using multiple strategies (e.g., HOV facilities and ridesharing programs), but the challenge lies in knowing how, where, and when to package these strategies. The key to an effective strategy screening and evaluation program is to follow a logical and thoughtful process

that uses all available information. The Congestion Mitigation Handbook is designed as a guide to that process.

### **5.2.5 Corridor/Subarea Screening Studies**

To assist project planners in the task of identifying reasonable alternatives, CATS, through the CMS Task Force, will conduct preliminary corridor or subarea screening studies. The purpose of these studies will be limited to identifying those strategies that appear most reasonable for the particular location. Project planners may then use these results to define the alternatives that will be examined in more detail as part of subsequent studies such as a Phase I engineering study. While the screening studies will be advisory in nature, their benefit is that of helping project planners focus on those strategies considered to be most reasonable.

The number and timing of these screening studies will depend upon the availability of resources. Corridors or subareas will be selected by the CMS Task Force based upon a combination of:

- results from the CMS Monitoring Program;
- results from other performance assessments, if available;
- cooperation and coordination with affected jurisdictions and agencies; and
- knowledge of other studies (it is expected that the CMS screening studies will cover areas not being examined as part of another current study).

The selected locations will be prioritized and matched to available resources.

## **6. PROJECT SELECTION AND IMPLEMENTATION**

The project selection or programming process leads to the development of the region's Transportation Improvement Program (TIP) and builds upon numerous activities including long range transportation planning, ITS deployment planning, project generation, and program integration, review and approval. To ensure that congestion management strategies are appropriately considered, congestion relief should be a factor within the project selection process. Furthermore, an implementation schedule must be developed, implementation responsibilities must be defined, and potential funding sources must be identified for each proposed strategy. These requirements are reflected in the CMS regulations.

The current programming process for northeastern Illinois, in large part, already incorporates these elements. The CMS is intended to be a tool which will integrate and enhance these current efforts by instituting a systematic approach to the development and analysis of information, thus assuring that congestion management strategies continue to be considered in a reasonable manner.

### **6.1 CURRENT PROGRAMMING PROCESS**

The project selection process is part of the development of the region's TIP. This cooperative metropolitan planning process, directed by CATS' Policy Committee (the MPO), involves federal, state, and local officials; transportation providers; citizens; and planning organizations in the region. In developing the TIP, project proposals from various agencies are received and available funding allocated to selected projects.

There are several important features of the TIP development process. First, the TIP development process is complex and lengthy. The steps from plan to program may take decades. Second, the TIP development process involves the aggregation of several program components into a single program for northeastern Illinois. Each program has different requirements and procedures. Third, development of the TIP is a constantly evolving process that changes in response to federal regulations and the needs of the region. Recent changes in the TIP development process resulted from the enactment of ISTEA, the Clean Air Act Amendments of 1990 (CAAA90), the management systems and the Americans With Disabilities Act (ADA). For example, TCMs are now an area of emphasis in developing the TIP. Additionally, opportunities for public participation, which were always part of the metropolitan planning process, are expanding.

The TIP process coordinates and programs the implementation of plans and projects. Potential projects are identified through various long range transportation planning efforts, such as the RTP. From these planning efforts, specific project proposals are initiated by local governments, public transportation operators, and the state of Illinois. It is in this stage that implementation plans meeting the CMS requirements are developed. These project proposals are then put forward for programming consideration at the subregional, regional and/or state level. In each case, the process of ranking or prioritizing proposals involves consideration of many factors, including that of congestion relief.

Two factors must be recognized when addressing the level to which congestion management or mobility enhancement are given priority in the TIP process. The first is that congestion relief is just one of many objectives or priorities that agencies must consider. Most notably, these other objectives include safety and maintenance of the existing system. In some instances, available funding may only be sufficient to cover needed safety and maintenance projects. The second factor is that many funding sources include constraints or restrictions related to the types of projects that may be funded from that source. Examples include funds programmed specifically for bridge or interstate maintenance.

### **6.1.1 TIP Development: From Plan to Program**

To develop the TIP for northeastern Illinois, participating agencies engage in long-range planning, project generation, and program integration, review, and approval. The current TIP development process is outlined on the following pages. It explains the interaction with the CMS and highlights opportunities in the process for public participation; participation in the early stages of the process is often very beneficial and effective.

#### ***6.1.1.1 A Coordinated Program of Planning Work***

The framework for the planning process in northeastern Illinois is developed in the region's *Unified Work Program for Transportation (UWP)*. Through the development of the UWP, a financially-constrained program of needed planning tasks is identified and coordinated. The UWP coordinates and programs the planning activities, much as the TIP coordinates and programs implementation activities. Tasks included in the UWP range from long-range plan development to project-specific planning to the development of the TIP itself. Activities related to the on-going implementation of the CMS will be identified in the UWP and coordinated with other participating agencies.

### **6.1.1.2 Long-Range Planning**

The RTP for northeastern Illinois encompasses the major programs, strategies, and new facilities necessary to accommodate the needs of the region as it grows and changes. The Goals and Objectives of the Plan guide the selection of projects and often represent a wide variety of project groups, such as non-motorized projects or transportation control measures, where specific project locations are undetermined. Therefore, the elements of the RTP are implemented through the TIP.

CATS completed an RTP update in 1994 to comply with the requirements of ISTEA. Work on a long-range plan for 2020, the *2020 Regional Transportation Plan (2020 RTP)* is underway. The 2020 RTP will provide direction for development of TIPs for the next two decades.

Additional long-range planning takes place at a variety of levels. For example, corridor studies may look at the general needs and potential alignments for new facilities. Subarea and countywide studies focus on particular geographical areas of the region's transportation system. Likewise, local governments may conduct local facility plans to prioritize needs. The CMS will utilize these activities, working with project implementors, to specify strategies designed to alleviate both present and anticipated congested conditions. Information gathered during this process will be fed back into the update of the regional transportation plan.

### **6.1.1.3 Project Proposals**

Utilizing the regional transportation plan that is developed through the cooperative metropolitan planning process, specific project proposals are initiated by local governments, transportation operators, and the state of Illinois. Projects are typically broken into phases: two preliminary engineering elements, right-of-way acquisition where necessary, construction and construction engineering.

In phase I engineering, multimodal, site specific options and alternatives are explored; conditions are determined; preliminary design sketches are completed; and an environmental review is completed. For this phase, the CMS provides guidance related to potential strategies and how they may be evaluated. In phase II engineering, plans and specifications are completed and quantities are estimated. If necessary, right-of-way acquisition begins at this time. Construction and construction inspection are the final elements of a project. Each of these elements may require a year or more, necessitating extensive advance planning on the part of implementors. Public participation is an integral part of this process for both the implementor and the MPO.

#### ***6.1.1.4 Subregional, Regional, and State Programming***

Before an implementor submits a project proposal for inclusion in the region's TIP, it is programmed by the responsible subregional, regional, or state agency. The MPO, with assistance from the state of Illinois and the RTA, provides estimates of federal, state and local funding available. Implementors then allocate these estimated resources using a set of evaluation criteria, subject to fiscal constraints, and schedule projects for one of the subsequent five years. The resulting programs are submitted to CATS for consideration in the region's TIP.

#### ***6.1.1.5 Program Review, Revision, and Conformity Analysis***

Following submission of proposed projects, the MPO reviews the proposed TIP for accuracy, fiscal constraint, compliance with air quality regulations, and compatibility with the regional plan. The proposed TIP and Conformity Analysis are reviewed by the regional planning agencies. NIPC conducts a review process to ensure that the TIP is consistent with local and regional plans. The TIP is then presented for a formal public comment period.

#### ***6.1.1.6 Formal Public Review and Comment Period***

The TIP is released for a formal public comment period of thirty days. Comments regarding the TIP and its conformity finding are specifically solicited from interested parties and individuals. Additionally, notices requesting participation are published in the local newspapers.

The conformity finding and the program taken as a whole are the focus of the comments during this review period. Typically, discussion of individual projects in the program will have taken place during implementors' public involvement processes much earlier in the TIP development process.

When the comment period ends, CATS staff and the implementors review the comments, respond, and make revisions to the TIP if necessary. If revisions are of such a scope as to require a new conformity run, CATS staff incorporates any necessary changes into the TIP document, and resubmits the resulting program.

#### ***6.1.1.7 TIP Approval***

Following the public comment process, the Work Program Committee submits the TIP to CATS' Policy Committee with a recommendation for endorsement. Policy Committee endorsement of the TIP and its conformity finding are the concluding actions in the MPO TIP approval process. After MPO endorsement, the governor (or a designee) must approve the TIP, then FHWA and FTA must issue a conformity finding on the TIP in consultation with the U.S. Environmental Protection Agency. Once these approvals are obtained and appropriate financing is available, program implementation may begin.

#### **6.1.1.8 TIP Changes**

Changes take place over the year that result in revisions to the TIP. For example, expected implementation dates may change, project limits may increase, or additional phases may be added to a project. There is a rigorous process for approving changes to the TIP once it has received Policy Committee approval and a federal conformity finding. The rules for changing projects in a TIP are approved by the Policy Committee.

## **6.2 CMS ACTIVITIES**

A goal of ISTEA and its related planning regulations is that congestion be given appropriate consideration within the regional transportation planning and project selection process. As described above, this goal is currently being met within northeastern Illinois. An understanding of current performance levels, and congested locations, is used by individual agencies to define study needs and develop project proposal. As part of proposal development, project schedule, responsibilities and potential funding are identified. Finally, congestion relief is one of the factors considered in the selection of projects for the TIP. This process has proved to be very effective in considering congestion and for matching funds with the most needed projects in the area. A system of checks and balances is inherently in place through the National Environmental Protection Act (NEPA) process which requires alternatives to be evaluated and multimodal components considered during Phase I engineering.

The intent of the CMS is not to replace existing processes, but rather to organize and supplement information necessary to develop strategies to alleviate congested conditions and enhance mobility. The CMS will enhance existing activities by instituting a systematic approach to the development and analysis of information. As the CMS monitoring and strategy consideration practices evolve, the results from these new practices should be integrated into the TIP process.

## **7. EFFECTIVENESS EVALUATION**

Effectiveness evaluation involves assessing the benefits that have actually been achieved from implemented transportation strategies. This information assists in making better planning decisions in the future, as lessons are learned from those projects already in place. It can be used to improve the estimation of impacts as part of subsequent studies and to provide guidance to decision-makers on the selection of effective strategies for future implementation. The Federal CMS regulations call for a "process for periodic assessment of the efficiency and effectiveness of implemented strategies in terms of the area's established performance measures." Generally, transportation agencies do relatively little effectiveness evaluation, due to its additional cost. However, there may be some situations in which evaluation of implemented transportation projects is worthwhile or necessary:

- Where evaluation is required as part of the funding obtained for the project. For example, some CMAQ projects come with the stipulation for a before-and-after study.
- Where there is little known about the actual benefits of the project. Effectiveness evaluation could be used to determine whether the benefits were sufficient for it to be tried elsewhere. For example, a survey might be conducted of a new type of trip-reduction initiative to determine how trip-making behavior actually changed.
- Where there is a significant community concern. In some cases, for example, development agreements have included a requirement for monitoring to ensure that traffic levels have not been exceeded or that the level of service has not deteriorated below a certain point or that the promised improvements are working.
- Where the information will help to improve and fine-tune on-going operations. For example, a traffic management system typically has a built-in monitoring capability of traffic and of system hardware that allows operators to continuously evaluate and improve operations.

However, there are also difficulties with effectiveness evaluation that limit its use. Effectiveness evaluation can be costly, and there can be a variety of complicating factors (e.g. changes taking place other than the transportation strategy itself) that make it difficult to isolate the impacts of the study improvement. This is why evaluating through the on-going monitoring system can be a good strategy, if the monitoring system can be designed to accommodate evaluation needs as much as possible.



## **7.1 EXISTING ACTIVITIES**

At present, a small number of projects or improvements are subject to post-implementation effectiveness evaluations. However, it must be recognized that regular data collection and performance monitoring programs provide a foundation for evaluating the effectiveness of strategies. As described in Chapter 4, there are a number of existing data collection programs that can provide input into an assessment of performance trends and strategy impacts. For example, the speed run data collected by CATS could be used for before-and-after evaluations. CATS is currently using these data for comparison of empirical to modeled speeds and for examination of performance. However, these data have not been used to measure the effectiveness of individual projects or strategies.

Post-implementation studies are currently conducted for projects implemented as part of selected programs, specifically those implemented under the CMAQ and SCAT programs. Projects funded through the CMAQ program are required to be monitored for both air quality and congestion impacts. projects require before-and-after studies to identify congestion relief and travel time impacts.

In addition to these programs, a number of individual projects have been subject to post-implementation evaluation assessment. This is often the case for larger-scale and ‘showcase’ projects. These include expressway projects, ADVANCE, and automatic toll collection on I-355.

## **7.2 CMS ACTIVITIES**

To enhance the region’s capability to assess the effectiveness of implemented strategies, a number of new activities have been or will be implemented. The first of these is the CMS Monitoring Program that was described in Chapter 4. Similarly, the proposed SRA Monitoring Program will provide systematic and consistent information for that portion of the transportation network. In addition, CATS, through the CMS Task Force, has developed guidelines for conducting effectiveness evaluation studies, will compile effectiveness information from other sources, and will take a lead role in conducting “after” studies for selected projects.

### **7.2.1 CMS Monitoring Program**

The primary effectiveness evaluation element of the northeastern Illinois CMS will be the CMS Monitoring Program. The monitoring program will provide regularly updated performance information

for an extensive multimodal transportation network in northeastern Illinois. The program includes a variety of congestion, multimodal and accessibility measures. This information will assist in determining whether significant projects and strategies have resulted in a change in congestion.

As appropriate, the monitoring system will be modified or enhanced to accommodate additional evaluation capabilities. For example, vehicle occupancy data could be collected annually on approaches to downtown and to selected major activity centers, such as just for the a.m. peak hour or peak period. This would enable before-and-after comparisons to be made periodically that would potentially detect the effect of various policy changes and trends over time. Other examples of enhancements to the monitoring system could include additional, strategic locations for the collection of data or enhanced data collection capabilities on existing systems (e.g. on transit system buses). The effect of a change in transit service could then be more routinely identified and evaluated in the course of regular operations.

### **7.2.2 SRA Monitoring Program**

As part of the continuing implementation of the SRA system, a monitoring program is being designed. This program is intended to sample portions of the SRA system annually and will focus on measuring three specific items: 1) system throughput, 2) congestion and effectiveness of movement, and 3) safety. These will be examined for a corridor based upon the type of improvement planned. Currently, a consultant is preparing a final report on performance measures. This report will identify an array of performance measures that may be used.

### **7.2.3 Evaluation Study Guidelines**

The CMS Task Force has developed guidelines to assist project planners in defining when and how to conduct effectiveness evaluation studies. A set of criteria has been defined to help identify when additional effectiveness evaluation beyond that provided by the monitoring program may be warranted. The criteria include:

- Current knowledge of benefits. Project types about which little is known about actual performance would be rated higher.
- Expected frequency of future implementation. Project types that will not likely be implemented very often would be rated lower.
- Importance of knowing the benefits. It may be important to know the benefits of certain projects because of their impacts, political sensitivities, or other factors.

- Cost of evaluation. Many types of projects would be difficult to evaluate without a significant investment.

These criteria may be used at the discretion of individual project sponsors to identify projects for which evaluation would be beneficial. Additionally, the CMS Task Force will use these criteria to make an annual determination of which regionally-significant transportation improvements, if any, should be evaluated beyond the monitoring process. It should be noted that in applying these criteria, the collection of some data may need to take place prior to project implementation.

The Effectiveness Evaluation Guidelines also provide assistance regarding how to conduct effectiveness evaluation studies. The guidelines identify the tools, methods and performance indicators that may be used to empirically measure the impacts or effectiveness of implemented strategies. As part of this, the level to which current monitoring programs may be used to capture these impacts is discussed. The Effectiveness Evaluation Study Guidelines are presented in the Congestion Mitigation Handbook.

#### **7.2.4 CMS Evaluation Studies**

CATS and the CMS Task Force will take an active role in conducting effectiveness evaluations and in encouraging individual project sponsors to do so. The CMS Task Force will make an annual determination of which regionally-significant transportation improvements, if any, should be evaluated beyond the monitoring process. Such improvements would likely be of a larger scale, and may be determined using the criteria established as part of the Evaluation Study Guidelines. For the selected improvements, the CMS Task Force will work with and encourage the project sponsor to conduct the effectiveness evaluation study. Where appropriate and as resources allow, CATS will take a lead role in conducting these studies at the direction of the CMS Task Force. In both instances, the support and cooperation of the project sponsor and affected jurisdictions will be sought.

#### **7.2.5 Effectiveness Evaluation Library**

An inventory of federal, state, and local evaluation information regarding the benefits of various types of strategies will be maintained by CATS. This inventory will be made accessible to those considering implementing various strategies. It will serve as a regional clearinghouse of evaluation information. This information could be used to support the planning and decision-making process.

## **8. RELATIONSHIP TO THE PLANNING PROCESS**

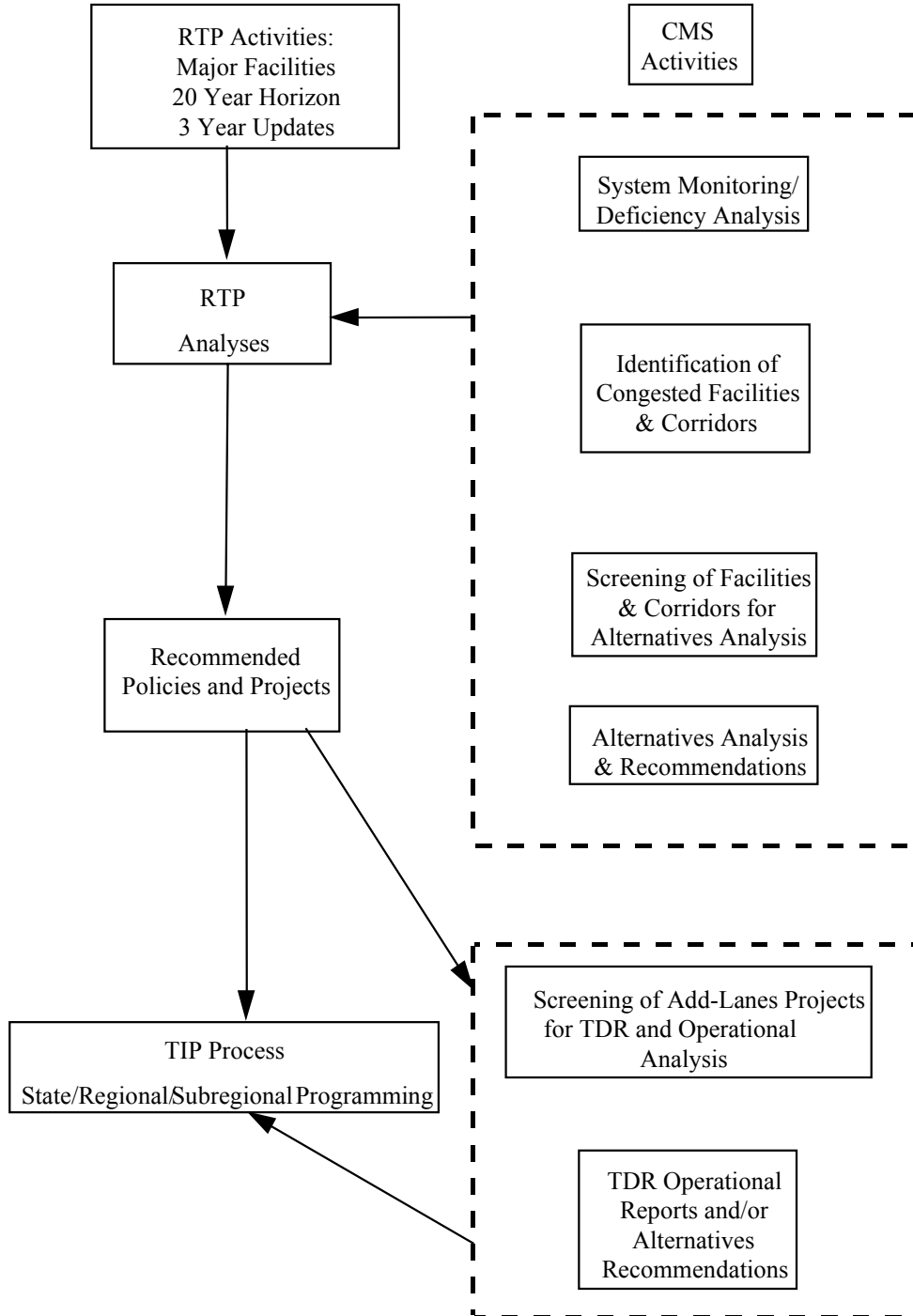
Several of the activities identified as components of the CMS are currently being accomplished as part of the continuous, comprehensive and cooperative transportation planning process. It is intended that the CMS enhance these activities by instituting a systematic approach to the development and analysis of information useful for both the RTP and TIP.

As diagrammed in Figure 8-1, CMS activities will focus primarily on the relationship with the RTP and the TIP. Clearly, efforts such as data collection and deficiency analyses have always been conducted in support of the development of long range transportation plans. One function of the CMS is to incorporate these functions and expand them into a systematic identification, screening and analysis of congested facilities and corridors. Results of these monitoring, deficiency and alternatives analyses will be used in two primary areas: first as information to feed into the RTP update which is conducted on a three year cycle; and, second as additional information to be used by various programmers responsible for developing the annual TIP.

The system monitoring activities directly associated with the CMS will essentially utilize data from existing sources or require only limited new data collection. Existing data sources available to CATS include projects and policies identified in the current RTP, IDOT's IRIS, speed runs on arterial streets conducted annually by CATS staff, information from the travel demand estimation models in use by the CATS, various traffic count programs conducted throughout northeastern Illinois, traffic data provided by IDOT's system surveillance program on the Interstate system, and other relevant information as provided by the transportation operators who are also members of the CMS Task Force.

The identification of congested facilities and corridors will utilize both empirically derived information on current conditions and travel demand estimation model results for future projections. The determination of congestion and its extent will rely on the specification of performance measures as defined previously in this report.

**FIGURE 8-1**  
**RELATIONSHIP OF CMS TO THE RTP AND TIP**



Those facilities and corridors identified as congested will be screened for the appropriateness of an analysis of strategies or combinations of strategies as listed in Table 3-1. Alternatives analyses will be prepared to examine those strategies identified as appropriate for a particular facility or corridor. As previously noted, these studies will be utilized in the update of the RTP and also provided to programmers responsible for the facilities and strategies studied.

Another function of the CMS is to examine those projects that entail the addition of general purpose lanes in terms of how TDR activities could enhance and extend the useful life of the proposed project. As with identification of congested facilities and corridors, a screening of these facilities is conducted to determine the appropriateness of the facility for conducting an analysis of TDR activities. Information from these analyses is provided to the programmers of the lane addition project. This activity of the CMS has been an integral part of the interim CMS currently in use in northeastern Illinois.

## **9. ROLES AND RESPONSIBILITIES**

The on-going functioning of the CMS will require the support of all agencies in the region. In addition, it will require that individual agencies fulfill, either directly or indirectly, a number of specific roles and responsibilities. CATS will have primary responsibility for the northeastern Illinois CMS, however IDOT, local agencies (both municipal and county), and the region's transit agencies (RTA, CTA, Metra and Pace) will also play important roles. The region's toll facility operators, ISTHA and the Chicago Skyway, also have a role in the future of the CMS. Furthermore, public participation is an important element of the region's transportation planning process, including implementation of the CMS.

The functions or tasks that support the CMS and the roles for these agencies are summarized in Table 9-1. The functions listed in this table are categorized according to the related CMS component. The roles for various agencies are defined as being either directly or indirectly related to the CMS. A direct role is one that is derived specifically from the functioning of the CMS. An indirect role is one where the designated task or role is already performed, but may now be guided by or used to support the CMS. For example, data collection currently performed by IDOT as part of its expressway surveillance and SRA activities will be used to support the CMS Monitoring Program.

On-going CMS monitoring will require the collection, submission and compilation of data. As currently defined, the CMS Monitoring program relies primarily upon data collected through existing activities by various agencies. New data collection requirements are limited to those for which CATS is responsible. The CMS does not require other agencies to undertake any new data collection programs, but does involve the need for these agencies to work cooperatively and submit the pertinent data to CATS. In turn, CATS is responsible for compiling the data, and conducting the performance assessment using the selected performance measures.

The results of the performance assessment may be used by CATS to identify system deficiencies and locations where further study may be warranted. The intent of such a study may be to verify or further define a potential problem, or to identify and evaluate potential solutions. It is also expected that other agencies will conduct similar processes of identifying potential deficiencies within their own systems. These processes may use the CMS performance assessment, but are also likely to rely upon internal assessments.

**Table 9-1  
ROLES AND RESPONSIBILITIES MATRIX**

Task/Function	CATS	IDOT	Local City & County Agencies	Transit Agencies	ISTHA/Chicago Skyway
<b>MONITORING</b>					
Collect Data	X	y	y	y	y
Submit Data		X	X	X	X
Compile Data	X	y	y	y	y
Prepare Performance Assessment	X	y	y	y	y
Identify Deficiencies and Establish Need for Further Study	X	y	y	y	y
Review and Update CMS Network	X				
Review and Update CMS Performance Measures	X				
<b>STRATEGY SCREENING AND EVALUATION</b>					
Distribute and Update Congestion Mitigation Handbook	X				
Conduct CMS Corridor/Subarea Screening Studies	X				
Conduct Alternatives Analysis	y	y	y	y	y
Prepare TDR Reports	X	y	y	X	
<b>PROJECT SELECTION AND IMPLEMENTATION</b>					
Set Project Priorities	y	y	y	y	y
Implement Projects	y	y	y	y	y
<b>POST-IMPLEMENTATION</b>					
Maintain Library of Effectiveness Evaluation Results	X				
Distribute and Update Study Guidelines as part of the Congestion Mitigation Handbook	X				
Conduct Effectiveness Evaluation Studies	X	y	y	y	y

Key: X Role performed directly as part of the CMS  
y Task or role currently performed that is related to the CMS



The above functions form the actual process of monitoring the CMS network. Representative of the 'living' nature of the CMS, this component also includes the tasks of updating and refining both the network and performance measures. These tasks are the responsibility of CATS, and specifically the CMS Task Force. Rather than being performed on a specific cycle, these tasks may be performed on a continuous basis, responding to changing needs, technologies, and experience.

The direct CMS activities that comprise the Strategy Consideration component include distributing and updating the Congestion Mitigation Handbook, conducting strategy screening studies, and preparing TDR reports for add-lane projects. CATS and the CMS Task Force will be responsible for maintaining the Congestion Mitigation Handbook. The handbook is to be updated as policies, knowledge of impacts, and evaluation techniques related to the various strategies change. The second task is that of conducting strategy screening studies for selected corridors and subareas. As resources permit, CATS will conduct these studies based on the results of the CMS performance assessment and other factors. The third task is the preparation of TDR reports for each add-lanes project submitted for consideration in the TIP. CATS, in cooperation with the region's transit agencies, will be responsible for preparing the TDR reports. As part of this component, agencies throughout the region would continue to conduct a variety of studies involving the evaluation of alternatives and the development of project proposals. These studies would not be directly part of the CMS, but may be influenced by the CMS regulations and each of the CMS activities to varying degrees depending upon the nature of the study itself.

The Project Selection and Implementation Component does not involve direct CMS activity. The requirement for this component is that congestion and congestion relief be considered within the selection process and that committed demand and operational management projects be implemented. It is expected that all agencies, through their existing procedures and activities, will meet these requirements.

CATS will play a very active role in the Effectiveness Evaluation component. Key activities include maintenance of the effectiveness evaluation library and development of the Effectiveness Evaluation Study Guidelines. Furthermore, CATS, through the CMS Task Force, will be responsible for identifying projects that warrant effectiveness evaluations and for conducting post-implementation effectiveness evaluations or encouraging sponsoring agencies to do. Other agencies are expected to participate in these studies and to conduct their evaluations in response to their needs and other requirements (e.g., CMAQ).

As the MPO for northeastern Illinois, the CATS Policy Committee and its implementing agencies have long recognized that a key ingredient in a successful transportation planning effort is the participation of the public. Through the region's public involvement plan, which includes (but is not limited to) open meetings, public hearings, newsletters, presentations by MPO staff, and the participation of citizen groups on task forces, the public can make meaningful contributions to the transportation planning process.

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