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Congestion Management Process

Documentation

Prepared by the Congestion Management Program

Draft

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1. INTRODUCTION

Highway users in the Chicago region may confront highway congestion on a regular basis.[1] Travel times in the region may be unreliable. Congestion can be caused by commuter traffic, construction, inclement weather, a cultural or sporting event, or traffic crashes. Congestion may be present seven days per week on some routes. Estimates of the regional cost of congestion have ranged from $4 billion to $11 billion per year.[2]

CMAP's Congestion Management Process (CMP) is the Chicago region's process for comprehensively addressing congestion in the surface transportation system. The CMP provides accurate, up-to-date information on transportation system performance and reliability. The CMP also assesses alternative strategies for congestion management to meet the region's needs.

CMAP works closely with the many agencies that operate the transportation system and that implement transportation system improvements. The CMP has established new channels for collaboration among partner agencies. The CMP is also closely integrated with GO TO 2040, the region's comprehensive regional plan, so as to advance plan's implementation throughout the region.

Systematic collection and analysis of transportation information as a part of the CMP allows CMAP to better understand and communicate congestion management needs to those partners. In this way, the CMP employs the knowledge that has come with better data availability, enhanced data management and modeling, and expanded applications of intelligent transportation systems (ITS) to improve congestion management within transportation planning.

The position of the CMP within the regional planning process allows for the work activities and policies that support the CMP to remain dynamic and iterative, while supporting a set of mutually agreed upon regional goals. These work activities and policies are expected to change over time to incorporate new best practices and reflect any changes to regional priorities.

The CMP is required for large metropolitan regions such as Chicago by federal regulations.[3] As the designated metropolitan planning organization (MPO)[4] for the Chicago region, MPO Policy Committee of the Chicago Metropolitan Agency for Planning has a central role in managing the regional transportation system, and has the responsibility for implementing the CMP. CMAP has prepared this document in support of the CMP on behalf of the MPO Policy Committee.

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[1] The Chicago region consists of the following Illinois counties: Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will, and Aux Sable Township in Grundy County, Illinois.

[2] See, for example, the Metropolitan Planning Council's *Moving at the Speed of Congestion* (2008); the Texas Transportation Institute's *2009 Annual Urban Mobility Report* (2009), and the $11.0 Billion estimate by Wells (USDOT) (2008).

[3] 23 CFR 450.320(a) and (b)

[4] MPOs are designated by the Governor of Illinois in consultation with local elected officials, and are responsible for carrying out the metropolitan transportation planning process. CMAP's MPO Policy Committee acts as

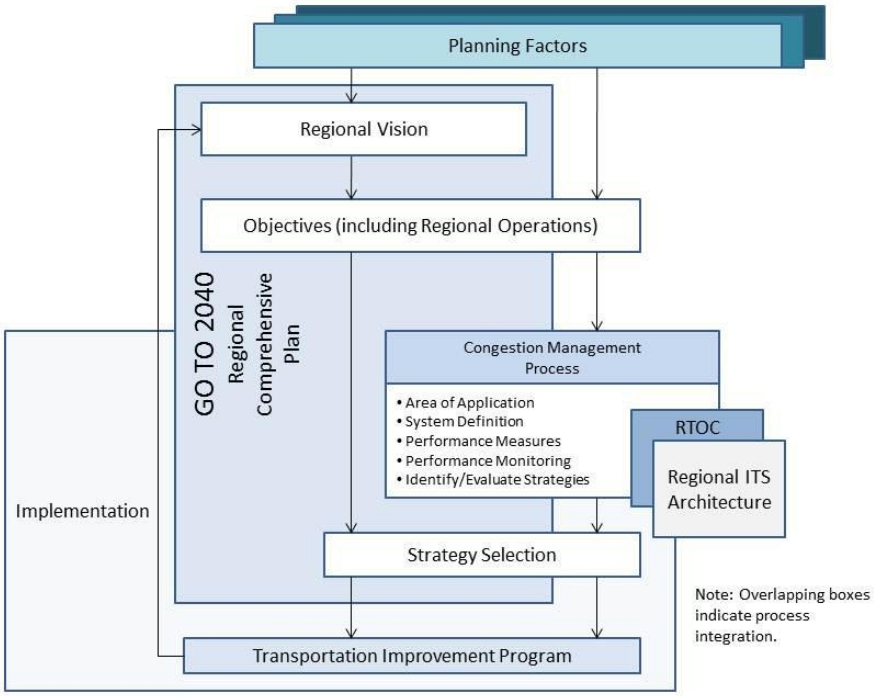
2. BACKGROUND OF THE CMP

The CMP builds upon the "Congestion Management System" first introduced into the metropolitan and statewide planning processes by the Intermodal Surface Transportation Efficiency Act of 1991. The Safe Accountable Flexible Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU) is the most recent authorization of the nation's surface transportation program.

Federal guidance has specifically explained that SAFETEA-LU refocused congestion management away from being stand-alone data analyses or reports to being fully integrated within the metropolitan transportation planning process.[5] CMAP has proactively applied such guidance by firmly integrating the CMP within the comprehensive planning process at the agency.

Figure 1-1 illustrates this systematic, objectives-based approach and the CMP's connection with the planning process.

Figure 2-1: Diagram of Objectives-driven CMP in Planning Process[6]



[5] Federal Highway Administration, 2011. Congestion Management Process, A Guidebook. 2011. P. 2. Posted at http://www.fhwa.dot.gov/planning/congestion_management_process/cmp_guidebook/.
[6] Ibid., p. 7, Figure 1 modified for Chicago region.

CMAP's congestion management process includes the basic elements suggested by federal guidance, including the development of congestion management objectives; establishment of multimodal performance measures; data collection and performance monitoring; strategies to manage congestion; implementation strategies; and program evaluation.[7]

In addition, some specific federal regulations apply to the Chicago region because of its nonattainment of National Ambient Air Quality Standards for 8-hour ozone and annual fine particulate matter (PM2.5) standards.[8] Any federally-funded transportation project in the region that significantly increases the capacity for single-occupant vehicles (SOVs) must be derived from a CMP. Specifically, expansion of facilities that would provide significant additional capacity for SOVs cannot proceed using federal funds unless "analysis demonstrates that travel demand reduction and operational management strategies cannot fully satisfy the need for additional capacity in the corridor and additional SOV capacity is warranted.[9]"

CMAP has made recent changes to better carry out these requirements within the region's CMP. These changes address congestion through long-range transportation planning and programming, such as coordinating planning for operations and management of the transportation system. The changes have also created new opportunities for advancing congestion management strategies that require implementation on a regional or subregional level, as opposed to those that are facility-specific or project-specific. For example, the CMP's link to GO TO 2040 has integrated congestion management into related CMAP efforts to encourage land use policy changes and to promote regional data sharing. The CMP has also greatly expanded consideration of freight congestion and freight impacts on passenger transportation.

The Need for Congestion Management

Beyond being a federal requirement, the need for a congestion management process is clear given the conditions of the transportation system in northeastern Illinois. Managing congestion in the region is and will continue to be significant element in sustaining residents' quality of life as well as mitigating the costs of congestion borne by residents and businesses alike. Furthermore, because congestion is a complex and multi-jurisdictional phenomenon, it is important to take a systematic and coordinated approach to solving congestion-related problems.

Roadway congestion, in particular, is a truly regional problem that affects a large part of the highway system for much of the day and causes considerable economic costs for both passenger travel and commercial goods movement. These costs are estimated to be between $4 billion and $11 billion per year.[10]

On the freeway system, congestion contributes to delays at some level seven days a week. According to the Texas Transportation Institute's *2011 Urban Mobility Report*, the Chicago region has some of the worst

[7] Ibid., p. 1.
[8] National Ambient Air Quality Standards (NAAQS) are established in the Clean Air Act and described in detail on the U.S. Environmental Protection Agency website: http://www.epa.gov/air/criteria.html.
[9] See 23 CFR 450,320 (e).
[10] See footnote 2, above

congestion compared to 15 other very large urban areas. For 2010 travel data, region ranked second in highest excess fuel consumed and first in highest economic costs per auto commuter.[11]

Rail congestion is also an issue of concern in the Chicago region. Positioned at the convergence of six of North America's seven Class I rail lines, and with an estimated 1,200 daily train routings[12], the region is the nation's rail hub. The freight rail network overlaps with the Metra commuter rail system, and the railroads have many road-rail and rail-rail at-grade crossings, which cause conflicts.

Both roadway and rail congestion cause freight delays in the region. In addition, waterway lockage and airport delays affect freight, potentially causing additional costs for doing business in the region.[13]

Growth forecasts indicate that the congestion problem may worsen, without mitigating actions. CMAP's 2040 population forecasts indicate that the region will grow by about two million residents and one million jobs.[14] Additionally, freight estimates indicate that truck traffic will grow by over 70% by the year 2040; rail volume is expected to grow by 62%, with the majority of the growth being intermodal freight.[15] These increases may put strains on the transportation system.

But highway congestion occurs for many reasons. Though congestion is typically seen as resulting from the level of travel demand outstripping supply, addressing congestion is in fact usually more complex than simply adding lanes where traffic is backed up. Focusing only on increasing highway capacity or on reducing travel demand misses a real understanding of traffic congestion, and misses opportunities to address congestion through thoughtful planning and a working knowledge of highway operations. Following are examples of sources of highway congestion that can be addressed in ways aside from building new roads or reducing demand:

- Much of the region's congestion results from "incidents," which might include traffic crashes, vehicle breakdowns, special events (sports, culture), construction, and adverse weather.[16]
- Congestion may result from excessive access (signals or driveways) on arterial highways. Likewise, congestion may also result from street networks that require all trips, even local trips, to use such arterial highways.[17]
- Congestion may result from highway bottlenecks. Operationally, bottlenecks may occur at lane drops (arterials and freeways), and on freeway sections with weaving areas or on-ramps requiring vehicles to

[11] Schrank, Lomax, and Eisele, 2011. 2011 Urban Mobility Report. Texas Transportation Institute. Posted at http://mobility.tamu.edu/ums/.
[12] www.createprogram.org, accessed June 2010.
[13] See Sections 4 and 5 of Cambridge Systematics, Inc. *Regional Freight System Planning Recommendations.* Prepared for Chicago Metropolitan Agency for Planning. June 2010. Posted at http://www.cmap.illinois.gov/freight-system-planning.
[14] Chicago Metropolitan Agency for Planning. *GO TO 2040 Comprehensive Regional Plan.* October, 2010.
[15] Ibid., p. 308.
[16] Cambridge Systematics, Inc. *Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation.* Prepared for Federal Highway Administration. Posted at http://www.ops.fhwa.dot.gov/congestion_report/congestion_report_05.pdf. Pp. 2-1 to 2-3.
[17] See *Arterials and Streets: Infrastructure and Operations*. Part II: Access Management. Prepared by Tom Murtha, CMAP. January, 2009. Posted at http://www.cmap.illinois.gov/cmp/strategies.

merge.[18] Merging and weaving traffic may cause traffic to slow down.[19] Slower speeds are associated with lower vehicle throughput. If the throughput is lower than the incoming volume, congestion will spread upstream from the bottleneck (even if the "capacity" at these upstream locations is greater than the volume).[20]

- Congestion may result from highway operations, such as trains crossing at-grade highway-railroad crossings.[21] Agencies without sufficient resources to properly design, operate, or maintain highway traffic signals and other traffic control devices may also add to delay.[22]

[18] Cambridge Systematics, Inc. *Recurring Traffic Bottlenecks: A Primer Focus on Low-Cost Operational Improvements.* Prepared for Federal Highway Administration. Pp. 9-10. Posted at http://ops.fhwa.dot.gov/publications/fhwahop09037/fhwahop09037.pdf.
[19] Ibid., p. 9.
[20] Ibid., p. 28.
[21] Steve Laffey, Illinois Commerce Commission. *Motorist Delay at Public Highway-Rail Grade Crossings in Northeastern Illinois, 2011 Update.* Posted at http://www.cmap.illinois.gov/freight-committee/minutes.
[22] National Transportation Operations Coalition. *2012 National Traffic Signal Report Card. Technical Report*. P. 3. Posted at http://www.ite.org/reportcard/TechnicalReport.pdf.

3. CMP OBJECTIVES

The current focus and structure of the Congestion Management Process (CMP) for northeastern Illinois is largely an outcome of CMAP's planning process for GO TO 2040. As the region's comprehensive plan, GO TO 2040 guides all transportation planning at CMAP and throughout northeastern Illinois. Thus, the following objectives, set forth in GO TO 2040, are objectives of the CMP.

- Hours of congested travel per day[23]
  - 2010: 1,800,000 (e)
  - 2040: 1,800,000 (t)
- Bridges found to be in "not deficient" condition[24]
  - 2007: 66% (a)
  - 2015: 70% (t)
  - 2040: 80% (t)
- Principal arterial route miles with acceptable ride quality[25]
  - 2006: 62% (a)
  - 2015: 65% (t)
  - 2040: 90% (t)
- Weekday transit ridership per day[26]
  - 2010: 2,000,000 trips (e)
  - 2015: 2,300,000 trips (t)
  - 2040: 4,000,000 trips (t)
- Percent of residents who are within walking distance of public transit from home:[27]
  - 2010: 68% (e)
  - 2015: 69% (t)
  - 2040: 75% (t)
- Percent of workers who are within walking distance of public transit from work:[28]
  - 2010: 76% (e)
  - 2015: 77% (t)
  - 2040: 80% (t)

[23] Ibid., GO TO 2040 p. 258. The population is forecast to increase from 8.6 million residents to 11.0 million. On a per person basis, the objective is for a reduction in congestion from .21 hours of congested travel per day to .16 hours of congested travel per day.

[24] Ibid., GO TO 2040. In addition, the CMAP Regional Bridge Conditions Report (July 2009, source of the baseline data) is posted at http://www.cmap.illinois.gov/cmp/measurement. The report briefly explains the bridge condition evaluation process.

[25] Ibid., GO TO 2040. In addition, Highway Ride Quality in the Chicago Region as of 2006 (November 2009, source of the baseline data) is posted at http://www.cmap.illinois.gov/cmp/measurement

[26] Ibid., GO TO 2040, pp. 292, 294. The baseline numbers reported are from the regional travel demand models. Annual ridership figures that can be tracked more closely are available from Pace and CTA; these closely tracked measures will be reported in CMP tracking documents.

[27] Ibid., GO TO 2040, p. 294. The baseline numbers reported are from regional travel demand models. "Walking distance to transit" is defined as .25 miles from a fixed route bus service or from a rail transit station.

[28] See the previous note.

- Implementation of CREATE:[29]
    - 2010: 10 CREATE projects completed (a)
    - 2015: 20 CREATE projects completed (t)
    - 2030: 71 CREATE projects completed (t)
- Motorist delay at highway-rail grade crossings.[30]
    - 2002: 10,982 hours/weekday (a)
    - 2015: 10,000 hours/weekday (t)
    - 2040: 5,500 hours/weekday (t)

(a): Actual, see footnote for source
(e): Estimated, from CMAP regional travel demand models
(t): Objective target

The link between the CMP and the regional plan has been largely established by aligning CMP objectives and activities with the regional priorities in GO TO 2040.

This policy direction allows further elaboration below for strategies to address regional congestion, including those specifically recommended in GO TO 2040. The GO TO 2040 objectives above support congestion management strategies to:

- Facilitate shifting the mode of additional passenger travel in the region to rely less on single-occupant vehicles.
- Improve regional transportation operations to enable the system to run more efficiently.
- Expand system capacity as required to maintain an acceptable level of service.

The scenario evaluation process that was used to develop GO TO 2040 is discussed further in Chapter 7 *Identification and Assessment of Strategies*.

[29] CREATE Program project implementation is tracked at http://www.createprogram.org/linked_files/status_map.pdf
[30] The Illinois Commerce Commission estimated 6-county motorist delay at railroad grade crossings in 2002. In 2011, the ICC estimated 6-county delay at 7,817 hours per weekday, substantially below the 2015 target and below the comparable figure in 2002.

4. AREA OF APPLICATION

CMP activities, such as performance monitoring and freight planning, are directed throughout the Chicago region's federally designated metropolitan planning area (MPA). This includes the seven counties of Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will, as well as Aux Sable Township in Grundy County, as shown in Figure 4-1.

Figure 4-1: Northeastern Illinois metropolitan planning area

As depicted in Figure 4-**2**, the model's highway network covers 18 full counties and three partial counties in Illinois, three full counties in Indiana, and three full counties in Wisconsin. CMAP has been working with the Northwestern Indiana Regional Planning Commission (NIRPC) to fully integrate the Indiana counties into CMAP's travel demand modeling framework.[31]

[31] These efforts and details of CMAP's modeling work are documented in detail at http://www.cmap.illinois.gov/modeling.

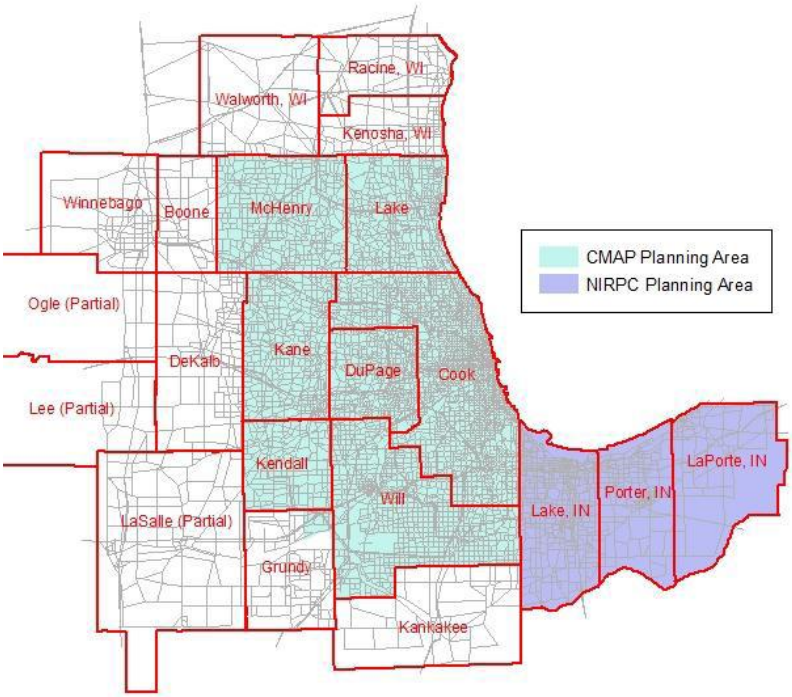


Figure 4-2: CMAP Travel Modeling Area

CMP Network

In order to support its role in analyzing and managing congestion, CMAP has designated a subset of the region's transportation facilities as a CMP-specific network. The multi-modal networks are the core elements of the transportation system, prioritized for monitoring and congestion mitigation strategy implementation, as appropriate. Particularly for the purposes of performance monitoring, it is useful to identify the region's key transportation system components that should be targeted for congestion management.

The CMP network comprises an extensive multimodal transportation system:

- Highway network[32]
    - Existing Freeways/Expressways (approximately 435 miles)
        - I-55, I-57, I-80, I-88, I-90, I-94, I-190, I-290, I-294, and I-355
        - Elgin-O'Hare Expressway and sections of: IL 53, IL 394, and US 41 (Lake Shore Drive)
    - Strategic Regional Arterial (SRA) system[33] (approximately 1,416 miles)

[32] The mileage indicated for the highway network is overlapping; the total below is the best estimate of the system accounting for such overlaps.

- Other principal arterials (approximately 1,908 miles)
- National Highway System (NHS) intermodal freight connectors (approximately 46 miles)
- GO TO 2040 planned capital additions (approximately 31 miles)[34]
    - Total CMP Highway System route miles: approximately 2,500. See Figure 4-3.

- Freight Rail network:
    - Railroad mainlines with more than 6 estimated freight trains per day (658 route miles)[35]
    - CREATE Program Corridors (103 route miles)
        - Total CMP Rail System miles: (677 route miles). See Figure 4-4.
- Transit service network:
    - Commuter rail service operated by Metra (980 directional route miles, 2010)
    - Urban rail and bus service operated by the Chicago Transit Authority (CTA), including planned arterial bus rapid transit services (1566 directional route miles, 2010)
    - Suburban bus service operated by Pace, including planned arterial bus rapid transit and express bus services (4059 directional route miles, 2010)
        - Total CMP Transit Service route miles: approximately 3300 miles.[36] See Figure 4-5.
- Bicycle and pedestrian network:
    - The bicycle and pedestrian network for purposes of congestion management remains to be defined.

[33] The SRA system is a CMAP-designated network of roads, developed to support transportation planning and analysis. Information about the system is available at http://www.cmap.illinois.gov/traffic/sra-resources.

Field Code Changed

[34] Includes Central Lake County Corridor and the Elgin-O'Hare Extension/West O'Hare Bypass. Intermodal freight connectors are not shown on Figure 4-3.

[35] National Transit Atlas Database, CMAP estimates (based on den09code>2). Most CREATE Program routes overlap with freight lines with more than six freight trains per day.

[36] Federal Transit Administration. National Transit Database, TS2.2, Tab DRM. Posted at http://www.ntdprogram.gov/ntdprogram/data.htm.

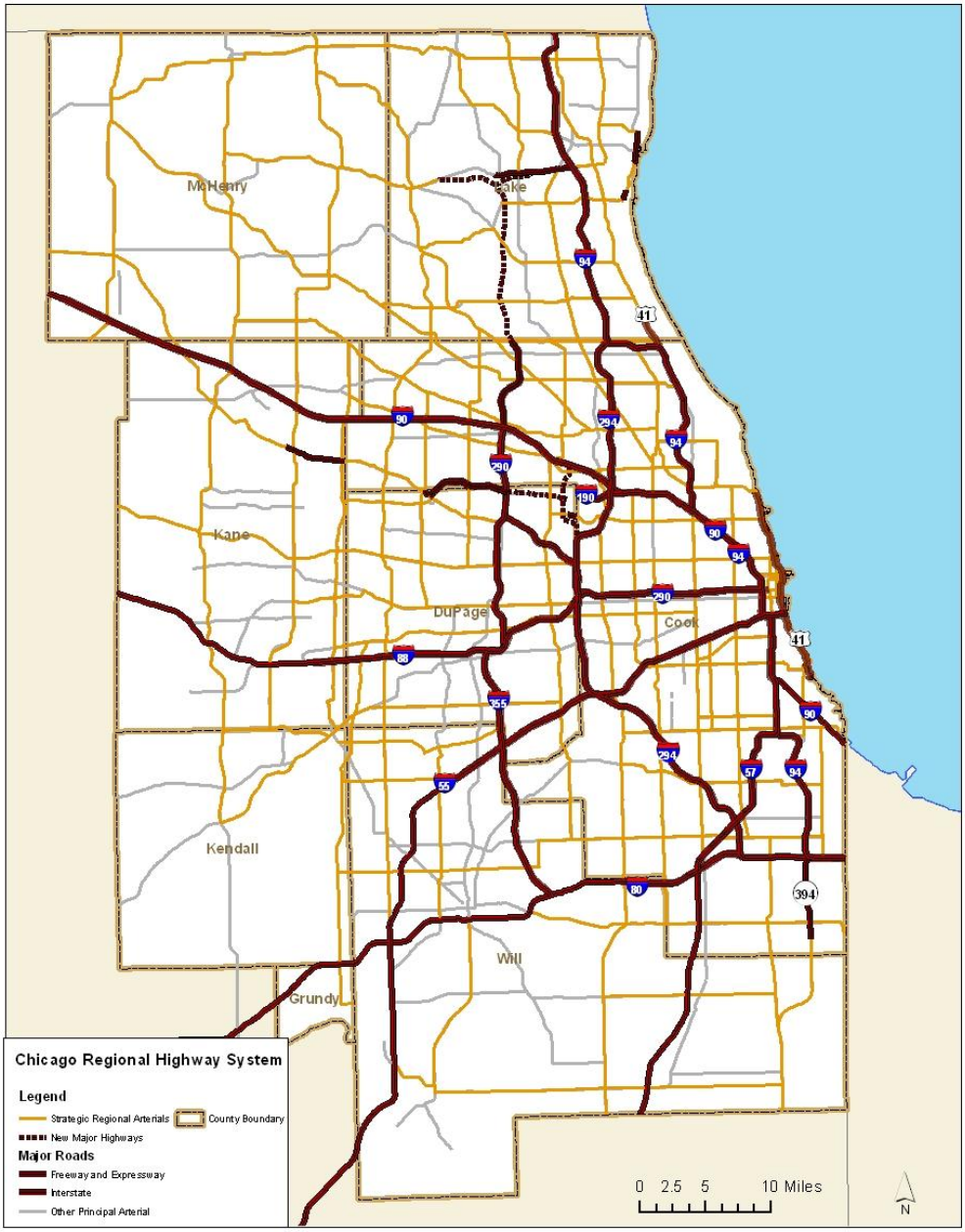


Figure 4-3: Chicago Regional Highway System

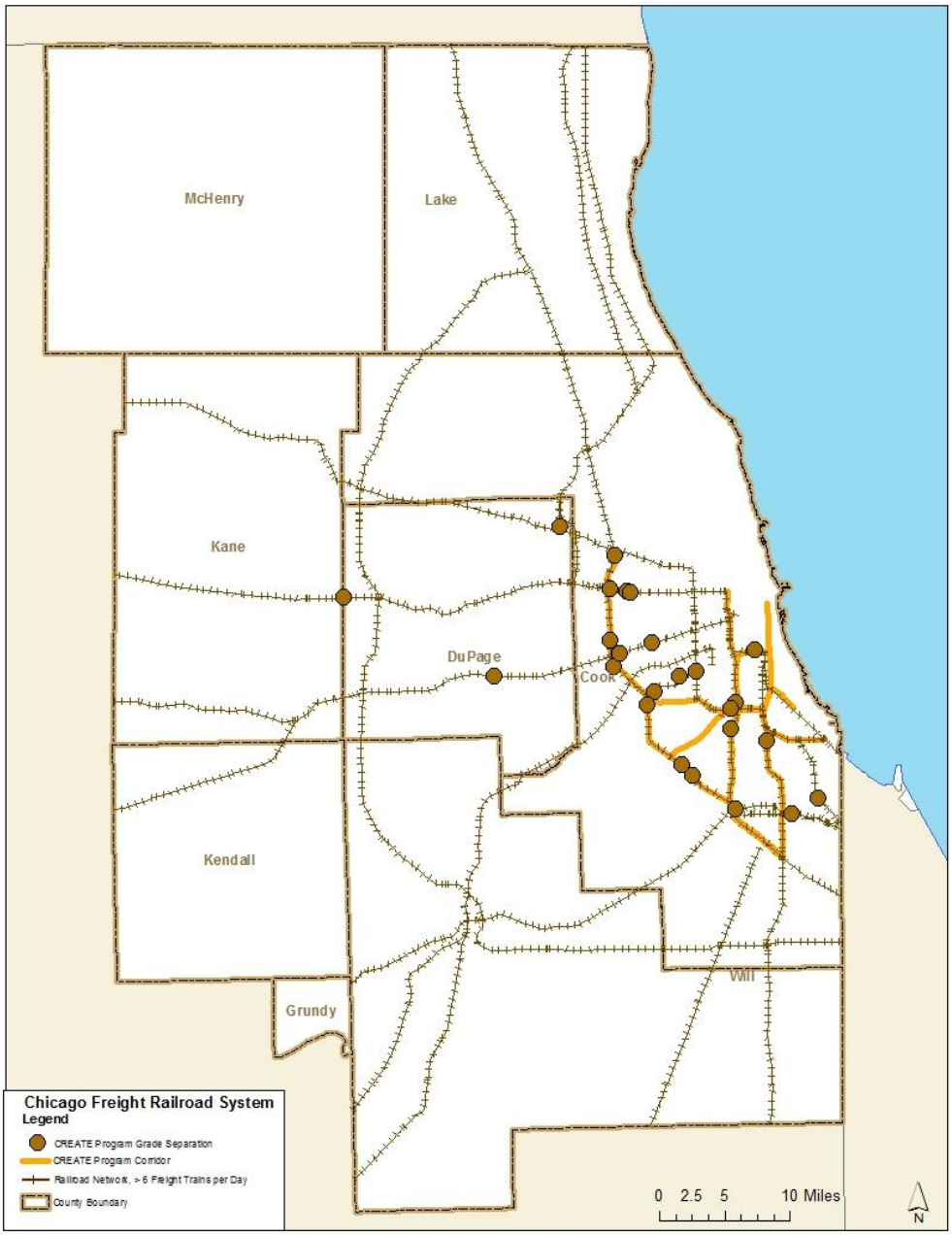


Figure 4-4: Chicago Regional Railroad System

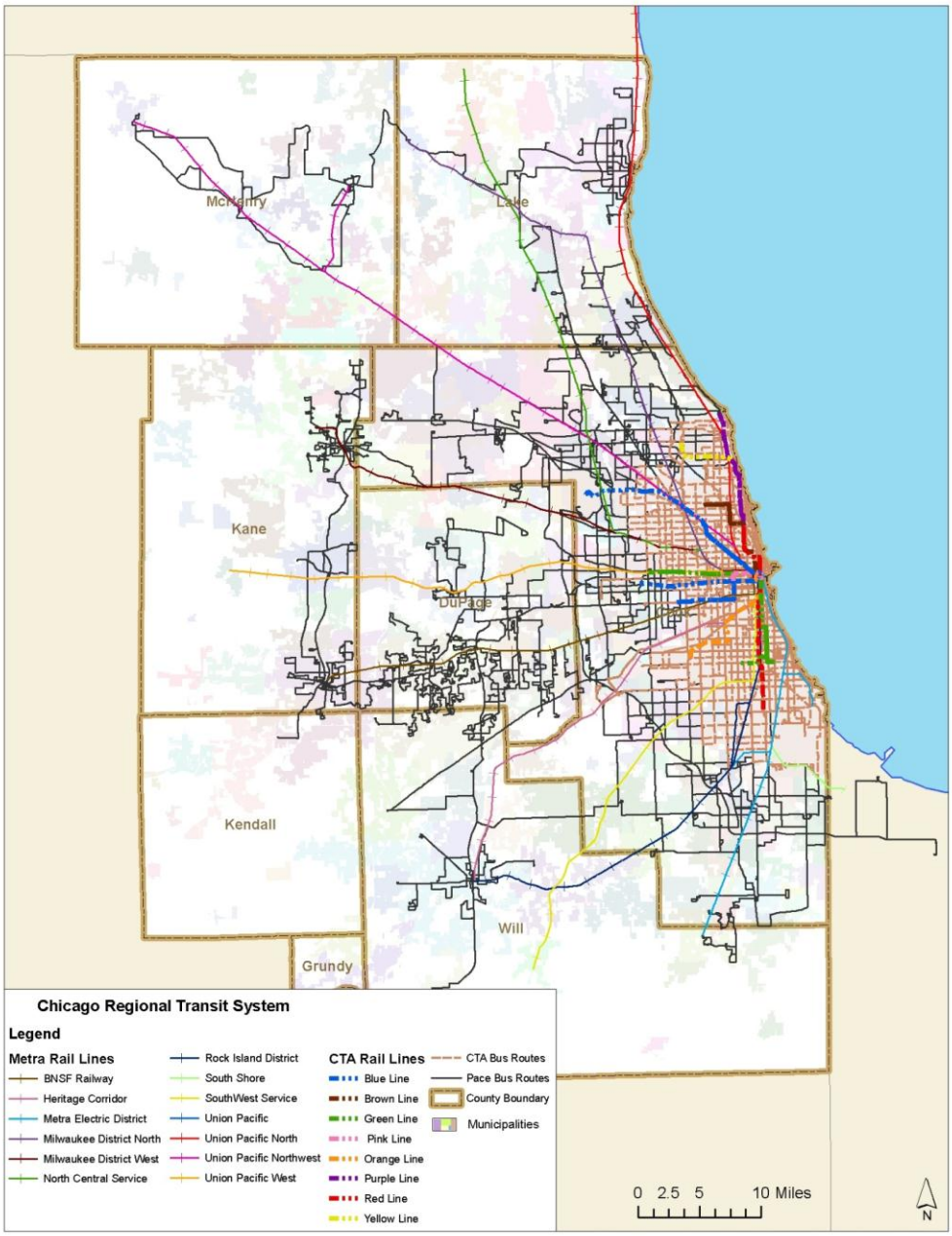


Figure 4-5: Chicago Regional Transit System

5. MULTIMODAL PERFORMANCE MEASUREMENT

Performance measurement is a major element of the Congestion Management Process. It is also critical to establishing the type of objective-driven, performance-based approach to transportation planning that CMAP and GO TO 2040 have committed to. The CMP is also intended to promote performance-based planning decisions that advance congestion management strategies. It also allows for the effective evaluation of potential strategies and programming decisions.

Performance data can also provide the feedback necessary to determine whether efforts to improve the system have been effective. Information on strategy effectiveness provides system operators with tools to make informed decisions, and to provide public accountability.

The large amount of operations data now available through intelligent transportation systems (ITS) infrastructure has enabled more effective analysis of congestion conditions and changes over time. The use of such data has largely supplanted regional model information as the primary data source for these activities at CMAP.[37]

Regional Indicators

The performance monitoring work within the CMP is integrated through *MetroPulse* regional indicators into the performance tracking of all regional planning activities. *MetroPulse* is a major initiative tied to measuring the effectiveness of GO TO 2040 implementation. Through *MetroPulse,* CMAP worked with the Chicago Community Trust in developing a comprehensive system of key indicators for measuring and tracking regional data (e.g., economic, environmental, transportation, etc.) over time. The indicators—of which CMAP's primary congestion management performance measures are a subset—are intended to track the progress toward achieving GO TO 2040.

Several of the transportation measures adopted as regional indicators were first identified in the *2030 Regional Transportation Plan*.[38] The GO TO 2040 indicators were developed from a the more general 2030 RTP measures, which were refined into particular metrics that have been used in other regions or nationally. For example, "highway travel time reliability" became the "planning time index."

Additionally, under GO TO 2040, development of the regional indicators incorporated broad input from stakeholders through CMAP's committees and groups, which served to enhance the range and significance of the chosen measures. For example, involvement by the Freight Committee and the Bicycle and Pedestrian Task Force identified new multimodal (e.g. walking, cycling, freight, and transit) indicators not previously monitored at the regional level.

As it becomes available, indicator data is made accessible to policy makers, community leaders, media, and the general public via the MetroPulse website.[39]

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[37] However, a robust travel demand model is necessary to evaluate future alternative scenarios.

[38] The 2030 Regional Transportation Plan, now replaced by GO TO 2040, is posted for archive purposes at http://www.cmap.illinois.gov/2030-regional-transportation-plan. The 2007 update (p. 33) first identified many of the measures used in the CMP process.

[39] Information on MetroPulse and the Regional Indicators Project is available at http://www.metropulsechicago.org.

Intended Application of Regional Indicators as Performance Measures

Monitoring and analysis activities within the CMP work program are a major source of updated *MetroPulse* indicator data, and all of the primary congestion-related performance measures are included in the Regional Indicators Project. However, CMP tracks these performance measures on a regional, subregional, or facility level. Facility level measurements are not used at this time in *MetroPulse*, but are critical in congestion analyses and recommendations for project planning. Thus, MetroPulse provides many of the measures discussed below on a regional basis. More detailed facility-level data is posted on the CMP web pages, http://www.cmap.illinois.gov/congestion-management-process.

The intended, most useful application of the regional indicators as performance measures is at a facility or corridor level. At these disaggregate levels, implementation of congestion management strategies, or appropriate congestion-relief projects, can be targeted to facilities or corridors not meeting congestion management performance standards.

Some transportation investments can't be programmed using this approach. For example, management systems are typically established for pavement and bridge structures to plan maintenance activities to preserve investments efficiencies.[40] A "worst first" investment strategy is very wasteful for pavement and bridge structures; rather, a stitch in time saves nine. So for pavement and bridge maintenance, an overall level of investment is established, with particular improvements programmed using the bridge and pavement management systems. However, at this time, it is not clear whether and how such a concern extends to congestion management.

The regional indicators are categorized into the following categories. Bold-text categories include indicators that are proposed to be used as congestion management performance measures:

- **System reliability**
- **System operations**
- **System accessibility**
- **Travel choices**
- **System Safety**
- System maintenance
- System investment
- Mobility for people with disabilities
- Other

Below, in Table 5-1, is a list of specific indicators, with details following for those categories with indicators proposed as performance measures (also indicated in bold). GO TO 2040 Comprehensive Regional Plan indicators are italicized.

[40] See http://www.fhwa.dot.gov/pavement/mana.cfm.

Table 5-1. Transportation Indicators - Regional Indicators Project

Category		Subcategory	Indicator
System Reliability	**1.1**	**Highway**	**Planning Time Index: Ratio of the total time needed to ensure 95% on-time arrival as compared to a free-flow travel time.**
	1.2	**Transit**	**on-time performance**
	1.3	Aviation	on-time performance
	1.4	Inter-Regional Rail	on-time performance
	1.5	**Incident Response**	**Incident response time**
System Operations	***2.1***	***Highway Congested Hours***	***The average number of hours during specific time periods in which at least 20% of the vehicle-miles of travel on instrumented road network is congested. Congestion is defined to occur when link speeds are less than 50 mph.***
	2.2	**Highway Travel Time Index**	**Ratio of the average peak period travel time as compared to a free flow travel time.**
	2.3	***Transit Passenger Trips per Capita***	***Number of unlinked passenger trips divided by the population for the six county service area***
	2.4	**Transit Passenger Miles per Vehicle Revenue Hour**	**Number of unlinked passenger miles divided by the hours that a vehicle is in service, including layover / recovery time, but excluding deadhead time.**
	2.5	Freight Travel Time	Rail travel time averages and variations across region for intermodal containers and average peak and offpeak travel time for trucks in freight significant corridors
	2.6	***At-Grade Highway-Rail Grade Crossing Delay***	***Vehicle-minutes of delay for at-grade crossings/length of time for traffic to recover***
System Accessibility	3.1	Pedestrian Environment	Weighted pedestrian environment factor
	3.2	Transit Connectivity Index	Measure developed by CNT using bus and train system route and service data to estimate the quality of transit in proximity to a census tract
	3.3	***Transit Oriented Development***	***% of population and jobs with access to transit***

	3.4	**Walkability/ Bikeability**	**Measured as Pedestrian Level of Service (PLOS) and Bicycle Level of Service (BLOS).**
Travel Choices	4.1	Inter-Regional Destinations Served by Distance	# of destinations served by distance intervals for air (non-stop)/inter-region rail/inter-region bus
	4.2	VMT per Capita	Average vehicle miles traveled per person
	4.3	Mode Share	% of work trips by mode * As data becomes available this will change from work trips to all trips
	4.4	Auto Ownership	Average number of vehicles per hhs
	4.5	**Percent of Truck Volumes Occurring Off-Peak**	**Vehicle Classification by Time-of-Day**
	4.6	Safe Routes to School	Communities with Safe Routes to School Programs or plans
	4.7	*Trails Plan Implementation*	*% of regional trails plan complete*
System Maintenance	*5.1*	*Road Condition/ Rating System*	*Condition Rating. International Roughness Index % above 170*
	5.2	*Bridge Condition*	*Bridge Condition Rating. % Structurally deficient or functionally obsolete*
	5.3	Transit Maintenance	Percent of assets in good condition
	5.4	Road Condition to Intermodal Facilities	Condition Rating for National Highway System Intermodal Connectors
System Investment	6.1	Program Accomplishment/ System Investment	% of Annual Element Accomplished, by Agency and Funding Program and transit capital program implementation
	6.2	Consumption by Source (Energy)	Energy consumption and source by sector
System Safety	**7.1**	**Crash Rate Per Capita / VMT**	**# of crashes per person and per vehicle mile traveled by crash severity and mode**
Mobility for People with Disabilities	8.1	% Transit ADA	% of rolling stock/stations ADA compliant
	8.2	Senior and Para-Transit Trips	# or percent of public transit trips made by seniors and persons with disabilities

	8.3	ADA Transition Plan Compliance	Governments with more than 50 employees must develop and implement transition plans to comply with the Americans with Disabilities Act and the Rehabilitation Act.
Other	9.1	Air Quality	Good air quality days per year
	9.2	Emissions	ambient concentration/exceedance
	9.3	Station-Area TOD Plans	Percent of rail stations or major bus/bus rapid transit corridors covered by an adopted TOD/Station Area Plan with breakout for implementation status
	9.4	Greenhouse Gas Emissions	GHG emissions by sector and county for current year
	9.5	Jobs-Housing Balance	Number and/or % of jobs located near affordable housing
	9.6	Obesity	Proportion of the population who are obese by selected age cohorts

New Proposed Performance Measure

Working with the GO TO 2040 Transit Focus Group, staff has proposed the following additional performance measure:

	3.5	**Transit Service Speed**	**Transit Service Miles / Transit Revenue Hours**

Details regarding this performance measure will be added after Transit Focus Group discussions are completed.

Proposed Performance Measure Evaluation and Details

Below is a summary for each congestion management performance measures used by CMAP in the Regional Indicators process, for indicator categories with proposed performance measures. The table includes the following information: the category that each measure falls within; whether the measure is available at the regional, subregional, and/or the facility level; a description of the "metric" used for calculating a value for each measure; the current or planned schedule for how frequently updated analysis or data compilation can be expected; the measure's coverage, that is, the physical extent of data availability; the data source used to calculate the measure; and, the current and planned availability of the data as presented, published, or otherwise made available in a CMAP data product. Some of the measures are still under development or have suggested improvements, and these are also noted.

Planning Time Index

- Measurement Category: System Reliability
- Geographic Availability: Regional and Facility levels
- Measure: Ratio of 95th percentile travel time to free-flow travel time. The greater the ratio, the worse the travel time reliability.
- Advantages: This can be measured and compared without regard to scale or distance, so it is useful for understanding travel time reliability problems from a facility level to even allowing national comparisons. This measure is also policy-neutral regarding speed targets: local arterials with lower design speed to facilitate livability and safety are not "congested" by this measure. This measure provides an objective measure that can be used for prioritization of improvements.
- Disadvantages: Regional-level summary and aggregation levels may not be meaningful to travelers or decision makers. A level has yet to be established (e.g., "1.20 or below") that is recognized for policy purposes as a value indicating reliability.
- Schedule: Produced annually for each facility for which detector data is available. Monitored quarterly for regional-level data. *Currently up-to-date for 2011.*
- Data coverage: Data is available for most urban freeway segments. Monitoring is being expanded to be consistent with federal regulations. Data for expressways is available in five-minute increments 365 days per year. Data for arterials not available.
- Data sources:
    - Regional-level data from the mobility monitoring program is at http://www.ops.fhwa.dot.gov/perf_measurement/ucr/index.htm.
    - For the expressway and tollway systems, data is downloaded from Traffic.com (Navteq/Nokia), where it is provided to us by agreement through the USDOT Mobility Monitoring Program. Traffic.com pulls the data from IDOT and Illinois Tollway sensors, but has sensors of its own as well.
- Public data availability:
    - Regional-level data has been posted on MetroPulse.
    - Facility-level expressway and tollway data is included in the Highway Performance Measurement page http://www.cmap.illinois.gov/cmp/scans.
- Suggested improvements:
    - Expand limited-access highway coverage to entire regional freeways and tollways.
    - Through the regional data archive, download sensor data directly from the Gateway traveler information system, rather than through traffic.com.
    - Improve calculation procedures for incidents.
    - Purchase 24-7 arterial speed data collected through on-board vehicle data.
    - The plannng time index relies on valid sensor speed measurements. Validate sensor speed information through on-board vehicle data.
    - CMAP, working through the Regional Transportation Operations Coalition, needs to establish a performance threshold for this measure. For individual facilities, a range of 1.2 to 1.4 may be a starting point for discussions.

- Make data available to programming agencies through the Data for Programming Decisions process.

On-Time Performance (Transit, Aviation, and Inter-Regional Rail)

- Measurement Category: System Reliability
- Geographic Availability: System and Facility levels
- Measure: Varies by agency and service. At this time, CMAP does not have vehicle schedule or vehicle location data to compute on-time data. The following measures, reported by agencies, are tracked by CMAP:
  - CTA: Rail delays of ten minutes or more
  - CTA: Percent of bunched bus intervals
  - Pace: On-time performance (percent)
  - Pace: Actual vehicle miles per road call
  - Pace: Percent missed trips per total trip miles
  - Metra: On-time performance
  - Amtrak: On-time performance (12-month moving average)
  - Aviation: On-time performance for arriving and departing passenger flights
- Advantages: This set of on-time performance measures is customer-focused for transit system users. There are potential surface transportation activities of MPO stakeholders which can improve the on-time performance of the passenger systems, including activities which require multi-jurisdictional coordination.[41] Each measure is regularly reported by the agencies involved in their own performance reports.
- Disadvantages: Aside from agency reports, no independent monitoring mechanism has been established for on-time performance. Agencies have improved reporting methodologies over the past several years, and could do so again. Such improvements offer higher-quality, more customer-focused data, but impact the ability to track trends in on-time performance. Regional-level summary and aggregation levels may not be meaningful to travelers or decision makers. While several target levels have been established at a system level, target performance levels do not appear to have been established for individual routes or services.
- Schedule: Most agencies prepare reports monthly. CMAP updates MetroPulse data at least every other year. *2011 data has been provided to MetroPulse staff for processing.*
- Data coverage: Data is available for all of the services.
- Data sources:
  - CTA: http://www.transitchicago.com/perfmetre.aspx.
  - Pace: http://www.pacebus.com/sub/about/annual_budget.asp.[42]

[41] Aviation, Metra, and Amtrak are cases which require private-sector coordination to improve performance. For aviation, this includes planned airside and terminal expansions (runways and gates). For Amtrak and Metra, the CREATE Program has been established as a public private partnership whose benefits are expected to include improved passenger service performance.

[42] Pace also has a single month of route-level performance data at http://www.pacebus.com/sub/about/performance.asp.

- Metra: Annual data is included in the Metra budget book, http://metrarail.com/metra/en/home/about_metra/planning_records_reports/finance_budget.html. Monthly reports are posted at http://metrarail.com/metra/en/home/about_metra/planning_records_reports/ridership_reports/on-time_performance.html.
- Amtrak: www.amtrak.com → "About Amtrak" → "View All Reports and Documents." (Two years of monthly performance reports are at the bottom of the page; on-time performance by route is at or near the end of each monthly report.)
- Aviation: http://www.transtats.bts.gov/OT_Delay/OT_DelayCause1.asp. Chicago passenger airports can be selected, with monthly and annual statistics available, including the causes of delay.

- Public data availability:
  - Regional-level monthly aviation data has been posted on MetroPulse. Transit and Amtrak on-time data postings are pending.
  - On-time performance data has been posted at http://www.cmap.illinois.gov/cmp/measurement for regional transit agencies and Amtrak, most recently in April, 2011.
- Suggested improvements:
  - Establish independent mechanism to collect route-based data, perhaps through a regional transit data archive.
  - CMAP, working through the transit agencies, needs to establish a performance threshold for this measure on a route-level basis.
  - Make data available to programming agencies through the Data for Programming Decisions process.
  - Consider annual updates of this data to MetroPulse.

Incident Response Time

- Measurement Category: System Reliability
- Geographic Availability: Incident location, aggregated up to various polygon, system, and corridor geographies.
- Measure: Measures are being investigated; final procedures have not been established.
- Advantages: While a final measure has not been established, incident management has been recognized as a critical process for reducing congestion. Incidents cause a large part of regional congestion, and may cause secondary incidents. Quick clearance is vital to reduce regional congestion. IDOT incident database contains excellent information regarding response and clearance times.
- Disadvantages: IDOT database information contains sensitive information regarding public safety communications and command/control that should not be public. IDOT incident database records are not georeferenced in their native format.
- Schedule: To be determined
- Data coverage: Regionwide data is available from the Gateway Traveler Information System and from IDOT databases.
- Data sources:

    - Gateway Traveler Information System.
    - IDOT incident database
- Public data availability:
    - None
- Suggested improvements:
    - Continue research and development of measures using this data

Congested Hours

- Measurement Category: System Operations
- Geographic Availability: Regional and Facility levels
- Measure: Average number of hours in which at least 20 percent of the vehicle miles traveled (VMT) on the instrumented segment is congested. For this measure, congestion is defined to occur when link speeds are less than 50 mph.
- Advantages: This can be measured and compared without regard to scale or distance, so it is useful for understanding Chicago's congestion problems from a facility level to even allowing national comparisons. This measure makes a policy assumption about speed (>50 mph in our case), so is appropriate only for the expressway system..
- Disadvantages: Regional-level summary and aggregation levels may not be meaningful to travelers or decision makers. A level has yet to be established (e.g., "one or below") that is recognized for policy purposes as "uncongested."
- Schedule: Produced annually for each facility for which detector data is available. Monitored quarterly for regional-level data. *Currently up-to-date for 2011.*
- Data coverage: Data is available for most urban freeway segments. Monitoring is being expanded to be consistent with federal regulations. Data for expressways is available in five-minute increments 365 days per year.
- Data sources:
    - Regional-level data from the mobility monitoring program is at http://www.ops.fhwa.dot.gov/perf_measurement/ucr/index.htm.
    - For the expressway and tollway systems, data is downloaded from Traffic.com (Navteq/Nokia), where it is provided to us by agreement through the USDOT Mobility Monitoring Program. Traffic.com pulls the data from IDOT and Illinois Tollway sensors, but has sensors of its own as well.
    - For arterials, data is not available at this time.
- Public data availability:
    - Regional-level data has been posted on MetroPulse.
    - Facility-level expressway and tollway data is included in the Highway Performance Measurement page http://www.cmap.illinois.gov/cmp/scans.
- Suggested improvements:
    - Expand expressway coverage to entire regional expressway system
    - Through the regional data archive, download sensor data directly from the Gateway traveler information system, rather than through traffic.com

- Improve calculation procedures for incidents.
- The congested hours measure relies on valid sensor speed measurements. Validate sensor speed information through on-board vehicle data.
- Make data available to programming agencies through the Data for Programming Decisions process.

Travel Time Index

- Measurement Category: System Operations
- Geographic Availability: Regional and Facility levels
- Measure: Ratio of peak period travel time to free-flow travel time. The greater the ratio, the greater the congestion indicated.
- Advantages: This can be measured and compared without regard to scale or distance, so it is useful for understanding Chicago's congestion problems from a facility level to even allowing national comparisons. This measure is also policy-neutral regarding speed targets: local arterials with lower design speed to facilitate livability and safety are not "congested" by this measure. This measure provides an objective measure that can be used for prioritization of improvements.
- Disadvantages: Regional-level summary and aggregation levels may not be meaningful to travelers or decision makers. A level has yet to be established (e.g., "1.10 or below") that is recognized for policy purposes as "uncongested."
- Schedule: Produced annually for each facility for which detector data is available. Monitored quarterly for regional-level data. *Currently up-to-date for 2011.*
- Data coverage: Data is available for most urban freeway segments. Monitoring is being expanded to be consistent with federal regulations. Data for expressways is available in five-minute increments 365 days per year. Data for arterials is available hourly for only a single 24-hour sample day.
- Data sources:
  - Regional-level data from the mobility monitoring program is at http://www.ops.fhwa.dot.gov/perf_measurement/ucr/index.htm.
  - For the expressway and tollway systems, data is downloaded from Traffic.com (Navteq/Nokia), where it is provided to us by agreement through the USDOT Mobility Monitoring Program. Traffic.com pulls the data from IDOT and Illinois Tollway sensors, but has sensors of its own as well.
  - For arterials, an annual HI-STAR traffic count database (that includes speed bins by hour) is provided by IDOT to CMAP.
- Public data availability:
  - Regional-level data has been posted on MetroPulse.
  - Facility-level expressway and tollway data is included in the Highway Performance Measurement page http://www.cmap.illinois.gov/cmp/scans.
  - Maps of arterial-level data are at http://www.cmap.illinois.gov/cmp/measurement:
    - Arterial maps.
    - Township map.
- Suggested improvements:
  - Expand expressway coverage to entire regional expressway system.

- Through the regional data archive, download sensor data directly from the Gateway traveler information system, rather than through traffic.com.
- Improve calculation procedures for incidents.
- Purchase 24-7 arterial speed data collected through on-board vehicle data.
- The travel time index relies on valid sensor speed measurements. Validate sensor speed information through on-board vehicle data.
- CMAP, working through the Regional Transportation Operations Coalition, needs to establish a performance threshold for this measure. For individual facilities, a range of 1.05 to 1.2 may be a starting point for discussions.
- Make data available to programming agencies through the Data for Programming Decisions process.

Transit Trips per Capita

- Measurement Category: System Operations
- Geographic Availability: Regional level; unlinked transit trips are available for each transit service.
- Measure: Unlinked transit trips for all transit services divided by population.
- Advantages: This measure is easily calculated from the National Transit Database. The data can be tracked annually and is estimated according to federal standards.
- Disadvantages: Regional-level summary and aggregation levels may not be meaningful to travelers or decision makers. This measure does not exactly match the weekday ridership from GO TO 2040, but can be used as a proxy calculated on an annual basis (the system-wide total unlinked passenger trips corresponding to the GO TO 2040 estimate of "2 million transit trips per day" for 2010 is 622,488,000 – up from 576,230,000 in 2003). Population re-estimates by the U.S. Census Bureau for years 2001 through 2009 required recalculation of the per capita rate.
- Schedule: Produced every other year. *Downloads and calculations are currently up-to-date for 2010, the most recent data available when the measure was calculated in early 2012. Data transmitted to MetroPulse staff has not yet been posted.*
- Data coverage: Data currently in use by CMAP from the National Transit Database is at the system level. Data is also available down to the bus-stop level for Pace and the Chicago Transit Authority from the agencies. N o continuous tracking at the station level is available for the Metra System.
- Data sources:
  - System-level data from the transit agencies is available at http://www.ntdprogram.gov/ntdprogram/data.htm (TS2.2).
  - Population estimates are available at http://www.census.gov/popest/.
  - Bus-stop-level and station-level data is available upon request from Pace and the Chicago Transit Authority.
- Public data availability:
  - System level data has been posted on MetroPulse.
- Suggested improvements:
  - Monitor boardings at finer levels of geography.
  - Create baseline levels for establishment of future performance levels.

- Monitor effects of GO TO 2040 implementation, including local technical assistance projects with expected transit effects.
- Add data summary to congestion management page http://www.cmap.illinois.gov/cmp/measurement.
- Make data available to programming agencies through the Data for Programming Decisions process.

Transit Miles Traveled per Vehicle Revenue Hour

- Measurement Category: System Operations
- Geographic Availability: Regional level; estimates of transit miles traveled and vehicle revenue hours are available for each transit service.
- Measure: Number of unlinked passenger miles divided by the hours that a vehicle is in service, including layover / recovery time, but excluding deadhead time.
- Advantages: This measure is easily calculated from the National Transit Database. The data can be tracked annually and is estimated according to federal standards. Were preparation of this measure timely, it would be an excellent warning sign of performance issues at transit agencies, since it is a basic measure of service efficiency.
- Disadvantages: Regional-level summary and aggregation levels may not be meaningful to travelers. Current procedures result in a delay in preparation of this data, reducing the usefulness of the data.
- Schedule: This data is currently prepared every other year. *Downloads and calculations are currently up-to-date for 2010, the most recent data available when the measure was calculated in early 2012.*
- Data coverage: Data currently in use by CMAP from the National Transit Database is at the system level. Data is available for each transit service.
- Data sources:
  - System-level data from the transit agencies is available at http://www.ntdprogram.gov/ntdprogram/data.htm (TS2.2).
- Public data availability:
  - System level data has been posted on MetroPulse.
- Suggested improvements:
  - Prepare data annually.
  - Determine whether data is available faster.

Freight Travel Time

- Measurement Category: System Operations
- Geographic Availability: Selected Facilities
- Measure: This measure is being developed and is not well defined. To date, data has been reported in the forms of (1) maps showing average speed by milepost for highways, (2) terminal dwell time for rail, as reported by the Association of American Railroads, and (3) lock delay time, reported by the U.S. Army, Corps of Engineers Lock Performance Monitoring System
- Advantages: To be determined.
- Disadvantages: To be determined
- Schedule: Irregular.

- Data coverage:
  - No-cost truck speed data is available for I-55 and I-90.
  - Freight rail terminal dwell time is available as follows:
    - BNSF: None
    - Canadian Pacific: "Chicago"
    - CN: Markham
    - CSX: "Chicago"
    - Norfolk Southern: None
    - Union Pacific: Proviso
  - Lock Delay is available as follows:
    - O'Brien lock
    - Lockport Lock
    - Brandon Road Lock and Dam
    - Dresden Island Lock and Dam
- Data sources:
  - Truck speed data from on-board instruments is available at https://www.freightperformance.org/fpmweb/user_login.aspx.
  - Freight rail terminal dwell time is available at http://www.railroadpm.org/.
  - Lock delay is available at http://www.ndc.iwr.usace.army.mil//lpms/lpms.htm (Summary of Lock Statistics).
- Public data availability:
  - Highway speeds are posted on the Freight Snapshot, http://www.cmap.illinois.gov/freight-snapshot.
  - Rail terminal and lock delay were reported as part of the Freight Systems Planning Recommendations process, http://www.cmap.illinois.gov/freight-system-planning.
- Suggested improvements:
  - Complete development of measure for posting on MetroPulse.
  - Investigate purchase of on-board speed data by vehicle class, allowing a more robust dataset for trucks (expected to be available from INRIX in 2013).
  - Improve understanding of freight rail terminal delay measure.
  - Investigate automatic data collection for rail car and container transit times.

Motorist Delay at Highway-Rail Grade Crossings

- Measurement category: System Operations
- Geographic availability: Facility, county, and regional levels. Field measurement is available at some locations.
- Measure: Estimated aggregate weekday hours of delay at highway grade crossings. This is generally calculated by estimating the speed, length, and volumes of trains (passenger and freight) along a corridor, all of which are used to estimate the "gate-down time." The gate-down time (plus a factor for clearance time) is then multiplied by the fraction of the vehicles affected to arrive at the total delay for each crossing.
- Advantages: This can be estimated for each crossing or on an aggregate basis for the region.

- Disadvantages: The measure takes no account of variation in gate-down times, which is known to be substantial. In addition, the measure takes no account of the time of day for the train movements, nor for autos and trucks. Lastly, the railroad data (the crossing inventory, train volumes, train speeds) is very time-consuming to acquire.
- Schedule: Six-county data was prepared by the Illinois Commerce Commission for 2002 and 2011. Improvements in methodology, initially hoped for in FY 2012, are expected in 2013.
- Data coverage: Delay estimates are available for each active crossing in the region.
- Data sources:
    - The best railroad crossing database for the region is available from the Illinois Commerce Commission. Individual crossing data is available online at http://www.icc.illinois.gov/railroad/search.aspx.
    - Highway volumes are obtained from the Illinois Department of Transportation.
    - Data regarding railroads is available from the National Transportation Atlas Database at http://www.bts.gov/publications/national_transportation_atlas_database/. However, the USDOT data is not up-to-date, and requires substantial edits in consultation with the railroad industry.
- Public data availability:
    - Regional-level and county-level data for 2002 and 2011 has been posted on MetroPulse.
    - A report with a full evaluation of the data will be completed in FY 2013.
- Suggested improvements:
    - Finish analysis of field data.
    - Determine whether sensor information (e.g., Blue TOAD reader data) is feasible for this data collection effort.
    - Using field data, recalculate 2011 data to take time of day into account for both automotive and train traffic.
    - Develop an ArcMap process to automate calculation of delay give new train counts and train speeds.
    - Make data available to programming agencies through the Data for Programming Decisions process.

Pedestrian Environment Factor

- Measurement Category: System Accessibility
- Geographic Availability: Calculated by traffic analysis zone for use in the regional travel demand models. The data is also aggregated for reporting purposes to the municipal, county and regional levels.
- Measure: Per recent travel model documentation, "*the average pedestrian environmental factor (PEF) is a surrogate variable in the model that takes the place of an actual survey of pedestrian and bicycle facilities. It is defined as the number of census blocks in a quarter-section…. Census blocks are closed geographic areas that are generally formed from streets. They are not necessarily rectangular or always contiguous with city blocks due to alleys and cul-de-sacs. A greater density of census blocks implies a more regular street network and more local streets, both of which improve walking and biking conditions. … [T]he original pedestrian environmental factor was developed using census*

information and the trip generation zone geography. Currently, the pedestrian environment factor is developed using the trip generation zones and a Navteq™ street file. Since the PEF value is, simply speaking, a score related to street network density for a trip generation zone, the street file can be used instead of the Census geography. In the new process, some modifications are made to both of the inputs. Streets identified as not appropriate for pedestrian use are filtered out of the Navteq file, and trip generation zones within the CMAP region have 'catchment areas' generated for them (a buffering out of their original boundaries) to factor in the network density of neighboring areas into that zone's score."[43] Note that in 2003, county-level reporting was prepared using analysis zones weighted by population. This weighting was not done for the 2010 reporting now posted on MetroPulse.

- Advantages: This measure is already calculated for the regional travel demand models. It is also a good measure of walkability.
- Disadvantages: No performance level has been established to warrant pedestrian and bicycle infrastructure.
- Schedule: This data has been prepared twice, once for travel models using 1990 census data, the second time using Navteq (Nokia) data for GO TO 2040 scenario evaluations. This data is not frequently updated.
- Data coverage: Data is available region-wide at the traffic analysis zone level.
- Data sources:
    - This data is prepared by CMAP staff using the Navteq (Nokia) roadway file. The data is maintained in the CMAP traffic analysis zone files used for trip generation.
- Public data availability:
    - County- and municipal-level data has been posted on MetroPulse.
- Suggested improvements:
    - Prepare data every five years.
    - Determine whether, for reporting purposes, the data should be weighted by population.
    - Recommend performance criteria for pedestrian accommodations.
    - Make data available to programming agencies through the Data for Programming Decisions process.
    - Improve MetroPulse documentation of the data

Transit Connectivity Index

- Measurement Category: System Accessibility
- Geographic Availability: This data is available down to the Census Bureau's block-group level.
- Measure: Per a review conducted by the U.S. Department of Housing and Urban Development by Econsult Corporation and Penn Institute for Urban Research, "*The transit connectivity index is a proprietary measure created by CNT. The index begins with a map of transit stops, and a buffer of concentric circles around each stop defining the 'access area.' The circles are at quarter mile intervals*

[43] Chicago Metropolitan Agency for Planning. *Travel Model Documentation: Final Report.* October 2010. Pp. 50-51.

for bus stops, and at half-mile intervals for other rail transit stops. Next, the following are defined for each block group:

- *LC: Land area of the block group covered by access area*
- *SFV: Service frequency value*
- *W: Weighting multiplier*
- *BLA: Total block group land area*

The six optimal weighting multipliers (W_d) are estimated by taking the average coefficients from regressing the six transit access variables (TCI_d) on two measures of transit utilization: autos per household (FAO), and percent journey to work by transit (FTU). Here are the weights for the six access areas:

Area	*Bus Distance*	*Rail Distance*	*Weight*
1	*0.00 to 0.25 miles*	*0.0 to 0.5 miles*	*1.00*
2	*0.25 to 0.50 miles*	*0.5 to 1.0 miles*	*0.72*
3	*0.50 to 0.75 miles*	*1.0 to 1.5 miles*	*0.22*
4	*0.75 to 1.00 miles*	*1.5 to 2.0 miles*	*0.22*
5	*1.00 to 1.25 miles*	*2.0 to 2.5 miles*	*0.18*
6	*1.25 to 1.50 miles*	*2.5 to 3.0 miles*	*0.05*

The final TCI estimate for each block group is taken as the sum of the six weighted transit access values (TCd,bg) in each block group:

$$TCI_{bg} = \sum_{d=1}^{6} \frac{W_d LC_{d,bg} SFV_{d,bg}}{BLA_{bg}}$$

where d indexes across the six concentric circles, and bg indexes the block group".[44]

It is expected that the U.S. Department of Housing and Urban Development will soon develop its own version of the housing and transportation affordability index, for which the transit connectivity index was developed.[45] It is also expected that some changes to the index as HUD implements it.[46]

- Advantages: This measure is already calculated. A cursory review of the data reveals that at the block group level of geography, the index values make sense. The data has already been developed. At the block group level, the data is replicable.[47]
- Disadvantages: Above the block group level (e.g., at the municipal level of geography), the data reported by the Center for Neighborhood Technology has not been weighted properly, or does not

[44] Econsult Corporation and Penn Institute for Urban Research. "Review of the Center for Neighborhood Technology's Housing and Transportation Affordability Index. Report submitted to Manhattan Strategy Group. February, 2012. Pp. 6-7. Posted at http://portal.hud.gov/hudportal/documents/huddoc?id=HTA-index.pdf.
[45] Ibid., throughout
[46] Ibid.
[47] Ibid., pp. 43-44.

reflect the full geographic area of municipalities, so can't be used. Alternatives include recalculating the values at CMAP or waiting until the USHUD version is available. In addition, longitudinal data is not available for the index, but could be added to the HUD version of the index once the calculation procedures have stabilized.

- Schedule: No schedule has been established for this data.
- Data coverage: Data is available region-wide.
- Data sources:
    - Data sources include the transit agencies' General Transit Feed Specification data feeds.
        - CTA: http://www.transitchicago.com/developers/gtfs.aspx
        - Pace: http://www.pacebus.com/sub/about/data_services.asp
        - Metra: http://metrarail.com/metra/en/home/about_metra/obtaining_records_from_metra.html.
        - South Shore: unavailable.
    - Census block group geographies are available at http://www.census.gov/cgi-bin/geo/shapefiles2010/main.
- Public data availability:
    - CMAP has not yet published this data. H+T data can be viewed at http://htaindex.cnt.org/map/.
- Suggested improvements:
    - Wait for USHUD data.
    - Consider recalculating data.
    - Establish performance standard for access to transit improvement warrants.

Transit-Oriented Development

- Measurement Category: System Accessibility
- Geographic Availability: This data is available region-wide down to the traffic analysis zone.
- Measure: Percent of population and jobs within 0.25 miles of transit.
- Advantages: This measure is easily calculated.
- Disadvantages: Unlike the transit connectivity index, this measure does not account for the quality of service. Also, the measure does not account for the efficiency of transit service to low-density populations.
- Schedule: No schedule has been established for this data. However, since it is a GO TO 2040 regional indicator, a high priority has been assigned to updates of this data.
- Data coverage: Data is available region-wide.
- Data sources:
    - Data sources include the transit agencies' General Transit Feed Specification data feeds.
        - CTA: http://www.transitchicago.com/developers/gtfs.aspx
        - Pace: http://www.pacebus.com/sub/about/data_services.asp

        - Metra: http://metrarail.com/metra/en/home/about_metra/obtaining_records_from_metra.html.
        - South Shore: unavailable.
- Public data availability:
    - Housing units with access to transit are compiled for year 2000 only on MetroPulse.
- Suggested improvements:
    - Establish schedule for data updates.
    - Consider stratifying the data by population density.
    - Consider establishing a performance standard for access to transit warrants.
    - Make data available to programming agencies through the Data for Programming Decisions process.

Walkability/Bikeability

- Measurement Category: System Accessibility
- Geographic Availability: Selected facilities and municipalities, summarized at the county levels.
- Measure: Bicycle and pedestrian level of service, calculated on a segment basis, using formulae laid out in Appendices D and E, posted as part of the Soles and Spokes planning process existing conditions document appendices. A calculator is available online from the Sustainable Communities Institute.
- Advantages: Field data collection is fairly simple for this measure. The measures are based on user experience captured with well-understood traffic conditions. The measure has a built-in performance standard that can be applied like a vehicle level of service measure.
- Disadvantages: The data model is not validated with high levels of truck traffic.
- Schedule: No long-term schedule has been established for this data. Data was last collected in summer, 2002. Data is expected to be collected again in summer, 2012.
- Data coverage: Data is calculated only for selected facilities and municipalities, but is summarized at the county and regional levels.
- Data sources: Most data is collected in the field. Some data is available on IDOT's IRIS file.
- Public data availability:
    - This data is available on MetroPulse, summarized at the county level and for selected municipalities.
- Suggested improvements:
    - Establish regular schedule for updates.
    - Consider establishing a performance standard for access to transit warrants.
    - Make data available to programming agencies through the Data for Programming Decisions process.

Inter-Regional Destinations Served by Distance

- Measurement Category: Travel Choices
- Geographic Availability: This measure is only available at the regional level.
- Measure: This is a simple tabulation of interregional passenger service destinations serviced non-stop (or with a layover of no longer than 20 minutes for bus and rail services) by distance and by mode.

- Advantages: Tabulation is fairly simple.
- Disadvantages: While the desired direction of the data has been established (in general, more rail and bus service to near destinations, and more air service to distant and intercontinental destinations), no target level has been established. In addition, the policy and financial mechanisms available to the MPO tend to be targeted to bus and rail services, rather than air services.
- Schedule: This has been updated every two years, most recently in 2012.
- Data coverage: Data is easily accessible for major air networks, Southwest Airlines, Amtrak, and Megabus. Data for smaller airlines not in a larger network are difficult to find.
- Data sources: Data is compiled from timetables:
    - United/Star Alliance: http://www.uatimetable.com/uatimetable/.
    - American/One World: http://www.aa.com/i18n/travelInformation/airportAmenities/electronicTimetable.jsp.
    - Delta/Sky Team: http://www.delta.com/schedules/travel/reservations/flight_sched/index.jsp.
    - Southwest: http://www.southwest.com/html/cs/travel_center/routemap_dyn.html.
    - Amtrak: http://www.amtrak.com/servlet/Satellite/Page/1237405732505/1237405732505. (schedules need to be checked for extended layovers).
    - Megabus: http://us.megabus.com/routemap.aspx (schedules need to be checked for extended layovers).
    - A fee-required database of passenger traffic flows for air travel is available from *Laboratoire d'Économie et d'Économétrie de l'Aérien* at http://195.220.159.118/recherche/leea/databaseA.htm.
- Public data availability:
    - This data is available on MetroPulse
    - High-level summary data is posted at http://www.cmap.illinois.gov/cmp/measurement.
- Suggested improvements:
    - Re-work MetroPulse presentation so that data bins are less detailed, like those on the congestion management web site.

Vehicle Miles Traveled per Capita

- Measurement Category: Travel Choices
- Geographic Availability: County and regional levels.
- Measure: Total vehicle miles traveled divided by population.
- Advantages: Data is easily available. This measure provides an overall measure of effectiveness for measures to manage travel demand.
- Disadvantages: No performance standard has been established. For the most widely used data (miles traveled within a jurisdiction), the data is not useful at lower levels of geography, since travel will relate less to population than highway routes. Because of this, this data has limited programming utility. An alternative dataset, available with good results at the zip code level, based on annual miles traveled for cars registered within a particular zip code (using odometer readings from clean-air vehicle inspections), is conceptually difficult for many people and presents a difficult analytical challenge.

- Schedule: This data is not scheduled.
- Data coverage: Data is available region-wide.
- Data sources: Population estimates are at http://www.census.gov/popest/. Annual VMT estimates are at http://www.dot.il.gov/adttravelstats.html.
- Public data availability:
    - This data is available on MetroPulse at the county and regional levels through 2009.
- Suggested improvements:
    - Establish regular schedule for updates.
    - Consider a future update of vehicle-based mileage estimates by zip code of vehicle registration.
    - Consider stratifying data by passenger and commercial VMT. Passenger VMT is more clearly affected by travel demand management.

Mode Share

- Measurement Category: Travel Choices
- Geographic Availability: Census tract, municipal, county and regional levels.
- Measure: Percent of workers by means of transportation.
- Advantages: Data is easily available for work trips. This measure provides an overall measure of effectiveness for measures to manage travel demand through mode shift.
- Disadvantages: No performance target has been established. For all but work trips, data is not easily available, and requires a travel survey to collect.
- Schedule: Journey-to-work data was collected in 2012.
- Data coverage: Data is available region-wide.
- Data sources: Journey-to-work data is available at http://www.census.gov/acs/www/. Data for all trips is available from the *CMAP Travel Tracker Survey* posted at http://www.cmap.illinois.gov/travel-tracker-survey.
- Public data availability:
    - This data is available on MetroPulse at the county for the five-year period ending in 2009. In addition, year 2000 census data is available for the municipal and tract level.
    - An analysis of trends from 2000 to 2010 is posted at http://www.cmap.illinois.gov/cmp/measurement#MeansofTransportation.
    - Two mode share research reports are posted at http://www.cmap.illinois.gov/cmp/measurement:
        - Trips Underway by Time of Day by Travel Mode and Trip Purpose for Metropolitan Chicago: Weekday Accumulations of Trips in Motion (pdf, 1.53 MB)
        - Chicago Regional Household Travel Inventory: Mode Choice and Trip Purpose for the 2008 and 1990 Surveys (pdf, 1.86 MB)
- Suggested improvements:
    - Establish regular schedule for updates.
    - Consider establishing targets by geography for areas with proposed transportation improvements.

- Investigate mechanisms to collect non-work-trip travel mode data.
- Make data available to programming agencies through the Data for Programming Decisions process.

Vehicle Availability

- Measurement Category: Travel Choices
- Geographic Availability: Census tract, municipal, county and regional levels.
- Measure:

$$\frac{\sum_{k=1}^{5} kHH_k}{\sum HH}$$

  Where k= number of vehicles; HH_k is the number of households with k vehicles, and $\sum HH$ is the total number of households in the analysis area (including those with 0 vehicles).
- Advantages: Data is easily available for vehicles available. Vehicle availability is a strong indicator of passenger vehicle travel demand, so this tracking this data is important for monitoring trends in travel demand.
- Disadvantages: No performance target has been established. This data changes very slowly. Also, because of the way the data is structured, households with more than five vehicles are counted as having five vehicles; this is a minor problem, since these households are not common.
- Schedule: Vehicle availability data was collected in 2012.
- Data coverage: Data is available region-wide.
- Data sources: Vehicle availability data is at http://www.census.gov/acs/www/.
- Public data availability:
  - This data is available on MetroPulse at the county for the five-year period ending in 2009. In addition, year 2000 census data is available for the municipal and tract level.
  - An analysis of trends from 2000 to 2010 is posted at http://www.cmap.illinois.gov/cmp/measurement#VehicleAvailability.
  - A research report that reviewed social and economic factors affecting household vehicle ownership, reviewing data through 2007, is posted at http://www.cmap.illinois.gov/cmp/measurement#VehicleAvailability
- Suggested improvements:
  - MetroPulse data presentations of this information need to be improved.

Percent of Truck Volumes Occurring Off-Peak

- Measurement Category: Travel Choices
- Geographic Availability: Points of vehicle classification counts, aggregated up to higher levels of geography.
- Measure: Percent of vehicles traveling off-peak by vehicle class. Peak-period is defined as 6am to 9am and 4pm to 7pm, Monday through Friday. Off-peak is all other times.
- Advantages: Off-peak travel for trucks reduces peak-period traffic congestion and may reduce truck-involved traffic crashes.

- Disadvantages: Vehicle classification data is not available for limited-access IDOT highways. We are limited to Illinois Tollway roads and arterial highways. Illinois Tollway data includes all vehicles with a given number of axles, so multi-axle vehicles may include utility trailers, boat trailers, etc.
- Schedule: This information was collected and analyzed in 2012. This data is on a two-year update schedule.
- Data coverage: Arterial roads, Illinois Tollway roads.
- Data sources: IDOT arterial vehicle classification data is available from http://idot.ms2soft.com/tcds/tsearch.asp?loc=Idot&mod. The database is available upon request from Mr. Rob Robinson at IDOT. Illinois Tollway data is available upon request from Rocco Zucchero at the Illinois Tollway.
- Public data availability:
    - This data is available on MetroPulse.
    - A table of trends from 2007 to 2011 is posted at http://www.cmap.illinois.gov/cmp/measurement#VehicleClass.
- Suggested improvements:
    - Develop hourly vehicle classification data for IDOT-jurisdiction limited access highways.
    - Find a mechanism to separate non-truck data from higher Tollway vehicle classification data.

Safe Routes to School

- Measurement Category: Travel Choices
- Geographic Availability: Sites with school travel plans are identified. These sites are identified by CMAP at the municipal level.
- Measure: Communities with school travel plans approved by the Illinois Department of Transportation.
- Advantages: This measure recognizes submitted and approved plans.
- Disadvantages: Given the recent elimination of funding for safe routes to school, the future of the school travel planning process is in question.
- Schedule: This information was collected and analyzed in 2012.
- Data coverage: Regionwide
- Data sources: Lists of approved plans are available from the Illinois Department of Transportation.
- Public data availability:
    - This data is available on MetroPulse.
- A table of trends from 2007 to 2010 is posted at http://www.cmap.illinois.gov/bike-ped.
- Suggested improvements:
    - Make data available to programming agencies through the Data for Programming Decisions process.
    - Work with IDOT and local agency staff to determine how school travel planning can be maintained and monitored without dedicated implementation funding.

Trails Plan Implementation

- Measurement Category: Travel Choices
- Geographic Availability: Facility construction status, aggregated to the county.
- Measure: Percent completion of Regional Greenways and Trails Plan.

- Advantages: This measure recognizes an adopted plan. The trails element of the Greenways and Trails Plan is often thought of as the "freeway" component for cycling in the region.
- Disadvantages: Few on-street bikeway facilities are included in the plan. On-street facilities are often more effective at shifting the means of transportation to bikes.
- Schedule: This information was collected and analyzed in 2012.
- Data coverage: Regionwide
- Data sources: Plan information is in the CMAP Bikeways Information System (BIS). Construction information is from the IDOT service bulletins.
- Public data availability:
    - This data is available on MetroPulse.
    - A table of implementation trends by county from 2009 to 2012 is posted at http://www.cmap.illinois.gov/bike-ped/greenways-and-trails.
- Suggested improvements:
    - Make BIS data available to programming agencies through the Data for Programming Decisions process.

Crash Rate per Capita and Per Vehicle Miles Traveled

- Measurement Category: System Safety
- Geographic Availability: Crash points, aggregated to polygon geographies
- Measure: Crashes per 100,000,000 VMT and per 100,000 Population
- Advantages: These measures are straight-forward to calculate.
- Disadvantages: The measures don't measure the facility- and corridor-based safety aspects of travel.
- Schedule: This information was collected and analyzed in 2012.
- Data coverage: Regionwide
- Data sources:
    - IDOT maintains a safety data mart with extensive crash information at http://www.dot.il.gov/trafficsafety/datamart.html.
    - IDOT-maintained city- and county-level crash summaries are at http://www.dot.il.gov/trafficsafety/summaries.html.
- Public data availability:
    - This data is available on MetroPulse.
    - A table of regional trends from 2002 to 2010 and a link to more detailed tables by county are posted at http://www.cmap.illinois.gov/cmp/safety.
- Suggested improvements:
    - Determine whether and how to provide facility-based crash rates.
    - Make crash data available to programming agencies through the Data for Programming Decisions process.

6. DATA COLLECTION AND PERFORMANCE MONITORING

CMAP has committed to serving as the authoritative source of information about the Chicago region and puts a high priority on making its data available to partner organizations and the general public. Specifically, CMAP seeks to expand its functions as the region's clearinghouse for transportation data, both current and archived, and to expand the types of data and coverage of its data resources.

DATA COLLECTION AND ANALYSIS

Data collection is fundamental to the ability to track the performance of the current transportation system and to evaluate potential performance outcomes of potential CMP strategies. CMAP coordinates with numerous agencies to collect the transportation system data necessary to support monitoring of performance measures within the CMP. Overall, CMAP relies on jurisdiction agencies to provide data for performance monitoring, and CMAP has established data sharing agreements with numerous partner agencies and contracted with various private data providers to obtain additional data.

For most transportation and indicator data, CMAP relies on existing monitoring activities and available data sets wherever possible, rather than in-house data collection. Doing so allows CMAP to focus its efforts on meaningful interpretation and presentation of the data, as well as facilitating data sharing activities. By making a more comprehensive range of data understandable and accessible, CMAP works to promote the comprehensive consideration of congestion outcomes and other quality of life factors in transportation planning activities throughout northeastern Illinois.

CMAP continues to try and identify opportunities for the acquisition of new data that could support regional planning initiatives in regional indicator tracking and congestion management performance monitoring.

Collaboration for Data Collection

Regional ITS Architecture

In-House Data Collection

Summer Field Data Collection Program

Travel Tracker Survey