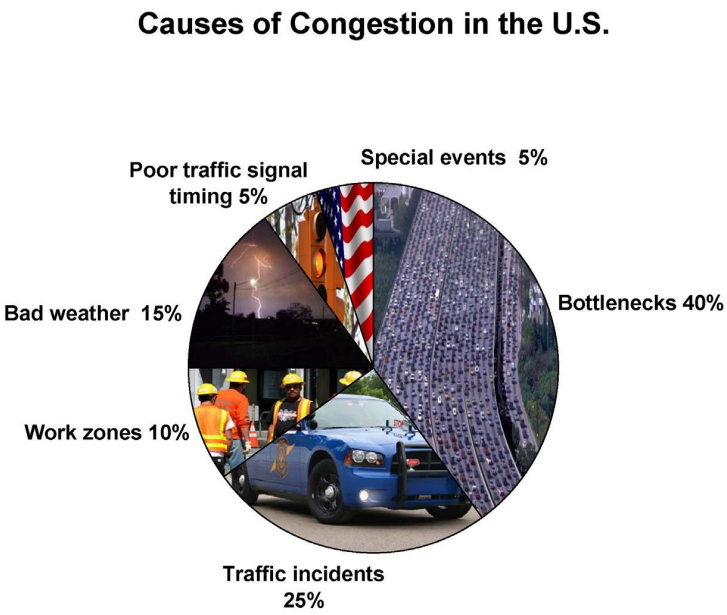
CHAPTER 8: CONGESTION & OPERATIONAL MANAGEMENT

Congestion Management Process

A Congestion Management Process (CMP) is a regionally accepted, systematic approach for managing congestion. It is a multi-modal approach to assess alternative strategies for congestion management and move these strategies into the funding and implementation stages.

The CMP is a guideline for local agencies in the development of their capital improvement programs within the metropolitan planning area. Because of the limited financial resources available to communities to address roadway congestion, KATS carefully reviews projects to determine their suitability for widening, transit accessibility, and non-motorized access. KATS then selects only the most critical areas recommended by road and transit agencies to become part of the list of capacity improvement projects, intersection improvements, and travel demand management/operation strategies in the planning area. The CMP is a tool used by road and transit agencies to determine what level of capacity improvement is most suitable for a corridor and uses data from the KATS Travel Demand Model, verified and supported by real world data, to analyze submitted capacity improvement projects.

Federal Highway Administration lists the following as the major sources of traffic congestion in the United States:



Bottlenecks are points where the roadway narrows or regular traffic demands cause traffic to backup. These are the largest source of congestion (40%);

Traffic incidents, such as crashes, stalled vehicles, debris on the road cause about 1/4 of congestion problems (25%);

Work zones for new road building and maintenance activities like filling potholes are caused by necessary activities, but the amount of congestion caused by these actions can be reduced by a variety of strategies (10%);

Bad weather cannot be controlled, but travelers can be notified of the potential for increased congestion (15%);

Poor traffic signal timing is a source of congestion on major and minor streets. This is the faulty operation of traffic signals or green/red lights where the time allocation for a road does not match the volume on that road (5%);

Special events cause "spikes" in traffic volumes and changes in traffic patterns. These irregularities either cause delay on days, times or locations where there usually is none, or add to regular congestion problems (5%).

Types of Congestion

Highway (or roadway) congestion, very simply, is caused when traffic demand approaches or exceeds the available capacity of the highway system. Though this concept is easy to understand, congestion can vary significantly from day to day because traffic demand and available highway

capacity are constantly changing. Traffic demands vary significantly by time of day, day of the week, and season of the year, and are also subject to significant fluctuations due to recreational travel, special events, and emergencies (e.g. evacuations). Available highway capacity, which is often viewed as being fixed, also varies constantly, being frequently reduced by incidents (e.g. crashes and disabled vehicles), work zones, adverse weather, and other causes.

To add even more complexity, the definition of highway congestion also varies significantly from time to time and place to place based on user expectations. An intersection that may seem very congested in a rural community may not even register as an annoyance in a large metropolitan area. A level of congestion that users expect during peak commute periods may be unacceptable if experienced on Sunday morning. Because of this, congestion is difficult to define precisely in a mathematical sense – it represents the difference between the highway system performance that users expect and how the system actually performs.

Congestion can also be measured in several ways – level of service, speed, travel time, and delay are commonly used measures. However, travelers have indicated that more important than the severity, magnitude, or quantity of congestion is the reliability of the highway system. People in a large metropolitan area may accept that a 20-mile freeway trip takes 40 minutes during the peak period, so long as this predicted travel time is reliable and is not 25 minutes one day and 2 hours the next. This focus on reliability is particularly prevalent in the freight community, where the value of time under certain just-in-time delivery circumstances may exceed $5 per minute. System reliability data from the National Performance Measurement Research Data Set has recently become available and will be used to validate model assumptions (INRIX Data).

Highway (Roadway) Congestion

Recurring Congestion occurs when traffic is greater than the roadway capacity; this can include peak hour congestion. The urban travel demand model predicts future recurring congestion and transportation planners use this tool to develop recurring capacity

deficiencies which are then analyzed for the best transportation capacity improvement projects to alleviate the congested areas.

Non-recurring Congestion – Road closures, construction detours, traffic crashes, weather conditions, special events and disabled vehicles are the main causes of non-recurring congestion. Road closures and construction detours can be modeled for their effects on the transportation system and strategies to minimize the effects of road closures and construction detours are routinely developed on a project-by-project basis. The other types of non-recurring congestion (traffic crashes, weather conditions, and disabled vehicles) are difficult to forecast and require different strategies than recurring congestion.

In this plan we focus on the types of recurring highway congestion caused by:

- Intersection delays, turning movements, and signal timing issues.
- Travel demand greater than general roadway capacity for either the entire 24-hour period or more of the peak periods (AM, Midday, or PM) in the current roadway system, today and the future projections for the Kalamazoo metropolitan area out to 2050.

Multi-Modal Congestion

The transportation system in the KATS Study Area is multi-modal and includes transit, bicycling, and walking as well as freight transportation. The KATS Travel Demand Model currently does not include a mode split with a full fixed route transit model. Future model development for the KATS 2050 Metropolitan Transportation Plan will include a transit component.

Transit

Fixed route transit service, while reducing vehicle demand, can cause delays to the transportation system when a bus makes frequent stops on a roadway that does not include at least for travel lanes or a bus lane.

Bicycling and Walking

In areas where appropriate, the addition of bicycling and walking facilities such as non-motorized pathways, bike lanes, and sidewalks can take traffic off congested roadways and move people onto alternative forms of transportation. This is one way in which traffic congestion can be alleviated with the incorporation of these forms of travel. See Chapter 5 for further details about these forms of travel in the MPO.

A more detailed look at congestion and the goals associated with its management can be found in the KATS Congestion Management Process document, available on the website or by requesting a hard copy.

Operational and Management Strategies

Federal legislation emphasized the inclusion of operational and management strategies to improve the performance of existing transportation facilities to relieve congestion and maximize the safety and mobility of people and goods.

The management tools that the Kalamazoo Area Transportation Study uses outside of the Congestion Management Process for these activities are management systems in the following areas:

- Pavement (Asset)
- Bridge
- Safety
- Public Transportation
- Intermodal

The KATS uses the Michigan Department of Transportation's (MDOT) management system known as the Transportation Management System. Members of the KATS also maintain and use local transportation system management tools like the components of the Michigan Department of Transportation's system but containing local data exclusively.

The transportation management systems used by the KATS were developed because of a requirement introduced by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) with continues emphasis in the Transportation Equity Act for the 21st Century (TEA-21). The KATS has replaced its previous Pavement Management System with the Asset Management System that was implemented statewide. Tools have been made available from the Michigan State Police and the Roadsoft asset management programs to augment the Safety Management System. In addition, the KATS local members use microsimulation, capacity software and other methods to optimize traffic signal corridors.

The primary purpose of the management systems is to provide the information and data needed to make effective decisions on the use of limited resources to improve system efficiency and protect existing and future infrastructure investments. The states have been assigned the lead role in developing and implementing the management systems. In metropolitan areas, state Metropolitan Planning Organization cooperation is emphasized. Recognizing that decision making on over 90% of the system miles is vested in local officials at various levels. This cooperative or join effort is important to the successful implementation and application of the management systems. Within the Kalamazoo metropolitan area, the local transportation agencies have advanced their management system activities, acting in coordination with and cooperatively through the Metropolitan Planning Organization. Coordination with the system development efforts by MDOT has focused on that same approach. The Kalamazoo Area Transportation Study has been both a direct and indirect participant in the development of the management systems.

Each local agency uses a combination of their own and other management systems for their planning, operation, and management of their systems. The KATS also uses a combination of local and state systems for its planning and programming purposes.