CONGESTION MANAGEMENT PROCESS (CMP) WEST MEMPHIS MPO

INTRODUCTION

This policy document of the West Memphis Metropolitan Planning Organization (MPO) provides the framework to carryout the CMP in the West Memphis-Marion Area Transportation Study.

Federal requirements state that regions with more than 200,000 people, known as Transportation Management Areas (TMAs), must maintain a CMP and use it to inform transportation planning and decision making. These requirements were introduced by the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 and were continued under the successor law, the Transportation Equity Act for the 21st Century (TEA-21). Whereas previous laws referred to this set of activities as a congestion management system (CMP), the most recent surface transportation authorization law, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), refers to a “congestion management process”, reflecting that the goal of the law is to utilize a process that is an integral component of metropolitan transportation planning.

The primary function of a CMP is to develop a systematic and consistent process for identifying locations of congestion on the multimodal transportation system, and to identify and evaluate potential actions that can effectively reduce congestion. Another function of a CMP is to ensure that traffic flow problems do not result in air quality issues.

The two primary causes of congestion are:

(a) Recurring Congestion, that tends to be concentrated in short time periods, such as "rush hours," and is caused from excessive traffic volumes resulting in reduced speed and flow rate within the system, and

(b) Non-recurring Congestion, caused from unforeseen incidents (road accidents, spills, and stalls), which affects driver behavior to a considerable extent. It is estimated that more than 60 percent of traffic delay is caused from incidents in an urban area. However, research has also shown that properly applied measures to manage the existing components of the system can have a profound positive effect. These measures, called congestion management or mitigation strategies, are designed to improve the operating efficiency of the existing transportation infrastructure. The CMP identifies areas of congestion and provides a framework for developing congestion mitigation strategies that can be implemented in the short term.

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A successful congestion management program should address both these types of congestion.

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

DEVELOPMENT PARAMETERS

The SAFE, ACCOUNTABLE, FLEXIBLE, EFFICIENT TRANSPORTATION EQUITY ACT: A LEGACY FOR USERS (SAFETEA-LU) addresses metropolitan areas' concerns about traffic congestion by requiring the development of a CMP that reduces travel demand and provides operational management strategies that enhance a region's mobility.

> **A Definition of Congestion:** The level at which transportation system performance is no longer acceptable due to traffic interference. The level of acceptable system performance may vary by type of transportation facility (freeways, arterials), geographic location (urban or rural area) and/or time of day. Congestion can be classified as either recurrent or non-recurrent. Recurrent congestion includes both the everyday congestion from regular work commuting and delays which occur due to planned special events, such as major sports events. Non-recurrent congestion includes minor and major traffic accidents, unusual weather conditions, roadway construction and maintenance.

As stated in the State CMP, the Arkansas State Highway and Transportation Department (AHTD) is responsible for monitoring and maintaining a database on all State Highway System Routes in all areas of the state, including Transportation Management Areas (TMA's*).

Other functionally classified roads that are identified as congested must be monitored and evaluated by local jurisdictions or regional agencies and will also be included in the State's data base.

This means that most of the major arterials and some minor arterials in the WMATS are monitored for congestion by the State. The MPO will work cooperatively with AHTD on congestion management for these roadways. Additionally, the MPO will monitor other routes and spot locations as they are identified as being congested. Some of those locations have been tentatively identified and shown on the maps included at the end of

this report. It should be noted that in accordance with the Unified Planning Work Program (UPWP) the MPO has and is continuing to advance congestion mitigation and traffic safety in the area in a number of ways, which will be discussed later.

The CMP will necessarily include the entire West Memphis – Marion Transportation Area Study (WMATS). The boundaries of the geographical study area are defined in the West Memphis MPO's *Prospectus*.

PERFORMANCE MEASURES AND STANDARDS

There are numerous ways to measure congestion. Examples include roadway and transit level of service (LOS), crash rates, transit headways, vehicle miles traveled, vehicle hours traveled and travel delay. Some of these measures require intricate data collection efforts, model simulations, or traffic analysis software to develop accurate measurements.

The principal guide to evaluate congestion will be traffic volume divided by roadway capacity (v/c Ratio). Travel time performance measures will also be used to identify congestion locations on selected routes with v/c ratio of 0.85 or higher.

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

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

1. The v/c ratio provides a good indication whether the facility is congested, if "excess" capacity is available, or if saturation conditions exist. A v/c ratio equal to 1.0 or greater indicates a Level of Service (LOS) "F" operation where the demand volume exceeds the available capacity of the roadway, inevitably resulting in forced flow conditions. The other categories vary slightly depending on the particular methodology from the Highway Capacity Manual that is being deployed, but in general the following v/c ratios and their corresponding LOS will be used:

    1) v/c < 0.85 = LOS A,B,C (Not Congested)
    2) 0.85 < v/c < 0.95 = LOS D (Marginal Congestion)
    3) 0.95 < v/c < 1.00 = LOS E (Moderate Congestion)
    4) v/c > 1.00 = LOS F (Serious Congestion)

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

identified roadways to measure travel time and amount of delay in relation to the posted speed limit.

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

DATA COLLECTION

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

The MPO has identified the following data to be used for performance measures:

Traffic Volumes -Average Daily Traffic (ADT). The AHTD collects traffic volume within the study area on State Highways and many other roads. These counts are generally made on a three-year rotation, meaning that each traffic location is counted at least every three years. Additionally, the MPO makes spot counts for determining local land use traffic generation factors along with specific traffic studies such as the current 4-way stop analysis.

Because ADT counts serve both congestion and air quality evaluation needs, as air quality becomes a major issue in our area the importance of this program will grow. From the air quality perspective, two of the principle inputs to air quality models – trips and vehicle miles traveled – can be derived from ADT.

Capacity. AHTD maintains a record of physical roadway characteristics on all State Highways in the Highway Needs Inventory. The MPO also maintains a record of the physical characteristics of roadways in West Memphis through its ongoing pavement inspection program, PAVER. These characteristics may be used to calculate the general capacity of the roadway, thereby allowing the comparison of volume to capacity.

Travel Time. The MPO will conduct limited travel time and spot delay studies on selected major routes. These routes will be traveled three times in each direction during

peak hours to compute a directional average speed. As stated above, the MPO will use a GPS system to obtain travel times.

Average Vehicle Occupancy. Performance measures should reflect the number of people moved as well as the vehicles moved. The MPO will conduct limited vehicle occupancy surveys at selected locations.

Accident Reports. Congestion breeds accidents and one method, therefore, of identifying congested areas is by evaluating accident data. The MPO will continue to collect area accident reports, identify high accident locations and review for improvement strategies.

IDENTIFICATION AND EVALUATION OF STRATEGIES

> **Transportation Control Measures (TCM):** a transportation management strategy or group of strategies that consist of both Transportation System Management (TSM) and Transportation Demand Management (TDM) measures. TCM strategies are intended to improve the mobility of goods and people with appraised air quality benefits and are considered relatively low capital cost solutions to congestion mitigation problems as compared to the traditional capital intensive solution of solving operational and travel demand problems with the addition of single-occupant vehicle (SOV) general purpose lanes.

The MPO will consider the broadest possible array of transportation strategies. Listed below several of these strategies that may be considered with the understanding that not all of them will be applicable to this area.

1. Transportation demand management measures, such as,

- Carpooling
- Vanpooling
- Alternative work hours
- Telecommuting
- Parking management

From the above list, carpooling seems to be the most promising in reducing congestion. The MPO is currently participating in the Memphis Area Rideshare Program. The potential benefit of this program to our area can not be overstated. Studies indicate that increasing the current average of approximately 1.3 persons per car in the Memphis area to 2.0 would remove over 75,000 vehicles from rush hour traffic.

2. Traffic operational improvements, such as,

- Intersection and roadway widening
- Channelization
- Traffic surveillance and control systems
- Motorist information systems
- Ramp metering
- Traffic control centers, and
- Computerized signal systems;

3. Measures to encourage high occupancy vehicle (HOV) use, such as,

- HOV lanes
- HOV ramp bypass lanes
- Guaranteed ride home programs, and

- Employer trip reduction ordinances;

For long distance treatments, a five-minute or more saving per trip is generally recognized as a prerequisite to ensure the viability of an HOV facility. For this reason and because of the extremely high percentage of truck traffic through this area, this strategy seems inappropriate for this area.

4. Public transit capital improvements, such as,

- Service enhancement or expansion
- Traffic signal preemption
- Fare reductions, and
- Transit information systems

5. Public transit operational improvements, such as,

- Exclusive rights-of-way (rail, busways, bus lanes)
- Bus bypass ramps
- Park and ride and mode change facilities, and
- Paratransit services;

6. Measures to encourage the use of nontraditional modes, such as,

- Bicycle facilities,
- Pedestrian facilities, and
- Ferry services;

The MPO has developed a bicycle plan in order to facilitate the use of bicycles in the study area. And the MPO is working with the AHTD and other agencies outside the study area to encourage the development of bicycle and related facilities that would enhance and encourage both intrastate and interstate cycling. However, pedestrian and bicycle enhancements are unlikely to yield appreciable benefits in any congestion mitigation effort for this area.

6. Congestion pricing

Because there are no toll roads and only limited transit services in the area there are no opportunities for congestion pricing. If a viable transit operation should become a reality in the study area, adjusting peak hour transit fares might prove beneficial. Realistically, however, this seems to be an inappropriate strategy for our area, at least for the foreseeable future.

7. Growth management and activity center strategies;

These are strategies that may be defined as the use of public policy to regulate the location, geographic pattern, density, quality and rate of growth of development. By

knowing the trip generation characteristics of various land uses and then exercising control over those uses one can theoretically limit the trip generation of a particular area to any given level. This level should be consistent with the capacity of the existing infrastructure and the level of service desired. A comprehensive growth management strategy can include not only transportation actions, but also actions dealing with housing, economic development, open space and community infrastructure. Growth management strategies must be implemented by local jurisdictions due to the nature of the associated activities and polices.

8. Access management techniques

Access management involves providing or managing access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity and speed.

Access management techniques include,

- Land-use control by zoning regulations,
- Land acquisition adjacent to roadways,
- Subdivision control, and
- Minimum driveway spacing.

9. Incident management

Incident-related or non-recurring congestion is said to cause approximately 60% of the congestion on our nation's highways. Because of the usual effectiveness of an incident management program and the relatively low cost involved in starting one, incident management may be one of the most-effective strategies available. Incident management programs vary widely in cost but all share the following elements:

- Detection
- Verification
- Response
- Removal
- Traffic management
- Information to motorists

With the development of increasingly sophisticated monitoring equipment and the increasing use of cellular phones, the detection, verification, response and removal of traffic incidents can be handled very quickly – if the appropriate system is in place. By developing a traffic management plan and providing this information to motorists quickly there can be significant opportunities to reduce incident-related queues.

10. Intelligent Transportation system and advanced public transportation system technology

AHTD, the MPO and other area stakeholders have developed an Intelligent Transportation System (ITS) Regional Architecture. In conjunction with this and in cooperation with the Memphis MPO an ITS project is underway that will eventually utilize cameras and changeable overhead signs as well as the internet, radio and TV to inform area motorists of incidents on or near the Hernando Desoto Bridge and the Memphis-Arkansas Bridge. This system will be enhanced with similar, coordinated technologies on I-240 and I-55 in Tennessee.

11. The addition of general purpose lanes

General-purpose lanes are specified as such in the regulations to distinguish ordinary roadway widening from widening for HOV use or other limited-purpose lanes. Widening a radial commuter arterial will reduce delay, which reduces all of the incentives to choose a travel method other than a single occupant automobile. Improved travel times also permit trip lengths to increase, which encourages the development pattern of continued urban sprawl. The net result is a cycle of development that results in traffic volume growth, a return of congestion, and greater vehicle emission of air pollutants.

Road widening is also a very expensive prospect in developed areas. Nevertheless, road widening and roads on new alignment are an essential and unavoidable component of the long-range transportation plan for any region that expects growth to continue, even at low growth rates.

CONCLUSION

It is the intent of the MPO that the implementation of this plan will adequately meet FHWA/FTA regulations and enhance the current congestion mitigation strategies in place for this area.

EXISTING PROGRAMS AND ACTIVITIES

The MPO is currently addressing congestion issues through the Unified Planning Work Program.

SUBTASK 5.2: CONGESTION MANAGEMENT

PURPOSE AND OBJECTIVE

To identify, relieve and minimize congestion.

To improve the safety of the transportation system for motorized and non-motorized users by reducing the number and severity of crashes on all public roads in the study area. (SAFETEA—LU , (2)).

Continue to identify and quantify transit type services including van services and van pooling provided in the study area. Continue to encourage and promote ridesharing.

Increase the use of transit services. (SAFETEA—LU, (2-7)).

Increase transit safety and security. (SAFETEA—LU, (2, 3)).

WORK TASKS

1. Travel-time studies on major and minor arterials.

2. In cooperation with AHTD, identify and prioritize existing high crash locations by maintaining and monitoring a traffic crash map and the computerized collision diagrams of selected high crash locations by continuing data input of local crash data as supplied by AHTD and the police departments of West Memphis and Marion through a computer data base program, locate all crashes on a street map of the study area, and produce collision diagrams of crashes at selected intersections as deemed necessary by the Study Director.

3. In cooperation with AHTD, monitor traffic volumes and related crash rates on arterials to determine congestion correlation and remedies. Develop and implement strategies for improving safety at hazardous or potentially hazardous locations.

4. Using traffic crash information, volumes, travel times, and other related factors, establish means to identify and reduce congestion and improve safety by using proven traffic engineering techniques through monitoring and publishing the ADT data as supplied by the AHTD on major and minor arterials in the Study Area along with supplemental data obtained from selected field counts by the MPO. And, in cooperation with AHTD and the Memphis MPO, study and evaluate incidence and crisis management on Interstates 40 and 55 in the Study Area with the goal of congestion reduction.

5. Continue to work cooperatively with Memphis Area Rideshare in developing car pool, vanpool, and related transportation demand services for this area. Activities will be centered on the development of the Commuter Club, a Memphis Area Rideshare program that uses area business discounts, free taxi rides and periodic newsletters in order to attract commuters and educate the population on the benefits of car and van pooling.

9. Work with MATA and the Memphis MPO in cooperation with AHTD in developing and monitoring a *Public Transit/Human Services Coordination*

Plan (CHSTP) for subrecipients of public transportation program funds. The SAFETEA-LU requires a locally developed, coordinated public transit/human services transportation plan for subreciepients of three transit programs. These programs are the Elderly and Individuals with Disabilities, the Job Access and Reverse Commute, and the New Freedom. The subrecipients must also be selected through a competitive process involving the MPO. Monitoring activities, through performance measures, will also be performed through the year.

END PRODUCTS

1. Traffic studies and recommendations for crash reduction; intersection and spot improvement recommendations including 4-way stop analysis.

2. A GIS traffic crash map indicating the location and linked to pertinent crash data that enables detailed analysis of both individual crashes and intersections with high crash rates.

..... 3. Travel-time data.

4. Traffic-count data.

5. Monitor ridesharing, van pooling, and other related transportation demand services data.

6. Monitor Congestion Management Process.

7. Continue to provide reports and maps to appropriate officials and agencies for public use about the types of transit services provided in the study area.

8. Monitor transit routes and services by MATA and other providers.

9. A Public Transportation/Human Services Coordination Plan for subrecipients of public transportation program funds.

10. A process to competitively select subrecipients within the study area and performance measures to monitor project activities.

List of Acronyms

ADT.....Average Daily Traffic

AHTD.....Arkansas State Highway and Transportation Department

CMP .....Congestion Management Process

FHWA ..... Federal Highway Administration

FTA .....Federal Transit Administration

HOV .....High Occupancy Vehicle

LOS .....Level of Service

ISTEA.....Intermodal Surface Transportation Efficiency Act

ITS.....Intelligent Transportation System

LRP.....Long Range Transportation Plan

NHS.....National Highway System

PMS.....Pavement Management System

PTMS .....Public Transportation Facilities and Equipment Management

SAFETEA-LU..... Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

SMS..... Safety Management System

SOV.....Single Occupancy Vehicle

SIP .....State Implementation Plan

STIP..... Statewide Transportation Improvement Plan

TCMP .....Traffic Control Measures

TDM.....Travel Demand Measures

TIP.....Transportation Improvement Program

TSM..... Transportation System Management

V/C ..... Volume-to-Capacity

VMS .....Variable Message Signs

VMT .....Vehicle Miles of Travel

WMATS.....West Memphis – Marion Area Transportation Study