TRAFFIC MANAGEMENT CENTERS

Description

Traffic management centers (TMCs) serve as the mission control for an urban area's major street and highway network. This one location monitors traffic signals, intersections, and roads and proactively deploys traffic management strategies to reduce congestion and coordinate state and local authorities during special events, emergencies, or daily stop-and-go traffic.

TMCs may not always be the first detector of crashes and stalled vehicles that cause traffic jams, but they are always an important information source. Operators monitor a closed circuit television (CCTV) system and alert the proper authorities and approaching drivers (via dynamic message signs [DMS] or a website) about problem areas, reducing crashes and saving drivers time, money, and wasted fuel. Representatives of law enforcement, fire and emergency management services (EMS), and local transit agencies are often co-located at TMCs to improve multiagency response.

Exceptional TMCs reach across city boundaries to collect information on the entire road network by using sensors, cameras, and other technology. Using a complete network picture, TMCs can proactively identify weak areas, suggest solutions to state or local agencies, and communicate solutions or information to drivers and transit riders in real time. They can also participate in studies of longer-term congestion reduction strategies.

Target Market

TMCs should be used to monitor the freeway and arterial network as well as transit of almost all urban areas. In larger urban areas where more than one municipality may exist, cooperation with TxDOT to develop a regional multi-jurisdictional TMC is generally more effective than each city or county sponsoring its own, separate TMC. The cameras and message signs,

Houston TranStar Operation Center (govtech.com)

Cost:	●●●●○
Time:	**Moderate**
Impact:	**Regional**
Who:	**Public Agencies**
Hurdles:	**Funding**

often owned by TxDOT, are typically used to monitor and communicate traffic conditions on freeways, highways, and other major surface streets in that particular city or region. Transit agencies owning and/or operating High Occupancy Vehicle (HOV) lanes and bus or rail fixed-guideway transit may also have CCTV resources that can be used to identify problems on their systems or adjacent roadway systems that may have limited visual coverage. Cooperation with emergency services or co-location of regional Emergency Operation Centers (EOCs) with a TMC may also be an effective option for directly coordinating transportation-related responses to a natural or man-made disaster situation. In all cases, coordination of response over a wider area is provided by the coverage a TMC can provide.

How Will This Help?

TMCs allow transportation and public works professionals to operate the roadway network in a systematic manner. Several benefits in reducing congestion are possible as a result. These include:

- Reduced delay caused by stalled vehicles or incidents by continually monitoring the network via CCTV cameras and sensors and deploying traffic management strategies as needed. Dispatching of tow trucks or other crash response personnel can also be facilitated by a TMC.
- Alert approaching vehicles to problem areas by updating message boards and traffic flow websites to better inform drivers.
- Provide information regarding alternate routes for vehicles, alleviating the effects of bottlenecks or incidents for a period of time, thereby reducing congestion.

Implementation Examples

TMCs have become standard in almost all major urban areas of the U.S.; many more are extending their coverage area outside the urban centers or even provide statewide coverage. The Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), and other ITS proponents, have published many case studies or implementation examples of several differing types and sizes of TMCs such as *Metropolitan Transportation Center Concepts of Operation: A Cross-Cutting Study* (referenced below).[1]

Houston, Texas: TranStar has 730 CCTV cameras used to monitor the network and dispatch emergency vehicles and tow trucks. The center also controls DMS and other operational devices, all contributing to reduce delay by 11.3 million vehicle hours ($227 million) in 2009.

Utah: CommuterLink monitors the major roads throughout the entire state of Utah. Since the TMC was deployed along with several other ITS strategies, freeway speeds have increased 20 percent and intersection delays have decreased by 27 percent.

Application Techniques and Principles

TMCs may be applied at various levels to address local and regional transportation management needs. FHWA and FTA guidance suggest three different classification methods for TMCs, which can be further characterized by the number and type of entities involved. Table 1 shows the general types of TMC business models that have been adopted in Texas.[2,3]

Issues

TMCs require significant funds to start and maintain operations, which can limit their deployment. Additionally, municipalities may not wish to hand over certain tasks, such as signal timing, to a TMC, limiting its effectiveness. Questions have also arisen regarding the ownership of, rightful purposes for use, charges for, and storage parameters for data collected by TMC sensors and CCTV cameras.[2] Developing an approved policy or data sharing agreement among TMC partners is an important part of developing a TMC. General traffic flow data from the TMC is typically provided to the public via TMC-sponsored websites or shared with Information Service Providers (ISPs) and then repackaged and distributed in order to disseminate real-time traffic information to the public.[2]

TMC Business Models & Configurations

Geographic Area Covered	Number and Type of Agencies Involved	Operating Mechanism
▪ Single jurisdiction TMC ▪ Multiple jurisdictions TMC ▪ Regional or district TMC ▪ Statewide TMC	▪ Single agency TMC ▪ Multiple transportation agencies ▪ Multiple agencies and disciplines	▪ Public agency staffed and operated TMC ▪ Private sector staffed and operated TMC

Table 1: TMC Business Models & Configurations

For more information, please refer to: http://mobility.tamu.edu/mip/strategies.php.

Who Is Responsible?

The responsibility for implementing a TMC depends on its structure and the agencies involved. Generally one agency (often TxDOT in a large urban area) will take the lead and work with local and regional partners that may include metropolitan planning organizations (MPOs), cities, counties, transit providers, and emergency responders.

Project Timeframe

Planning for the construction and operation of a large, multijurisdictional TMC takes a period of years to complete. Assessing operational and funding needs, assembling agency and private partners, and identifying the proper location and facility type are all required before moving toward actual construction. Small, single jurisdiction TMCs or those active during special events can be completed more quickly, but still take more than one year to integrate instrumentation and information to be managed from a single site and to secure required funding.

Cost

The costs to provide a specialized facility to house a TMC vary dramatically according to the (1) size and scope of the operations that will be managed by the TMC; (2) whether the building is newly constructed for this purpose or converted from an existing building; and (3) other factors such as regional labor and material costs. Design and funding decisions should be made to accommodate planned operational needs rather than attempting to place needed operations into available space that may not be adequate. Capital expenses should be expected to range from several hundred thousand dollars for small TMC facility to several million dollars for a large, metropolitan area TMC housing multiple agencies and services.

The Federal Highway Administration provided cost estimates for yearly operational costs for TMCs with a variety of sizes and operational periods each week in its 2005 publication, TMC Business Planning and Plans Handbook.[3] Those numbers are presented in Table 2 for reference and to provide information on general magnitude of expenditure for each type. Inflation in both personnel and physical plant costs should be taken into account in estimating the costs for undertaking such a project today.

Traditional funding sources for both capital and operating expenditures for TMCs have been from the National Highway System (NHS), Surface Transportation Program (STP), Interstate Maintenance (IM), Congestion Mitigation Air Quality Program (CMAQ), and MAP-21/ SAFETEA-LU/TEA-21 type funds. Past funding bills have also included specialized funding programs for capital expenditures such as the National Corridor Planning and Development Program, ITS Integration, and the Coordinated Border Infrastructure Program. Most of these funding programs require local matching funds at (federal, state, or local) 90/10, 80/20, or even 50/50 ratios.[3]

TMC Annual Operations Cost Estimates (In 2005 Dollars)[3]

TMC Size *Operations/Days*	Personnel Costs ($1,000s)	Physical Plant Costs ($1,000s)	Total Annual Operation Costs ($1,000s)
Large Regional TMC *24 Hours/Day, 7 Days/Week*	$1,278.1	$1,838.8	$3,116.9
Large TMC-Weekday *12 Hours/Day, 5 Days/Week*	$476.5	$180.7	$657.2
Medium TMC-Peak Period *8 Hours/Day, 5 Days/Week*	$277.9	$109.4	$387.3
Small TMC *Special Event or Incident Response Only*	$53.6	$46.9	$100.5

Table 2: 2005 Annual Operations Cost Estimates for TMCs of Various Sizes and Operational Periods

For more information, please refer to: http://mobility.tamu.edu/mip/strategies.php.

Data Needs

Data needs are intensive at TMCs as described in the above sections. Traditional ITS information from roadway sensors, signals, and CCTV cameras are generally necessary to support the operation of a TMC. As anonymous vehicle tracking technologies (e.g., GPS tracking of Bluetooth signals that provide travel time) develop further, even more effective measures of traffic flow through the transportation system should be available. This type of data would be useful to both TMC operators and to the traveling public.

Traffic Management Center Best Practice

- Type of Location: Typically one or more urban areas, although other models are possible.
- Agency Practices: Financial and operational commitment to work cooperatively with regional partners to improve traffic operations and emergency response capabilities associated on the transportation network.
- Frequency of Reanalysis: Long-term commitment to TMC partnership is needed both to implement the system and to remain effective in managing transportation system operations and emergency needs over a long period of time.
- Supporting Policies or Actions Needed: Financial commitment to long-term capital and operating expenditures.
- Complementary Strategies: Signal operations and management, aggressive incident clearance, all active traffic management strategies, road weather management, traveler information management, special event management, managed (HOV/HOT) lanes, variable pricing, and reversible traffic lanes.

For More Information

1. Federal Highway Administration and Federal Transit Administration, Metropolitan Transportation Center Concepts of Operation: A Cross-Cutting Study, Washington, DC, 1999. Available: http://tmcpfs.ops.fhwa.dot.gov/cfprojects/uploaded_files/TMCConOpsCrossCutting.pdf. Accessed: July 24, 2012.

2. Texas Transportation Institute, *Development of Guidelines for Data Access for Texas Traffic Management Centers*, TxDOT Research Report 0-5213-1, College Station, TX, 2007. Available: http://tti.tamu.edu/documents/0-5213-1.pdf. Accessed: July 20, 2012.

3. Federal Highway Administration, *Transportation Management Center Business Planning and Plans Handbook*, TMC Pooled Fund Study, Washington, DC, December 2005. Available: http://tmcpfs.ops.fhwa.dot.gov/cfprojects/uploaded_files/TMC_BPG_Final.pdf. Accessed: July 19, 2012.

4. Federal Highway Administration, Traffic Management Center Pooled Fund Study website, http://tmcpfs.ops.fhwa.dot.gov.