Metropolitan Transportation Management Center

A Case Study

Michigan Intelligent Transportation Systems

Improving Safety and Air Quality While Reducing Stress for Motorist

October 1999

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Foreword

Dear Reader,

We have scanned the country and brought together the collective wisdom and expertise of transportation professionals implementing Intelligent Transportation Systems (ITS) projects across the United States. This information will prove helpful as you set out to plan, design, and deploy ITS in your communities.

This document is one in a series of products designed to help you provide ITS solutions that meet your local and regional transportation needs. We have developed a variety of formats to communicate with people at various levels within your organization and among your community stakeholders:

- **Benefits Brochures** let experienced community leaders explain in their own words how specific ITS technologies have benefited their areas;
- **Cross-Cutting Studies** examine various ITS approaches that can be taken to meet your community's goals;
- **Case Studies** provide in-depth coverage of specific approaches taken in real-life communities across the United States; and
- **Implementation Guides** serve as "how to" manuals to assist your project staff in the technical details of implementing ITS.

ITS has matured to the point that you don't have to go it alone. We have gained experience and are committed to providing our state and local partners with the knowledge they need to lead their communities into the next century.

The inside back cover contains details on the documents in this series, as well as sources to obtain additional information. We hope you find these documents useful tools for making important transportation infrastructure decisions.

Christine M. Johnson
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Director, ITS Joint Program Office
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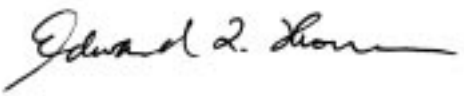

Edward L. Thomas
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Preface

The following case study provides a snapshot of Michigan's Intelligent Transportation Systems transportation management center (MITSC). It follows the outline provided in the companion document, *Metropolitan Transportation Management Center Concepts of Operation—A Cross Cutting Study,* which describes operations and management successful practices and lessons learned from eight transportation management centers in the United States and Canada.

This case study reflects information gathered from interviews and observations at the downtown Detroit transportation management center. The authors appreciate the cooperation and support of the Michigan Department of Transportation and its partners in the development of this document.

Contents

Background ***1***

Design and Implementation ***3***

Operations ***5***

Maintenance ***6***

Background

The Michigan Intelligent Transportation System Transportation Management Center (MITSC) contains both an original system dating from 1981 covering 32.5 miles, and an expansion of the system to cover a total of 180 centerline miles of freeway that is still being constructed. The original system concept was prepared in 1969. On the basis of the performance of the original system, there was a desire within Michigan Department of Transportation for system expansion, but acquiring the necessary funding was a problem. Two years of Congestion Mitigation and Air Quality funding was eventually identified to fund the expansion.

A formal set of goals and objectives are being developed. Based on discussions to date, the primary system objectives are to:

- Improve safety and air quality
- Reduce stress for motorists.

The focus of activity in the MITSC is to make the traveler's trip less stressful by providing better information to the traveler. When a problem occurs, the MITSC helps Michigan State Patrol and others correct it quickly.

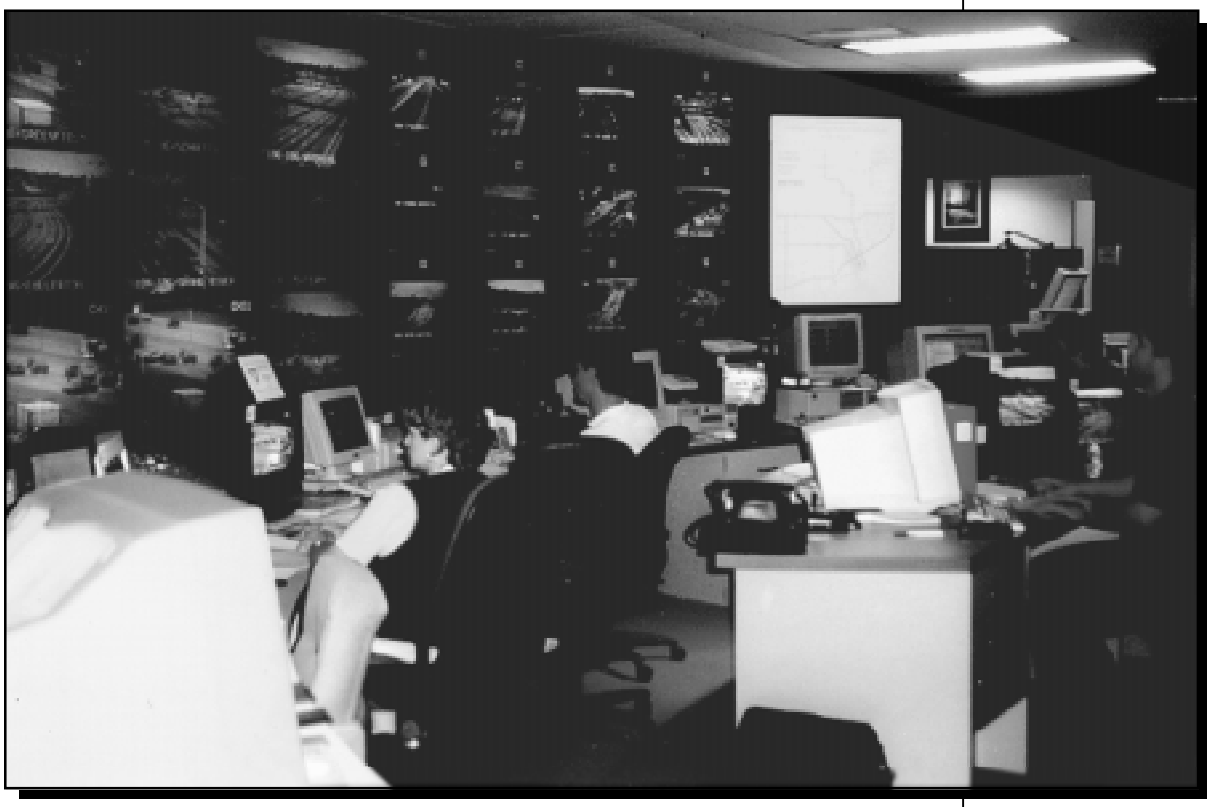
Courtesy of MapQuest

Design and Implementation

General system design parameters for Michigan's Intelligent Transportation System Transportation Management Center are the following:

- The older portion of the system includes ramp meters, detectors, and closed-circuit television with communications via coaxial cable. The portion being implemented includes the same components and Highway Advisory Radio, communicating via microwave and spread spectrum to an OC-48 fiber optic network.
- The control center is above the Greyhound bus garage in downtown Detroit with close access to the freeway. The control room is roughly 30 feet by 80 feet. The front of the room contains two dozen 25-inch color video monitors and an 8-foot by 9-foot video wall. Front to back, the room contains a row of four operator positions, a supervisor console, and then two rows of cubicles for Michigan State Patrol dispatch and other services. The rear of the room provides closed offices for the Michigan State Patrol.

The Detroit TMC developed special procedures to smooth traffic flow to and from major parking sites for its large downtown special events venues.



Design and Implementation

Method of Implementation

- The new system is being implemented through a firm fixed-price design/build/warranty contract. The contractor was selected based on best perceived value. The original system was implemented and has been expanded through conventional consultant design and low-bid construction contracts.

Testing

- The operational objective is for 95 percent of the equipment to be up 95 percent of the time, with no entire subsystem ever less than 95 percent reliable.
- Subsystem level acceptance is under way. Test plans were developed as part of the contract. Most testing is being performed by contractor personnel and witnessed by Michigan Department of Transportation staff.
- The operational readiness testing approach is being discussed. The system is available for use in a partially functional condition at the request of the Michigan Department of Transportation.

Training

- The contractor will provide training and operator and system documentation. Staff are being trained as new subsystems come online. New system staff are provided "hands-on" training by the Assistant Operations Manager.
- Once training materials are accepted, their upkeep becomes Michigan Department of Transportation's responsibility.

Documentation

- Operations procedures documentation will be prepared by Michigan Department of Transportation using word processing, computer aided design, and charting software. The computer aided software engineering tools the contractor used to develop the system software provide additional software documentation. An index-driven online help function is available.
- The implementation contractor is providing "as-builts" on CD-ROM.
- The contractor prepared detailed requirements documentation in response to the Request For Proposals, which had been prepared internally by Michigan Department of Transportation (MDOT) project staff.

Michigan DOT greatly enhanced coordination in incident management by co-staffing the TMC with Michigan State Patrol.

Operations

Workload and Performance

- There are two shifts, operated by three temporary personnel per shift. Shift break is at noon, with roughly a 30-minute overlap. Michigan State Patrol works 24 hours a day, 7 days a week with different shift breaks.
- System operation is being privatized; the privatization contractor is studying system operation.
- Typically six to twelve incidents that require active management occur daily. The system is also used to provide information regarding recurring congestion, including congestion related to the road construction in the area.
- Operator actions are logged manually. The new system will provide automatic logging of most activity.
- Operations staff work extensively with MDOT Construction and MDOT Maintenance in identifying faults and repairing field equipment. They also monitor radio traffic to maintenance staff and field engineers, and answer the MITSC's switchboard number.

Coordination

- Verbal coordination works effectively between Michigan State Patrol dispatch and MDOT operators. All personnel can view the front wall monitors and the large screen display. Michigan State Patrol has a Michigan Intelligent Transportation System workstation and video monitors and will have video control. The MDOT assistant TMC manager is stationed in the control room roughly 50 percent of the time.
- Coordination by telephone occurs with the Oakland County Roads Commission, whose FAST-TRAC traffic signal system can send its signal situation to MITSC. Oakland County Roads Commission can view and control MDOT's closed-circuit television cameras.
- Communication with the privately sponsored Courtesy Patrol is via cellular telephone.
- MDOT Construction faxes work zones and road closures to MITSC, where they are manually entered into the computer.
- There is no direct linkage between the MITSC control center and the local transit provider, SMART, although a significant and increasing amount of data from MITSC is available to SMART via the Internet.

Conflict Resolution

- The system database presents a unique recommended solution to each incident, based on incident location and type. Variable message sign and highway advisory radio messages can be edited manually. The TMC deputy manager and manager are located on site.

Nonstandard Operations

- Traffic management plans for special events are developed by ad hoc teams. MDOT coordinates with major parking facilities during special events.
- An emergency operation planning process will be implemented once the new system is accepted.

Maintenance

Fault Detection and Correction

- The new system indicates equipment malfunction through changes in icon color of the device on the system map. Not all devices are monitored constantly due to limitations on total communication bandwidth.
- Failures noted in use or reported by the system are logged manually, and calls placed to MDOT Maintenance, internal MITSC staff, or to the contractor.

Configuration Management

- The contractor currently maintains control for configuration management of the computer hardware and software. No formal MDOT configuration management program is in place for the total system.

Logistics

- MDOT Maintenance is identifying tools and spares that will be required outside of the warranty. Some purchases will be difficult due to limitations on sole-source acquisition. Acquisition of spares for the older system is a problem as many parts and tools are no longer available. MDOT is considering the upgrade or replacement of these devices.

Maintenance

- Maintenance is provided by two personnel from the MDOT district office. Discussions are under way regarding contracting for full system maintenance. Maintenance of the older system has become problematic due to loss of expertise in its technologies.
- The contractor is presently supporting control room equipment under a 2-year warranty that was included with the design/build/warranty contract.

For further information, contact:

Federal Highway Administration Resource Centers

Eastern Resource Center
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Baltimore, MD 21201
Telephone 410-962-0093

Southern Resource Center
61 Forsyth Street, SW
Suite 17T26 – HRA-SO
Atlanta, GA 30303-3104
Telephone 404-562-3570

Midwestern Resource Center
19900 Governors Highway
Suite 301 – HRA-MW
Olympia Fields, IL 60461-1021
Telephone 708-283-3510

Western Resource Center
201 Mission Street
Suite 2100 – HRA-WE
San Francisco, CA 94105
Telephone 415-744-3102

Federal Transit Administration Regional Offices

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55 Broadway, Suite 920
Cambridge, MA 02142-1093
Telephone 617-494-2055

Region 2
1 Bolling Green
Room 429
New York, NY 10004
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Region 3
1760 Market Street, Suite 500
Philadelphia, PA 19103-4124
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6301 Rockhill Road, Suite 303
Kansas City, MO 64131-1117
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Denver, CO 80202-5120
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Notes

This Document Is One in a Series of Products That Address ITS Issues Pertinent to a Variety of Audiences

Elected and Appointed Officials • Senior Decision Makers
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Emergency Service Providers • Metropolitan Planning Organizations
Additional Transportation Stakeholders

Products Available in This Series:

- **Benefits Brochures** quote how ITS technologies have benefited specific areas

- **Cross Cutting Studies** present current data from related ITS applications

- **Case Studies** provide in-depth coverage of ITS applications in specific projects.

- **Technical Reports** include results from various Field Operation Tests.

- **Implementation Guides** assist project staff in the technical details of implementing ITS

ITS Topics Addressed in This Series:

- Commercial Vehicle Operations
- Emergency Services
- Enabling Technologies
- Emissions Management
- Freeway and Arterial Management
- Planning and Integration
- Real-Time Traveler Information
- Transit, Toll, and Rail Management
- Weather Information for Travelers and Maintenance

For a current listing of available documents, please visit our Web site at:
www.its.dot.gov

ITS Web Resources

ITS Joint Program Office:

http://www.its.dot.gov

ITS Cooperative Deployment Network (ICDN):

http://www.nawgits.com/jpo/icdn.html

ITS Electronic Document Library (EDL):

http://www.its.fhwa.dot.gov/cyberdocs/welcome.htm

ITS Professional Capacity Building Program Catalogue:

http://www.its.dot.gov/pcb/98catalg.htm

Federal Transit Administration:

http://www.fta.dot.gov

Intelligent Transportation Systems

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