# Metropolitan Transportation Management Center

## A Case Study

## *COMPASS*

## Effectively Managing Traffic and Incidents

October 1999

# 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
Program Manager, Operations
Director, ITS Joint Program Office
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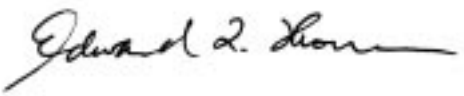

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## Preface

The following case study provides a snapshot of the Downsview, Ontario transportation management center (TMC). 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.

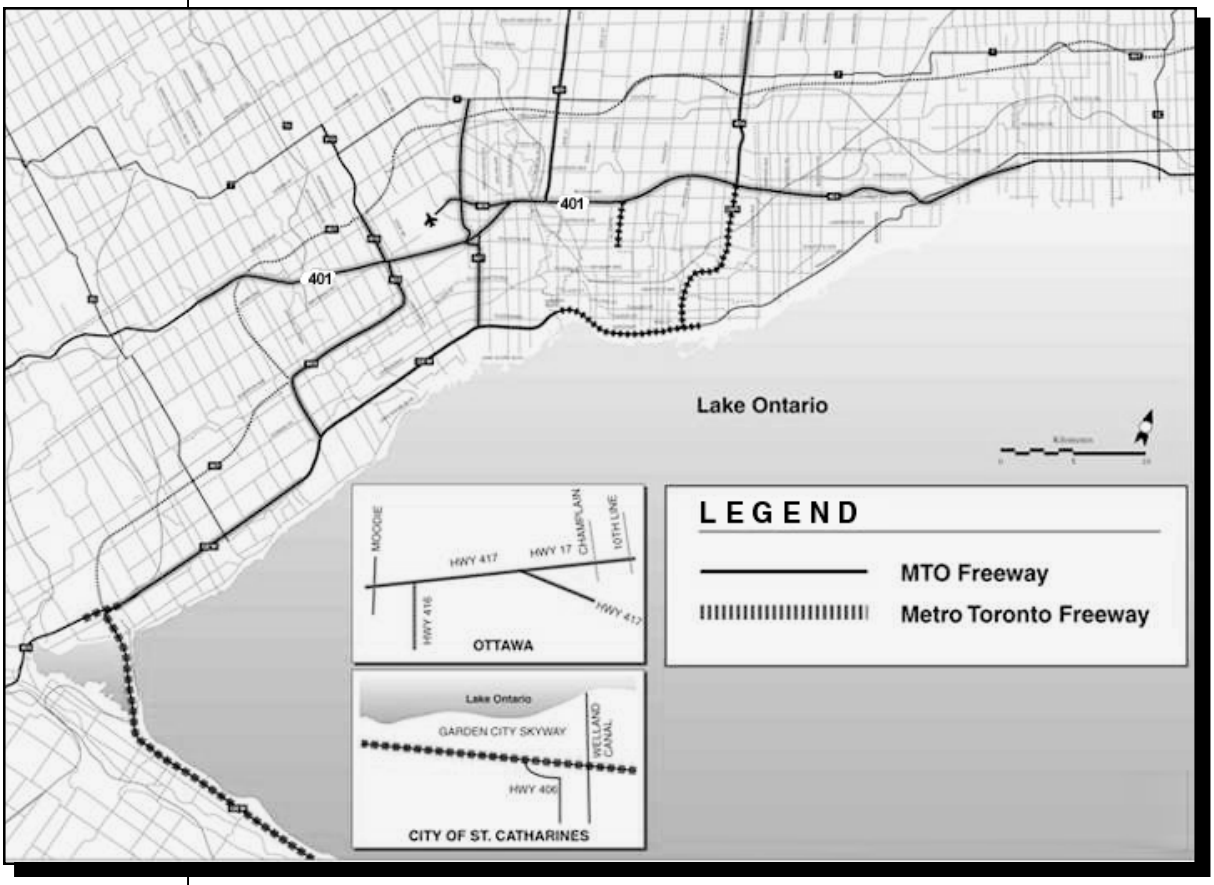
This case study reflects information gathered from interviews and observations at the Downsview transportation management center. The authors appreciate the cooperation and support of the Ministry of Transport Ontario (MTO), and its partners in the development of this document.

## Contents

# Background

COMPASS is the transportation management program of the greater Ontario area which contains three transportation management centers, each responsible for a separate segment of highway. This study focuses on the TMC in the Downsview section of North York, Ontario. The Downsview system covers Highway 401 as it enters and proceeds through Toronto from the west. The preliminary design was completed in the late 1980's, and the system became operational in 1991.

The initial objective of the Downsview system was to balance traffic between express and collector lanes on Highway 401. Incident detection and incident management were added to the design. COMPASS has recently completed a value engineering study that allowed a complete review of the initial principles.



# Design and Implementation

General system design parameters for Downsview are:

- The 45-foot by 40-foot Downsview control room is in a Ministry of Transportation Ontario (MTO) office building about one block north of 401. The control room is configured in the following way:
  - Three curved rows of consoles, with the first containing five positions, the second a team lead, and the third (elevated) three positions, typically used by the operations supervisor.
  - The room front has 69 19-inch monitors.
  - Each console features typically two 13-inch monitors, two computer terminals (for different systems), a video control panel, and a multiline desk phone.
  - Two maintenance radio consoles.
  - Glass block construction on one side provides outside light.

- The operators detect incidents and congestion based on computer alarms, scanning of video images, and incoming telephone and radio calls. They verify incidents with closed circuit television cameras, and then identify the incident or congestion location and the type of incident to the computer system. The system recommends specific messages for specific variable message signs. Variable message signs carry congestion management messages automatically. A separate system faxes traffic information automatically to an appropriate list of agencies and other organizations. Operators also have access to a Road Weather Information System monitor.
- The present system contains variable message signs, loop detectors (0.3 mile intervals, in every lane), and color-closed-circuit television cameras. Communication is over a fiber optic network.

***COMPASS began as a traffic load/flow balancing program and later expanded to include incident management, thus increasing the positive impact on traffic flow.***

## Method of Implementation

- Following the preliminary design report, a detailed design was prepared by consultants and agency staff. Software was developed externally under a consulting agreement. Field equipment was installed under multiple construction contracts, overseen and inspected by consultants and agency personnel. Agency personnel performed final integration.

# Design and Implementation

## Testing

- Consultant and agency personnel do testing at the manufacturer's site and after field installation. Agency personnel perform operations readiness testing.

## Training

- Operator training is primarily on the job. Additional training is provided when system expansions occur and when operational procedures change. New operators are assigned to work briefly with maintenance and at Ontario Provincial Police dispatch.

## Documentation

- Operators are provided an operations procedures manual that contains information on:
  - System purpose, background, objective, and overview
  - Job descriptions, conduct, security, shift start and end procedures
  - Changeable message sign operation and policy, incident detection
  - Closed circuit television cameras and taping
  - Detector placement, use of computer terminals and Road Weather Information System
  - TRIS (traveler and road information system) policy
  - Driver and vehicle terminal, communications, and incident management protocols
  - Media, general public, Ontario Provincial Police liaison, and liaison with other COMPASS and Ministry of Transportation Ontario staff
  - Radio system protocol, hardware failures procedures, phone directory, and use of operational documents.
- Other documents provided to operators include:
  - A patrol list providing patrol coverage and methods of contact
  - A technical and electrical binder listing applicable personnel, methods of contact, and Ministry of Transportation Ontario signal locations
  - A nuclear emergency/provincial emergency manual
  - Drawings of equipment locations and IDs
  - Emergency telephone numbers
  - Construction contract listings of projects and contacts
  - A driver and vehicle binder providing numbers for Ministry of Transportation of Ontario Commercial Vehicle Operations staff
  - A service crew binder providing maintenance contacts and emergency operator contacts, including emergency services, automobile clubs, and road agencies.
- The computer system Help function is procedurally oriented.

***Provincial and metropolitan governments continue to develop ways to increase integration and coordination between COMPASS and RESCU operations.***

# Operations

## Workload and Performance

- The Downsview TMC is staffed 24 hours a day, 7 days a week in three shifts with 1-hour team lead overlaps. Peak period shifts include three operators and a shift supervisor. Staffing totals 12, including three part-time personnel, two team leaders, and one supervisor.
- Communications logs are maintained continually. Videotaped incidents are logged separately. The system automatically logs actions implemented through the system. Various statistics on workload are compiled and analyzed.
- Primary sources for hiring include students from a local technical college with a program in transportation and other parts of Ministry of Transportation Ontario, drawing on surplus or laid off personnel. Ministry of Transportation Ontario has recently prepared a study of hiring sources and backgrounds.

## Coordination

- Interface with Ontario Provincial Police is via telephone to Ontario Provincial Police dispatchers; all other emergency services are contacted through Ontario Provincial Police. Ontario Provincial Police and local law enforcement agencies request continuous taping of areas with special problems, as does the traffic engineering office of the Ministry of Transportation Ontario . Debriefings are held with Ontario Provincial Police and other involved agencies after major incidents. There are also twice-annual senior level meetings between Ministry of Transportation of Ontario and Ontario Provincial Police.
- COMPASS contacts both the Toronto Transit Commission and GO transit operations centers by telephone in the event of major incidents, and provides faxes of lane closures and incidents to both agencies. Since Toronto Transit Commission buses do not use Highway 401, which is the focus of COMPASS, further integration is not of significant value to either program.
- Work is under way to share video with the city's RESCU system and to address common variable message sign messaging approaches.
- Media receive fax output as do all other relevant agencies at no charge. View-only video access is provided to media for a subscription fee of $500 per month.

# Operations

## Conflict Resolution

- On-site decision-making authority passes from operators to operator team leads to the shift supervisor to the operations manager (on site). Section heads for design and construction are also on site, and maintenance is nearby. Key personnel are accessible by pager and cellular telephone.

## Nonstandard Operations

- Special events do not have much impact on the freeway system, and thus do not create a significant workload. However, about a half-dozen major snow storms occur per year.
- The conference room adjacent to the control room has been outfitted as an emergency operations facility, with separate communications lines, video, and computer access.

# Maintenance

## Fault Detection and Correction

- To represent a malfunctioning field device, the computer workstations provide both messages and special symbols or changes in icon color on the system map. If a failure occurs, Operations calls Maintenance or the computer support section and is able to restart some functions. Operations also notifies the illumination and signal departments of signal, flasher, or illumination failures.

## Configuration Management

- Maintenance has created its own configuration database. Information on newly installed equipment is provided by the installation's contractor. The database is maintained by the systems group within the maintenance organization.

## Logistics

- Most spares are supplied via installation contracts, and additional spares are acquired through construction contracts. Ministry of Transportation Ontario returns failed units to manufacturers for repair. Ministry of Transportation Ontario is able to buy spares directly from manufacturers.

## Maintenance

- Maintenance uses a preventive maintenance program developed by a consultant and regional design group.
- With current installation contracts, Ministry of Transportation Ontario requires 2 to 3 years maintenance by the contractor, including preventive maintenance but excluding weather and traffic damage. Training is procured through the installation contracts.
- Some maintenance work, including support of the variable message signs and the fiber optic communications network, is contracted, with a trend toward increasing such contracting. However, Ministry of Transportation Ontario systems staff members maintain the computer system.

***COMPASS has implemented an on site emergency operations center, enhancing interagency coordination under emergency conditions.***

**For further information, contact:**

## Federal Highway Administration Resource Centers

**Eastern Resource Center**
10 S. Howard Street, Suite 4000 – HRA-EA
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

**Region 1**
Volpe National Transportation Systems Center
Kendall Square
55 Broadway, Suite 920
Cambridge, MA 02142-1093
Telephone 617-494-2055

**Region 2**
1 Bolling Green
Room 429
New York, NY 10004
Telephone 212-668-2170

**Region 3**
1760 Market Street, Suite 500
Philadelphia, PA 19103-4124
Telephone 215-656-7100

**Region 4**
Atlanta Federal Center
61 Forsyth Street, SW
Suite 17T50
Atlanta, GA 30303-3104
Telephone 404-562-3500

**Region 5**
200 West Adams Street
24th Floor, Suite 2410
Chicago, IL 60606-5232
Telephone 312-353-2789

**Region 6**
819 Taylor Street
Room 8A36
Fort Worth, TX 76102
Telephone 817-978-0550

**Region 7**
6301 Rockhill Road, Suite 303
Kansas City, MO 64131-1117
Telephone 816-523-0204

**Region 8**
Columbine Place
216 16th Street, Suite 650
Denver, CO 80202-5120
Telephone 303-844-3242

**Region 9**
201 Mission Street, Suite 2210
San Francisco, CA 94105-1831
Telephone 415-744-3133

**Region 10**
Jackson Federal Building
915 Second Avenue, Suite 3142
Seattle, WA 98174-1002
Telephone 206-220-7954

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

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

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*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

U.S. Department of Transportation
400 7th Street, SW
Washington, DC 20590

Federal Highway Administration
Room 3416, HOIT-01
Phone: (202) 366-0722
Facsimile: (202) 493-2027

Federal Transit Administration
Room 9402,TRI-10
Phone: (202) 366-4991
Facsimile: (202) 366-3765

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