
datamanagementgroup

# Annual Report
# 2009

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# INTRODUCTION

The Data Management Group (DMG) was established in 1988 on the basis of a proposal from the University of Toronto's Joint Program in Transportation for an autonomous research group with the following objectives:

a) establish a common, centrally-accessible database containing information on transportation activities, zone systems, transportation networks and land use activity,
b) provide a transportation data retrieval service to the participating agencies,
c) monitor the adequacy of available data and propose approaches for adding to or updating the data as mutually agreed upon by the agencies,
d) promote greater interaction between university researchers and practitioners in the field of urban transportation planning,
e) promote the communication of transportation information and data obtained or administered by the Data Management Group to interested agencies and to the public,
f) further the improvement of transportation demand analysis, research, and forecasting in the Greater Toronto Area.

Although the administration of the group has changed to the Department of Civil Engineering at the University of Toronto, the DMG continues to be guided by these objectives into this its 21st year of continuous operation.

Program approval and funding of the DMG is the collective responsibility of members of the Transportation Information Steering Committee (TISC) with the following membership:

City of Hamilton
City of Toronto
GO Transit
Ministry of Transportation, Ontario
Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Peel
Regional Municipality of York
Toronto Transit Commission

Each participating agency appoints a member of their technical staff to the Transportation Research and Data Management Group (TRADMAG), which is a standing committee of TISC, and is responsible for coordinating the needs of the funding agencies and the activities of the research project.

This report provides a brief profile of the staff employed during the calendar year 2009 and a description of the activities undertaken by the DMG under the headings of information processing, preparing for a 2011 Transportation Tomorrow Survey, computer resources and technical support.

## STAFF AND LOCATION

The DMG is located in offices at;

Department of Civil Engineering
University of Toronto
Galbraith Building, Room 305
35 St. George Street
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Full-time Technical Staff in 2009

Susanna Choy, B.A.Sc. (Industrial Engineering), M.Eng. (Civil Engineering) University of Toronto, P.Eng.

Reuben Briggs, B.A.Sc. (Civil Engineering), M.A.Sc. (Civil Engineering) University of Toronto, P.Eng.

Sharon Kashino, B.E.S. (Environmental Studies) University of Manitoba, G.I.S.A.S. Sir Sandford Fleming College

Urban Transportation Planning Interns in 2009

Ragu Kanagalinham, B.A.Sc. (Civil Engineering) University of Toronto

Justin Chin, B.A.Sc. (Civil Engineering) University of Toronto

Software Development and Technical Support in 2009

Michael O'Cleirigh, B.Computing (Computing & Information Science), University of Guleph

Summer Students in 2009

Mark Gaglione, 3rd year undergraduate, Department of Civil Engineering, University of Toronto

Rafik Matta, 3rd year undergraduate, Department of Computer Science, University of Toronto

Part-time Director

Gerald N. Steuart, Professor Emeritus, Department of Civil Engineering, University of Toronto

Data Management Groups Web Site

http://www.dmg.utoronto.ca

## INFORMATION PROCESSING

The term 'information processing' is used in this instance to describe a set of activities supporting the management, storage and distribution of urban travel information. The principle components of this information are the results of the Transportation Tomorrow Surveys and a collection of all Cordon Count surveys.

Transportation Tomorrow Surveys and iDRS

Under the guidance of TISC, a series of urban travel surveys have been conducted every five years since 1986. The DMG administers the data files on urban travel contained in the 1986, 1991, 1996, 2001 and 2006 Transportation Tomorrow Surveys in the form of a set of relational databases with various methods of access. Direct access to the original files is restricted to DMG staff to ensure that information on a particular household cannot be identified. Currently, data files available to iDRS users contain the following information:

| | Number of Records | | | |
|---|---|---|---|---|
| Year | Households | Persons | All Trips | Transit Detail |
| 1986 | 61,453 | 171,086 | 370,248 | 56,615 |
| 1991 | 24,507 | 72,496 | 157,349 | 14,896 |
| 1996 | 115,193 | 312,781 | 657,971 | 70,295 |
| 2001 | 136,379 | 374,182 | 817,744 | 85,095 |
| 2006 | 149,631 | 401,653 | 864,348 | 87,244 |

The increasing size of the databases reflects not only growth in the area but also changes in the size of the area surveyed.

As part of a work plans for 2008 and 2009, the Data Management Group assumed the responsibility for assembling data from the 2006 TTS into a series (3) of summary reports. The first of these reports, "2006, 2001, 1996 & 1986 Travel Summary Report for the Greater Toronto and Hamilton Area", contains household, person and travel data for some 44 geographic areas from 4 travel surveys. The second report, "2006, 2001 and 1996 Travel Survey Summary for the Transportation Tomorrow Survey Area", contains the same information for some 21 geographic areas representing the entire survey areas in the last three travel surveys. The first two reports were compiled in 2008 and released early in 2009. The final report representing the Wards within the Greater Toronto Area and Hamilton was relaesed in 2009.

Originally, a staff member at the DMG processed every request for travel information and stored the results in a computer file that was then forwarded to the end user. In the mid 1990s, in an effort to improve access, staff at the DMG developed a text-based data retrieval system (drs) as the original method for external users to gain access to the data files and complete the data extraction themselves. This retrieval system was very effective when a modem was used as the principle method of remote access to the DMG's computer system. Over the past ten years, as the demand for travel data grew and the Internet became the preferred method of remote access, a data retrieval sys-

tem specifically designed for Internet access was developed (iDRS). All the features of drs were incorporated into the browser-based iDRS and the drs process was phased out. In order to meet the changing needs of the data, the DMG continues to improve the functions of iDRS and is in the process of develping a new version of the software.

The initial release of iDRS was restricted to use by the funding agencies. As the DMG gained more experience with the procedure and continuous improvements were made, more users were allowed access. In 2002, access to iDRS was made available to any individual that requested access. The individual is required to sign an agreement form and system security is maintained by giving each user a unique login and password. This procedure has the added benefit that agencies outside the Greater Toronto and Hamilton Area that participated in the 1996, 2001 and 2006 Transportation Tomorrow Surveys can access their data without the need to set up their own database system.

The iDRS procedures are reasonably complex, therefore, the DMG staff compiled a user's manual in 2004. The manual is available to all existing and potential users at:

http://www.dmg.utoronto.ca/pdf/idrs/idrs_manual.pdf

A majority of data requests processed by iDRS use one of the several zone systems that have been defined by the participating agencies over the years. In 2007, the DMG completed the task of assigning travel data for all TTS (including the 2006 TTS) to the 2001 zone system. The result is that users can trace historical trends using a consistent spatial definition. In 2009, the DMG assembled a new 2006 zone system from files submitted by the 2006 TTS participants. Only the 2006 TTS data set has been assigned to the new zone system.

Access through iDRS needs to be used in conjunction with the latest description of the data files, which is documented in the publication '2006 Transportation Tomorrow Survey: Data Guide', available at:

http://www.dmg.utoronto.ca/reports/ttsreports.html

Summary of Browser Based 'iDRS' Data Requests in 2009

| Month | Number of Data Queries | Number of Sessions |
|---|---|---|
| January | 1678 | 264 |
| February | 1807 | 336 |
| March | 2076 | 407 |
| April | 1803 | 444 |
| May | 1456 | 282 |
| June | 1887 | 332 |
| July | 1981 | 323 |
| August | 1540 | 301 |
| September | 1192 | 265 |
| October | 1713 | 318 |
| November | 1837 | 370 |
| December | 775 | 146 |
| **Total 2009** | **19745** | **3788** |
| **Total 2008** | **21006** | **4045** |

Since the public release, the use of the TTS data have been expanded. In 2009, there were over 80 different agencies and groups that extracted the data through iDRS.

Affiliations of the Browser Based 'iDRS' Users in 2009

AECOM
Agence Metropolitaine de Transport Montreal
Altus Group Economic Consulting
ARUP
BA Group
Canada Lubricants (Suncor Energy)
Canadian Urban Institute
Candevcon Limited
CBS Outdoor Canada
Centre for Sustainable Transportation
CF Crozier and Associates
City of Barrie
City of Brampton
City of Brantford
City of Guelph
City of Hamilton
City of Mississauga
City of Peterborough
City of Toronto

Affliations of the Browser Based 'iDRS' Users in 2009 (continued)

City of Vaughan
Coach Canada
Cole Engineering Group
Community Development Halton
Community Partners
Concordia University
County of Wellington
Curtin University of Technology
Deloitte Consulting
Dillon Consulting
Durham Sustain Ability
Entra Consultants
ENVIRON Corp.
GHD Ltd.
GO Transit
Halcrow Consulting Inc.
IBI Group
Infrastructure Canada
iTrans Consulting Inc
LEA Consulting Ltd.
Mark Engineering
McMaster University
Memorial University Of Newfoundland
Metrolinx
Milton Canadian Champion Newspaper
MMM Group
McCormick Rankin Corporation
Ministry of Transportation, Ontario
Neptis Foundation
Ontario Power Authority
Paradigm Transportation Solutions
Pattison Outdoor Advertising
Poulos & Chung Ltd.
Queen's University
Read Voorhes & Associates Ltd.
Region of Durham
Region of Niagara
Region of Peel
Region of Waterloo
Region of York
RJ Burnside & Associates
Ryerson University
Sernas Group Inc
Smart Commute Association
Social Planning and Research Council of Hamilton
Social Planning Council of Cambridge and North Dumfries

Affliations of the Browser Based 'iDRS' Users in 2009 (continued)

St. Michaels Hospital
Steer Davies Gleave
Synectics Inc.
TD Economics
Tennessee Technological University
Pennsylvania State University
Toronto Parking Authority
Transit Policy Liaison Office
Toronto Transit Commission
Town of Markham
UEM Consulting Inc.
UMA Engineering Ltd.
University of Calgary
University of Leeds Institute for Transport Studies
University of New South Wales (Austrailia)
University of Toronto
University of Waterloo
York University

A History of iDRS Data Requests

The growth in use of TTS data is reflected in the growth of the use of iDRS for data extraction. The following table shows the growth since iDRS was first introduced in 1999. The 'Number of Sessions' reflects the number of times registered users, including DMG staff, have initiated a data retrieval session. The 'Number of Queries' reflects the number of times an output was generated during a session. Almost without exception, many queries are generated during a given session.

| Year | Number of Data Queries | Number of Sessions |
|---|---|---|
| 1999 | 536 | 160 |
| 2000 | 1508 | 370 |
| 2001 | 7495 | 727 |
| 2002 | 6924 | 1411 |
| 2003 | 16239 | 2695 |
| 2004 | 13124 | 2142 |
| 2005 | 10654 | 2032 |
| 2006 | 9369 | 1771 |
| 2007 | 18971 | 2950 |
| 2008 | 21006 | 4045 |
| 2009 | 19745 | 3788 |

Special Data Requests

The interactive procedures available with iDRS satisfy the majority of data needs. However, some data needs are too complex and require the intervention of an experienced analyst to formulate a custom query from the database. In addition, the DMG's staff can often help define the most relevant data for the problem at hand. Although special data requests are an important function, an objective of the DMG continues to be to reduce the number of such data requests in favour of users processing their request through iDRS. The success of this strategy is apparent in that all special data requests in 2009 were associated with a funding partner or a research project. 12 special data requests were made in 2009 and each required special manipulation of the full database. The special requests are listed below in two catagories; requests from funding agencies, requests from the research community.

Data Requests from Funding Agencies

A matrix for the number of persons in each planning district who held a combo/ dual transit pass but made no GO-train or GO-bus trips was provided to Halcrow Consulting for a Cross Boundary study done on behalf of Metrolinx and TTC.

2006 TTS household, person and trip information, coded to a special zone system was prepared for IBI for the GGH model development project on behalf of the Ministry of Transportation Ontario.

Several 2006 TTS AM peak trip matrices aggregated by mode and travel purpose and coded to a special Durham region zone system were prepared for iTrans on behalf of Durham Region.

The daily trip rates of persons holding various transit passes, their origin planning districts and how many of their trips crossed regional boundaries was provided from the 2006 TTS database to Halcrow Consulting for a Cross Boundary study done on behalf of Metrolinx and TTC.

The total number of home to work trips made by mode,the total trips made by apartment dwellers and the number of apartment dwellers within 500m of TTC subway and RT stations was provided to the City of Toronto.

2006 TTS PM and midday peak trip matrices aggregated by mode and travel purpose and coded to a special Durham region zone system were prepared for iTrans on behalf of Durham Region.

Employment and population data from the 2006 TTS database were assigned to a specific system in Peel Region for the Hurontonio Modelling study carried out by the MMM group and Eric Miller for the City of Mississauga.

Data Requests from the Research Community

2006 transit disaggregate data was provided to Mohammed Wahba for his work with Prof Amer Shalaby of the Department of Civil Engineering at the University of Toronto.

2006 disaggregate household and person data for the Hamilton area were provided to Prof Matt Rooda of the Department of Civil Engineering, University of Toronto for a research project in conjunction with McMaster University

2006 Transit trip records including route information and start time of trip for trips made using GO-transit were prepared for Ahmed Osman for his graduate work under the supervision of Prof Amer Shalaby.

2001 and 2006 TTS data for the GTAH was provided to Prof Daniel Badoe of the Department of Civil and Environmental Engineering at Tennessee Technical University.

1986,1996,2001 and 2006 TTS household, person and trip data was provided to Ph.D candidate Raktm Mitra of the Department of Georgraphy, University of Toronto for his research on walking school trips being conducted under the supervision of Prof Ron Builing.

Cordon Counts and CCDRS

The City of Toronto (then the Regional Municipality of Metropolitan Toronto) began collecting detailed information on the type and volume of traffic crossing selected points on the road system as early as 1975. The counting locations were selected such that screen lines or cordon lines could be defined and the counting program has continued on a regular basis since that time, usually twice in a five year cycle. Subsequently, other Regions began similar programs. Given the number of Regions with a similar program, they began coordinating their count programs and defining a common set of data standards. In 1998, this cooperation made it possible for the DMG to assemble the most recent of such traffic counts in a common database structure and develop a Cordon Count Data Retrieval System (CCDRS).

Participating agencies are now using CCDRS as a tool in verifying their cordon count results. In 2009, another Cordon Count was undertaken by the participating regions. Small updates were done to the existing Cordon Count database during 2009 but 2009 data was not added as the data had not yet been forwarded to DMG. The CCDRS procedures are reasonably complex and new users should refer to the user's manual. The manual is available to all existing and potential users at: http://www.jpint.utoronto.ca/PDF/doc104.html

Summary of CCDRS Data Requests in 2009

| Month | Number of Data Queries | Number of Sessions |
|---|---|---|
| January | 151 | 46 |
| February | 219 | 63 |
| March | 89 | 33 |
| April | 93 | 40 |
| May | 522 | 72 |
| June | 290 | 58 |
| July | 272 | 38 |
| August | 189 | 55 |
| September | 99 | 45 |
| October | 119 | 41 |
| November | 121 | 44 |
| December | 59 | 22 |
| **Total 2009** | **2223** | **557** |

| | | |
|---|---|---|
| **Total 2008** | **2392** | **725** |

Browser Based CCDRS Users in 2009

407 ETR
AECOM
Altus Group Economic Consulting
BA Group
Candevcon Limited
City of Brampton
City of Mississauga
City of Toronto
Concordia University
Dillon Consulting
ENVIRON
GO Transit
Halcrow Consulting
IBI Group
iTrans Consulting Inc.
LEA Consulting Ltd.
MMM Group
McCormick Rankin Corporation
Ministry of Transportation Ontario
Peter Dalton Consulting

Browser Based CCDRS Users in 2009 (continued)

Region of Durham
Region of Halton
Region of Peel
Region of York
Town of Markham
Transit Policy Liaison Office
Toronto Transit Commission
University of Toronto
URS Canada Inc
Valcoustics Canada Limited
York University

A History of CCDRS Data Requests

The growth in access to the CCDRS data is reflected in the increased number of data extractions. The following table shows the growth since CCDRS was first introduced in 1999. The 'Number of Sessions' reflect the number of times registered users, including DMG staff, have initiated a data retrieval session. The 'Number of Queries' reflects the number of times an output was generated during a session. Almost without exception, many queries are generated during a given session. The busiest years were just after restrictons on access to the data were removed. An increase in activity is usually associated with the release of a new cordon count.

| Year | Number of Data Queries | Number of Sessions |
|---|---|---|
| 1999 | 411 | 108 |
| 2000 | 2207 | 558 |
| 2001 | 2662 | 713 |
| 2002 | 5596 | 931 |
| 2003 | 2439 | 642 |
| 2004 | 2392 | 631 |
| 2005 | 3724 | 767 |
| 2006 | 3611 | 798 |
| 2007 | 5243 | 1416 |
| 2008 | 2392 | 725 |
| 2009 | 2223 | 557 |

## COMPUTER RESOURCES AND TECHNICAL SUPPORT

Transportation Modeling:
Since 1989 the Data Management Group has operated a multi-user computing platform to support the storage and distribution of urban travel data and to support a shared licence for professional grade travel simulation software.

Starting with two participating agencies, it has grown over the years to include all the regional planning agencies in the Greater Toronto and Hamilton Area. The current particpants are:

City of Brampton
City of Hamilton
City of Mississauga
City of Toronto
GO Transit
Ministry of Transportation, Ontario
Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Peel
Regional Municipality of York
Toronto Transit Commission
University of Toronto

The Canadian developed EMME/2 software was selected after an independent evaluation as the simulation software that would be shared between the participating agencies.

Members of the participating agencies or authorized consultants working on their behalf were able to access one of several SUN Solaris based multi-user servers residing within the offices of the Data Management Group.

The travel simulation work was conducted within a shared environment. The total processing power, storage and network bandwidth were split between the demands of the active users.

In 2007, the developer of EMME/2 announced they would phase out the multi-user EMME/2 software in favour of a single user EMME/3 software more suited to running on a personal computer. As an alternative to every user having a single user licence the DMG developed a mechanism to host and administer licences centrally. In EMME/3, modeling work takes place on the users personal computer which acquires the licence from the DMG through a secure connection over the Internet. In 2008, on behalf of the funding partners, six professional sized licences were acquired and an agreement negotiated for the continued use of EMME/2 with support gradually phased out.

In 2009, two additional professional sized licences were acquired to facilitate

transportation research activities at the University of Toronto.

Information Retrieval:
Originally, all data requests were processed manually by data analysts within the DMG. Over time, automated systems have been developed to allow users to retrieve most information themselves allowing the data analysts to focus on the harder cases.

In 1992 the Unix based Empress relational database was used to house the available research data and allow users to extract, using a text based interface, aggregated results for further analysis. Access to the Data Retrieval System (DRS) was limited to funding agency users with accounts on the DMG Solaris systems.

In 1998 development started on rewriting the DRS system to allow more complex queries to be specified, increase execution performance and allow access to the tool through a secure web site. In 1999 the DRS system entered production supporting the TTS, MTARTS and Zonal datasets. In 1999, the CCDRS system also entered production supporting the Cordon dataset. At first access to the systems was restricted to funding agency users only; but in 2002 access was expanded to allow anyone to gain access to the system by filling in an access request form.

Starting in 2008 a new version of the data retrieval system has been under development. It seeks to improve on all areas of the existing system to improve its performance, usability and maintainability. It will create a unified task processing framework and support each data set (TTS, Cordon, MTARTS and Zonal) as variations of the same system. The interface will be modernized to allow quick autocompletion of survey variable values and have improved error detection capabilities.

In 2009 a prototype interface was created to allow spatial aggregations, like TTS Traffic Zones, or Cordon Count Stations and Screen Lines to be viewed and selected in an interactive web map. A prototype is shown on the next page. It was developed using PostGIS to store the boundary polygons, Geoserver to provide the Image Tiles and OpenLayers to mesh our image tiles with the Google satillite layer. The prototype explored different strategies for adding/removing zones and presenting the currently selected zones.

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