Data Management Group
Annual Report
2005

The Data Management Group is a research program located at the University of Toronto's Joint Program in Transportation and is made possible by the financial support of the funding partners:

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

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.

The DMG has been guided by these objectives into its 18th 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 year and a description of the activities undertaken by the DMG under the headings of information processing, computer resources and technical support, published reports and related university research in the calendar year 2005.

STAFF AND LOCATION

The DMG is located in offices at;

Joint Program in Transportation
University of Toronto
Galbraith Building, Room 305
35 St. George Street
Toronto, Ontario M5S 1A4
Telephone: (416) 978-7282
FAX: (416) 978-3941

The Joint Program in Transportation provides administrative support through their Administrative Officer and Financial Manager, Lorine Jung.

Full-time Technical Staff in 2005

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.

Urban Transportation Planning Interns in 2005

Daniel Samson, B.A.Sc. (Civil Engineering) University of Toronto
Daphne Lee, B.A.Sc. (Civil Engineering) University of Toronto

Computer Programmer (2006 TTS Software Re-write)

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

Summer Students in 2005

Renno Fo Sing, 3rd year undergraduate, Department of Electrical and Computer Engineering, 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.jpint.utoronto.ca/dmg/

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

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 and 2001 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. Data files on 1986 travel contain detailed information on 370,000 trips taken by 171,086 individuals residing in 61,453 households. The data files for the 1991 survey contain 157,349 trips taken by 72,538 individuals residing in 24,507 households. The data files for the 1996 survey contain 657,971 trips taken by 312,781 individuals residing in 115,193 households. The data files for the 2001 survey contain 817,744 trips taken by 374,182 individuals residing in 136,379 households. The increasing size of the databases reflects not only growth in the area but also an increase in the size of the area surveyed.

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. More than ten years ago, staff at the DMG developed the 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 system specifically designed for internet access was developed (iDRS). The resources required to keep two systems operational are becoming too costly and the drs process was phased out. During the phasing-out period, all the attractive features of drs were incorporated into the browser-based iDRS.

Use of the iDRS access procedure has grown significantly since it was first released in 1998. The initial release 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, the iDRS procedure 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 GTA plus Hamilton that participated in the 1996 and 2001 Transportation Tomorrow Surveys can access their data without the need to set up their own database system. Use of the system is

carefully monitored to be certain all users are given reasonable service. The system is currently providing excellent service to all users, consequently, in 2004 the DMG implemented an online procedure for requesting access to iDRS.

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 2004, the DMG completed the task of assigning travel data for all TTS to the newly defined 2001 GTA zone system. The result is that users can trace historical trends using a consistent spatial definition.

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.jpint.utoronto.ca/PDF/doc102.html
Access through iDRS needs to be used in conjunction with the latest description of the data files, which is documented in the publication '2001 Transportation Tomorrow Survey: Data Guide', available at
http://www.jpint.utoronto.ca/PDF/doc96.html

Summary of Browser Based 'iDRS' Data Requests in 2005

Month	**Number of Data Queries**	**Number of Sessions**
January	1646	161
February	1113	268
March	741	163
April	546	136
May	561	156
June	904	157
July	614	119
August	669	163
September	1161	188
October	982	165
November	1074	230
December	643	126
Total 2005	**2032**	**10654**

Total 2004	**2142**	**13124**

Browser Based 'iDRS' Users in 2005

Aviva Canada
BA Consulting Group
Bate Enterprises
Candevcon Ltd.
Cansult Ltd.

Browser Based 'iDRS' Users in 2005 (continued)

Centre for Sustainable Transportation
City of Brampton
City of Guelph
City of Mississauga
City of Peterborough
City of Toronto
Cole Engineering Group
Community Development Halton
Dillon Consulting Ltd.
EarthTech Inc.
Entra Consultants
Geocom Recherche
Giffels Associates Ltd.
GO Transit
Greater Toronto Airports Authority
IBI Consulting Group
iTrans Consulting Ltd.
Lakehead University
LEA Consultants
Marshall Macklin Monaghan Ltd.
McCormick Rankin Consultants
McGill University
McMaster University
Ministry of Tourism, Ontario
Ministry of Transportation, Ontario
Morrison Hershfield Ltd.
Neptis Foundation
Northwest Atlantic Canada
Peter Dalton Consulting
Poulos & Chung Ltd.
Queen's University
Region Municipality of Durham
Region Municipality of Halton
Region Municipality of Peel
Region Municipality of York
Sernas Transtech
Tedesco Engineering
Totten Sims Hubicki Associates
Toronto Transit Commission
Town of Ajax
Town of Caledon
Town of Newmarket
Tranplan Associates
Treklogic Inc.
University of Toronto
University of Waterloo
Viacom International Inc.

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. There were 7 special data requests from funding agencies and the research community in 2004 and 7 in the year 2004. Brief descriptions of all special data requests in 2005 are contained in Appendix A.

Transportation Tomorrow Survey 2006

A decision to proceed with a 2006 TTS was taken in 2004 by the Transportation Information Steering Committee (TISC) and the administrative structure of the survey was approved. The responsibility for all policy and funding matters are to rest with TISC. The committee delegated the technical responsibility to a Transportation Tomorrow
Survey Technical Committee with representation from all participating agencies, and gave management responsibility to a Management Team associated with the DMG. The participating agencies include the following:

City of Barrie
City of Brampton
City of Guelph
City of Hamilton
City of Kawartha Lakes
City of Peterborough
City of Toronto
County of Durham
County of Peterborough
County of Simcoe
County of Wellington
GO Transit
Ministry of Transportation Ontario
Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Niagara
Regional Municipality of Peel
Regional Municipality of Waterloo
Regional Municipality of York
Toronto Transit Commission
Town of Orangeville

The survey management team will consist of individuals who have broad range of experience based on their involvement in past TTS survey work. A decision to directly involve the DMG staff in all aspects of the Survey was approved by the Steering Committee. The objective is to have DMG staff

familiar with every detail of the collection and processing of the data. Key staff for the survey includes:

Project Director, Gerald Steuart (Data Management Group)
Project Manager, Peter Dalton (Independent Consultant)
Site Manager, Sharon Kashino (Independent Consultant)
Survey Management Coordination, Susanna Choi (Data Management Group)
Coding Manager, Reuben Briggs (Data Management Group)
Manager of Training, Ian Fisher (Independent Consultant)
Software Development, Michael O'Cleirigh (Data Management Group)

The technical committee met for the first time on July 27, 2005 and approved a work plan for the first phase of data collection. The committee gave approval for the use of the same data collection methods as previous TTS with the same 5% random sample of households as used in the 2001 TTS. The strategy selected was to conduct the interviews for agencies outside the GTA plus Hamilton in the Fall of 2005 from a single site located close to subway access in central Toronto. The maller survey in 2005 allows for assembling the necessary equipment, testing the new software and computer support as well as training interviewers and supervisors for the larger stage in the Fall of 2001. The interviewing phase began on September 16, 2006, which was later than planned. The project experienced a series of problems both technical and workforce. The slow start was resolved by extending the interviewing period into January and February of 2006. The target of 37,000 completed interviews was reached on February 9, 2006.

A second meeting of the Technical Committee was held at the survey site on October 6th, 2005. The members of the committee were given a demonstration of the new software used to support the telephone interviews.

Cordon Counts

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 every few years on a regular basis since that time. 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 definitions. 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). The CCDRS data files contain count information from 1975 in the City of Toronto, from 1981 in Peel Region, from 1985 in Halton and York Regions and from 1989 in Durham Region.

The cordon count program counts vehicles, classified by vehicle type, for each direction on a selection of locations throughout the GTA during daylight hours on a day in the spring. Considering each direction and each year of a count to be a separate counting station, in 2004 there were 17,957 stations in the database. Some improvements to the database were undertaken in 2004, specifically, the Station descriptions available from the main page in CCDRS were updated to inform users of the counting method (ATR or Manual) used by each region. This reflects a growing trend in the use of automatic traffic recorders (ATR) by all agencies.

Participating agencies are now using CCDRS as a tool in verifying their cordon count results. The results of a 2004 Cordon Count were assembled in CCDRS in the calendar year 2005 and should be verified and ready for release to all users early in 2006. Access to preliminary results was restricted to the participating agencies. The CCDRS 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.jpint.utoronto.ca/PDF/doc104.html

Special Data Requests

The interactive procedures available with CCDRS, in a manner similar to 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. Only one such special data request from one of the funding agencies occurred in 2004. A brief description of the special data request in 2004 is contained in Appendix A.

Summary of CCDRS Data Requests in 2005

Month	Number of Data Queries	Number of Sessions
January	519	80
February	505	100
March	230	103
April	155	55
May	175	74
June	222	82
July	157	60
August	98	43
September	177	41
October	122	44
November	1300	68
December	64	17
Total 2005	**3724**	**767**

Total 2004	**2392**	**631**

CCDRS Users in 2005

Canadian Imperial Bank of Canada
City of Brampton
City of Mississauga
City of Toronto
EarthTech Inc.
iTrans Consulting Ltd.
LEA Consultanting Ltd.
McCormick Rankin Consultants
Marshall Macklin Monaghan Ltd.
Ministry of Transportation, Ontario
Morrison Hershfield Ltd.
Region Municipality of Durham
Region Municipality of Halton
Region Municipality of Peel
Region Municipality of York
SNC Lavalin
Siroky Group
Toronto Transit Commission
University of Toronto

COMPUTER RESOURCES AND TECHNICAL SUPPORT

The concept of a university research centre providing shared computer resources and technical support in the development and operation of a large-scale computer simulation of urban travel began as a small research initiative in 1989. By the year 2003, all funding agencies and several local governments had become full funding partners in the collective sharing of a computer system supporting three licences of the EMME/2 transportation planning simulation software. In 2004, an arrangement was made with the Greater Toronto Airports Authority to join the community of users of the shared computer resources. These agencies and consultants working for these agencies, share the operation of the EMME/2 simulation package on the DMG's computer system. At the present time, virtually all users access the system through an Internet connection. The research community at the University of Toronto owns an additional licence and is supported by the DMG. The DMG provides ongoing technical support to existing and authorized new users of the simulation software. At the same time, the DMG provides and supports the necessary resources for efficient operation of iDRS and CCDRS.

The shared computer system uses a version of the UNIX operating system. The DMG staff is aware that most of the users, both internal and external, are not familiar with UNIX and every attempt is made to simplify their experience on the shared system.

Most of the external connections to the DMG's computer system are to run some aspect of the EMME/2 simulation software. In addition to maintaining the computer system and simulation software, the DMG provides technical support in the form of small projects that are intended to enhance the collective use of EMME/2.

The DMG is continually searching for ways to efficiently administer the computer system. In 2005, an agreement was established with the University of Toronto's Computing and Network Services (CNS) to provide system support as required. Neither party was certain of the level of support required by the DMG, therefore the first year would be considered as an experiment. Several problems were solved in a timely manner by CNS and improvements were implemented to the security procedures.

DMG PUBLICATIONS

Publications generated by the activities of the DMG are placed on our web site in a format suitable for access and printing by the user. The following publications were created in the year 2005.

"Data Management Group Annual Report 2004", Report 106 (May 2005)

UNIVERSITY RESEARCH

A portion of the funding provided to the DMG is allocated to unspecified research on topics related to urban transportation. In addition to these funds, the very research nature of the DMG's activities is conducive to the development of other research projects, some of which receive funding from other sources. The research support that is made possible by the existence of the DMG include: access to the data bases, access to the EMME/2 network and modelling system, access to software (ArcInfo, Oracle, SAS, etc.) and technical support in the use of these data and software.

Undergraduate Theses Completed in 2005

8 Undergraduate Thesis in the Department of Civil Engineering under the direction of Professors A. Shalaby and E.J.Miller

Graduate Theses Completed or in Progress in 2005

Ali, S.A., "Development and Evaluation of Toronto Rapid Transit Network Expansion", M.Eng., (Toronto, Professor A. Shalaby)

Austin, R., "Building Around Transit in the Restructuring Metropolis: Issues and Policy Options for the Warden Corridor Redevelopment", M.Sc.Pl., (Toronto, Professor E.J.Miller)

Carrasco, J., "Modelling Social Networks", Ph.D. (Toronto, Professor E.J.Miller)

Elgar, I., "Office Location Modelling", Ph.D. (Toronto, Professor E.J.Miller)

Habib, K.M.N., "Dynamic Activity-Based Modelling", Ph.D. (Toronto, Professor E.J.Miller)

Habib, M.A., "Dynamic Modelling of Housing Transactions", Ph.D. (Toronto, Professor E.J.Miller)

Hadayeghi, A., "Macroscopic Crash Prediction Models for Road Safety Planning", Ph.D. (Toronto, Professor A. Shalaby)

Haroun, A., "Microsimulating Residential Housing Markets", Ph.D. (Toronto, Professor E.J.Miller)

Hatzopoulou, M., "Modelling Sustainability Indicators", Ph.D. (Toronto, Professor E.J.Miller)

Li, F.L.C., "Mode Split Analysis in Toronto", Ph.D. (Toronto, Professors A. Shalaby)

Litwin, M., "Dynamic Household Activity Scheduling Processes", Ph.D. (Toronto, Professor E.J.Miller)

Mohammed, A., "Forecasting Transit Network Evolution", Ph.D. (Toronto, Professors A. Shalaby)

Roorda, M., "Activity-Based Household Travel Modelling Using TASHA", Ph.D. (Toronto, Professor E.J.Miller)

Wahba, M. M., "A New Modelling Framework for the Transit Assignment Problem: A Multi-agent Learning-based Approach", M.A.Sc. (Toronto, Professor A. Shalaby)

Zhang, J., "Effectiveness of Transportation Budgeting and Spending in Canadian Municipalities" , M.Sc.Pl (Professor E.J.Miller co-supervised with J. Farrol)

Reports, Publications and Presentations in 2005

Tsang, F. A.S. Shalaby and E.J. Miller, "Improved Modeling of Park-and-Ride Transfer Time: Capturing the Within-day Dynamics", forthcoming, Journal of Advanced Transportation*, 2005.*

Sousa, P. and E.J. Miller, "A Performance-Driven Transit Funding Model", Transportation Research Records, Journal of the Transportation Research Board*, No. 1927, 2005, pp.73-81.*

Miller, E.J., M.J. Roorda and J.A. Carrasco, "A Tour-Based Model of Travel Mode Choice", Transportation*, Vol. 32, No. 4, 2005, pp. 399-422.*

Miller, E.J., "Transportation Planning & Modelling: A Canadian Perspective", presentation to the Mumbai Metropolitan Region Development Authority, Mumbai, India, August 18, 2005.

Roorda, M.J., E.J. Miller and N. Kruchten, "Using a Genetic Algorithm to Estimate Household Model of Ridesharing, Vehicle Allocation and Tour-based Mode Choice", presented at the CUPUM Conference, London, June 29 - July 1, 2005.

Roorda, M.J., E.J. Miller and N. Kruchten, "A Tour-Based Mode Choice Model Incorporating Inter-personal Interactions within the Household", presented at the PROCESSUS Second International Colloquium on the Behavioural Foundations of Integrated Land-use and Transportation Models: Frameworks, Models and Applications, Toronto: June 13-15, 2005.

Mohammed, A., A. Shalaby and E.J. Miller, "Understanding the Growth of Bus Networks – Modelling the Evolution of the Mississauga, Ontario Bus Network", (poster) presented at the PROCESSUS Second International Colloquium on the Behavioural Foundations of Integrated Land-use and Transportation Models: Frameworks, Models and Applications, Toronto: June 13-15, 2005.

Mohammed, A., A.S. Shalaby and E.J. Miller, "Prediction Modelling of Transit Network Evolution: Case Study of the Mississauga, Ontario Bus Network", presented at the CSCE 6th Transportation Specialty Conference, Toronto: June 2-4, 2005.

Tsang. F.W.K., C.A. Kennedy, M. Haider, E. J. Miller, "Impact of Locational Socio-Demographic Characteristics on Business Location Decision and Sales Performance: A Case Study of Car Dealerships in Toronto", presented at the CSCE 6th Transportation Specialty Conference, Toronto: June 2-4, 2005.

Weldon, M., M.J. Roorda and E.J. Miller, "A Model of Transit Pass Ownership", presented at the CSCE 6th Transportation Specialty Conference, Toronto: June 2-4, 2005.

Miller, E.J., "Transportation and Places to Grow", presented at the Canadian Urban Institute Urban Leadership Series workshop Places to Grow: Here, There – Not Just Anywhere, To-

ronto, June 1, 2005.

Miller, E.J., "Travel Demand Modelling in the Greater Toronto Area", presented to Transport Canada, Toronto & Ottawa (video-conference): April 21, 2005.

Miller, E.J., "(Un)sustainable Transportation in the Greater Toronto Area", presented in the Environmental Seminar Series, Institute for Environmental Studies, University of Toronto, February 9, 2005.

Sousa, P. and E.J. Miller, "A Performance-Driven Transit Funding Model", presented at the 84th Annual Meeting of the Transportation Research Board, Washington, D.C., January 10-13, 2005.

APPENDIX A SPECIAL DATA REQUESTS

In addition to the data requests that are served directly through the on-line interactive Data Retrieval System (iDRS) and the Cordon Count Data Retrieval System (CCDRS), the DMG staff processed the following requests in 2005.

Participating Agencies and Research Community

5000 random trip records with the associated transit, person, household variables from the 2001 TTS were provided to Hans Riekko at Queen's University for his M. Pl. thesis.

Ron Buliung, a post-doctorate fellow with the Joint Program in Transportation at the University of Toronto, requested origin-destination trip matrices from the 1996 and 2001 TTS for various time periods, travel modes and trip purposes.

Population, total number of trips and average trip lengths for 10 GTA zones from the 2001 TTS, broken down by travel mode, were provided to Professor Chris Kennedy from Civil Engineering at the University of Toronto.

2001 TTS trip, transit and personal attributes for home-based trips were extracted from the 2001 TTS for Professor Eric Miller to develop his mode choice model.

2001 TTS employment reassigned to census tracts and dissemination areas was provided to Neptis Foundation for research purposes.

The City of Toronto Planning Department requested population, employment, and total number of auto and transit trips made during morning peak period at a re-defined zone level from the 2001 TTS.

2001 TTS household, person and trip attributes for the GTA and Hamilton area were provided to McCormick Rankin Corporation for the GTA HOV East Forecasting Study undertaken at the Ministry of Transportation, Ontario.