Data Management Group
Annual Report
2001

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TABLE OF CONTENTS

SUMMARY

In cooperation with the funding agencies, the Data Management Group (DMG) has defined a set of urban travel data that is of collective interest to transportation planning agencies and the research community. Access to these data, which include results from various travel surveys and counting programs, is possible either interactively or by special request. One measure of success is the increase in the number of times transportation planning agencies have requested access to the available data. In one calendar year, just before the 1991 Transportation Tomorrow Survey data became available, there were 42 such requests. In the calendar year 2000, access to a greatly expanded database was accomodated a total of 1236 times and in 2001 a total of 1706 times.

The funding agencies and several local governments, in addition to consultants working for these agencies and the research community, share the operation of the EMME/2 simulation package on the Data Management Group's computer system. During the year, the DMG provided support to these users in five major categories:

- development and maintenance of a shared Greater Toronto Area 2001 EMME/2 network, including preparation for the 2001 TTS data validation,
- technical assistance in the form of technical advice, macro writing and EMME/2 training,
- testing of the new graphical user interface for EMME/2 (ENIF),
- assistance in the development and application of travel forecasting procedures,
- assistance in the application of EMME/2 modelling procedures to consultants working on projects for a member agency.

The DMG's role in information processing and support of EMME/2 is made possible by the sharing of a central computing resource at the DMG. Modem access to the computer system was improved in 2001 to V.90 speed with the installation of digital service (ISDN). With the increased use of internet access, system security became an important issue and access is now restricted to connection through a secure shell (SSH). An indication of the security problem is that 286 attempts were made during the year to access the system without authority. New computing resources were added to the system in 2001 in the form of a new server and a significant increase in disk storage. Users will be migrated to this new server early in 2002. Currently, the DMG maintains three web sites, an unsecure site containing general information, a secure site containing restricted information and a Transportation Tomorrow Survey site. A rough measure of a web site's success is the number of hits. In 2001, the unsecure site received 140,000 hits, the secure site 55,000 hits and the TTS site 85,000 hits.

Summary (continued)

Under the guidance of the Transportation Tomorrow Survey Technical Committee, the DMG is managing the 2001 Transportation Tomorrow Survey. The smaller survey phase in 2000 collected travel information from more than 22,500 households in the areas outside the GTA. The larger phase of the survey took place in the fall of 2001 with successful interviews from 101,200 households. Release of the travel data is expected in the summer of 2002.

The DMG's interaction with the academic community resulted in 16 undergraduate and 15 graduate theses plus 5 reports, publications and presentations.

INTRODUCTION

The Data Management Group is a research project located at the Joint Program in Transportation, which is a research centre of the Faculty of Applied Science and Engineering at the University of Toronto. The Joint Program in Transportation was established in 1970 and the Data Management Group began operation in 1988. A brief history of both is contained in *"Data Management Group Annual Report 1998, Report 81, Joint Program in Transportation (May 1999)"* available in Adobe Acrobat format at <http://www.jpint.utoronto.ca/PDF/doc81.html>. One measure of the Data Management Group's success is the increase in the number of times transportation planning agencies have requested access to the available data. In one calendar year, just before the 1991 Transportation Tomorrow Survey data became available, there were 42 such requests. In the calendar year 2001, access to a greatly expanded database was accomodated a total of 1706 times.

Program approval and funding of the Data Management Group is the collective responsibility of the members of the Transportation Information Steering Committee (TISC), previously called the Toronto Area Transportation Planning Data Collection Steering Committee (TATPDCSC), with the following membership:

City of Hamilton, formerly Regional Municipality of Hamilton-Wentworth
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, responsible for coordinating the needs of the funding agencies and the activities of the research project.

The activities of the Data Management Group can be grouped as follows:

Information Processing is the set of activities supporting the organization, storage and distribution of urban travel information. The principle components of this information are the results of the Transportation Tomorrow Surveys and regular cordon count surveys.

EMME/2 Technical Support is the set of activities in support of the shared computer simulation procedures used by transportation planning agencies in the Greater Toronto Area.

2001 Transportation Tomorrow Survey is the set of activities undertaken by the Group to manage and assist in the conduct of this three year data collection effort.

Data Management Group 2001 Annual Report

Introduction

Computer System Support is provided to all of the activities listed above.

The Data Management Group operates with a part-time director, a full-time technical staff of four, part-time technical staff and summer students. Administrative support is provided by the Joint Program in Transportation.

The Data Management Group is located in offices at;

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INFORMATION PROCESSING

In cooperation with the funding agencies, the Data Management Group (DMG) has assembled a set of data on urban transportation that is of collective interest to transportation planning agencies in the Greater Toronto Area plus Hamilton and to the research community. These data can be summarized as follows:

- household, person and trip data from the 1986, 1991 and 1996 Transportation Tomorrow Surveys,
- trip data from the 1964 MTARTS,
- place of work and place of residence linkages from the 1986 Census,
- GO Rail and GO Bus surveys from 1983 to 1997,
- vehicle and person classification counts contained in all Cordon Counts from 1975 to 1998.

These data are stored on the DMG's computer system in a relational database structure. Access to these data is provided in three ways. First, access to travel information is provided to all registered users of the system with a command line procedure called 'drs'. Second, access to all information is provided to registered users with two browser-based procedures. Access to travel information is called 'iDRS' and the separate procedure for cordon count information is called 'CCDRS'. Third, because the data are complex, the staff at the DMG will extract information for a particular application using custom computer programs. This procedure is called a 'complex data request'.

Text-based Data Retrieval System 'drs'

Access to all the data mentioned above, except Cordon Count data, can be extracted using a text screen displayed in a normal login to our system. The text-based data retrieval system (drs) was the original method for users to gain access to the system and was developed ten years ago. As the needs of the funding agencies changed and as more travel information became available, modifications and improvements have been implemented.

Staff at the DMG and frequent users of the EMME/2 software use this text-based data extraction method extensively with the aid of a current data guide. The most currrent data guide is *"1996 Transportation Tomorrow Survey: Data Guide, Version 2.1, Report 60, Joint Program in Transportation (August 1997)"* available in Adobe Acrobat format at <http://www.jpint.utoronto.ca/PDF/doc60.html>.

This is a convenient method of data extraction for users of EMME/2 as the initial text screen on system sign in can be used to access drs and resulting data files are automatically stored in their home directory. The following is a summary of the use of drs during the calendar year 2001 compared with a total in 2000.

Information Processing

Summary of Text Based 'drs' Data Requests

Month	Number of Data Queries	Number of Sessions
January	32	10
February	27	9
March	166	53
April	88	25
May	349	54
June	75	18
July	29	11
August	121	32
September	24	11
October	63	25
November	35	10
December	32	8
Total	**1041**	**266**

Total 2000	**1048**	**308**

Text Based 'drs' Users in 2001

City of Mississauga
City of Toronto
IBI Consulting Group*
Lea Consulting Ltd*
McCormick Rankin Consultants*
Ministry of Transportation, Ontario
Professor Eric Miller
Regional Municipality of Halton
Regional Municipality of Peel
Totten Simms Hubicki Associates*
University of Toronto undergraduate and graduate students
(*access permission granted by a funding agency)

Internet Browser Data Retrieval System (iDRS)

Development of the data retrieval system using a web browser (iDRS) began in 1998 and was made fully functional in 1999. A complete description of the iDRS is contained in a previous Annual Report, *"Data Management Group Annual Report 1998, Report 81, Joint Program in Transportation (May 1999)"* available in Adobe Acrobat format at <http://www.jpint.utoronto.ca/PDF/doc81.html>.

System security is maintained by requiring all users to provide a login and password. The new access method was tested by the funding agencies, then consultants were given access with approval by one of the funding agencies for a restricted period of time, depending on the duration of the project. Late in 2000, the funding agencies gave approval to an experiment that would allow access to

iDRS by any public or private agency. The experiment with more open access, which still requires a login and password, began in the Spring of 2001.

The following is a summary of the use of iDRS during the calendar year 2001 compared with a total in 2000.

Summary of Browser Based 'iDRS' Data Requests

Month	**Number of Data Queries**	**Number of Sessions**
January	161	46
February	215	54
March	333	67
April	213	32
May	611	52
June	3784	145
July	937	71
August	297	69
September	74	15
October	481	98
November	284	45
December	105	33
Total	**7495**	**727**

Total 2000	**1508**	**370**

Browser Based 'iDRS' Users in 2001

BA Consulting Group
City of Toronto
Delcan Corporation
Dillon Consulting Ltd
Entra Consultants Ltd
GO Transit
IBI Consulting Group
iTrans Consulting Ltd
Lea Consulting Ltd
McCormick Rankin Consultants
Ministry of Transportation, Ontario
Paradigm Transportation Solutions
Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Peel
Toronto Transit Commission
TranSearch Group Inc
University of Toronto undergraduate and graduate students

Complex Data Requests

The interactive procedures available on drs and 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. There were 8 such requests for data from funding agencies and the research community in 2001. In addition, a small number of private firms ask for information. These private requests are processed on a cost recovery basis. There were 9 such requests in 2001. The corresponding numbers were 26 and 8 in the calendar year 2000. Brief descriptions of special data requests in 2001 are contained in Appendix A.

Cordon Count Data Retrieval System (CCDRS)

The collective results from a regular program of detailed traffic counts undertaken over several years by various Regional Governments in the Greater Toronto Area on the road and transit systems are a rich source of valuable data for a wide range of transportation planning projects. In cooperation with the funding agencies, the DMG has assembled all such traffic counts for the years prior to 1998 in a common data base structure. The complete data set contains detailed information from 38 separate cordon count programs undertaken by five Regional Municipalities spanning a time period from 1975 to 1998.

CCDRS was made fully functional in 1999. A complete description of the CCDRS is contained in *"Data Management Group Annual Report 1998, Report 81, Joint Program in Transportation (May 1999)"* available in Adobe Acrobat format at <http://www.jpint.utoronto.ca/PDF/doc81.html>. Corrections and refinements continued to be made in the year 2001.

The following is a summary of all uses of CCDRS during 2000 compared with a total for 1999.

Information Processing

Summary of CCDRS Data Requests

Month	Number of Data Queries	Number of Sessions
January	123	30
February	71	40
March	51	31
April	43	17
May	465	50
June	284	72
July	176	51
August	202	41
September	175	92
October	527	107
November	344	116
December	201	66
Total	**2662**	**713**

Total 2000	**2207**	**558**

CCDRS Users in 2000

City of Mississauga
City of Toronto
Delcan Corporation*
IBI Consulting Group*
iTrans Consulting Ltd*
Lea Consulting Ltd*
McCormick Rankin Consultants*
Ministry of Transportation, Ontario
Morrison Hershfield Ltd*
Peter Dalton Consulting*
Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Peel
Regional Municipality of York
(*access permission granted by a funding agency)

EMME/2 TECHNICAL SUPPORT

The funding agencies and several local governments, in addition to consultants working for these agencies, share the operation of the EMME/2 simulation package on the Data Management Group's computer system. In addition, access to the simulation package is given to teaching and research activities at the University of Toronto. During the calendar year 2001, the DMG provided support to these users in five major categories:

- development and maintenance of a shared Greater Toronto Area 2001 EMME/2 network, including preparation for the 2001 TTS data validation,
- technical assistance in the form of technical advice, macro writing, and EMME/2 training,
- testing of the new graphical user interface for EMME/2 (ENIF),
- assistance in the development and application of travel forecasting procedures,
- assistance in the application of EMME/2 modelling procedures to consultants working on projects for a member agency.

Develop and Maintain the EMME/2 Networks

Development of the 2001 Integrated Greater Toronto Area Road and Transit Network began in 1999. A preliminary version of the integrated network was made available to the funding agencies in December 2000 (Release 0), which was intended principally for checking. Development of the 2001 Integrated Network continued in the calendar year 2001 with a distribution of Release 1 in November 2001. Summer students were hired to assist with the time consuming tasks of data collection and network coding. DMG staff coordinated the execution of the project with representatives of the funding agencies. The major network development tasks accomplished in 2001 include:

- update of the provincial, regional and municipal construction programs that reflect changes from information contained in Release 0,
- collection of the transit information relevant to the year 2001 and implementation of the relevant changes,
- collection of the electronic network and reference files necessary for development,
- conversion of coordinates for supplementary files (mainly annotations) from NAD27 to NAD83
- collection and update of the data related to the traffic counts and establishing a link between the EMME/2 network and cordon count data base,
- technical training of the temporary staff,

- establish consistency checks of 2001 Integrated Network and corresponding development of macro procedures,
- encoding of the new cordon counts link attribute codes,
- implementation of a detailed representation of interchange ramps, some collector/express lanes, and the geometry of some freeway segments,
- adjustment of the centroid connectors to the new 2001 network topology to represent both the 1996 and 2001 Traffic Zone Systems.

More detailed technical information on the network development is contained in the documentation provided with Release 1 of the 2001 Integrated Greater Toronto Area Road and Transit Network on Data Management Group's computer system.

Technical Support To EMME/2 Users

Technical support is provided to EMME/2 users in the Greater Toronto Area in response to requests and if the user is associated with a funding agency or a university research project. Many requests for technical assistance are recieved during the year, but only requests requiring more than one hour to satisfy are recorded. In the calendar year 2001 there were 158 requests of a substantial nature, compared with 125 requests in the calendar year 2000. The following is a brief summary of the source of these requests:

Source	Number of Requests in 2000	Number of Requests in 2001
Funding Agencies	83	77
Local Municipalities	11	13
University Research	19	30
Consultants	12	38
Total	**125**	**158**

The requests fall into five broad categories:

- execution of a specific technical task in EMME/2,
- execution of a specific analytical or modelling task in EMME/2 with or without macro development,
- technical assistance with setup of the EMME/2 program and related utilities,
- management of the data related to EMME/2 networks or trip tables,
- inquires pertaining to methodological and mathematical particulars of models and applications.

Graphical User Interface for EMME/2 (ENIF)

In the calendar year 2001, the Data Management group was selected by INRO as a test site for the new graphical user interface for EMME/2. The new program is called ENIF and is intended to compliment and partially replace some of the EMME/2 functionality. The software was not officially released in 2001, however, in order to be prepared for the technical support of the new interface and to investigate possible implications of supporting it on the DMG's computer system, DMG is participating with INRO by testing the software with GTA data. DMG staff attended a developer's workshop on the new product, installed the software on the DMG's computer system and tested it with the data commonly in use by the funding agencies. Preliminary results of the testing and capabilities of the software have been briefly discussed at the Ontario Emme/2 User's Group meeting and the GTA Modelling Group.

Assistance In Travel Forecasting Procedures

DMG staff participates in the Greater Toronto Area Modelling Group, which provides a forum for active EMME/2 users to discusss issues and needs in the development of forecasting procedures in the GTA plus Hamilton. DMG staff provided technical advice to the Group on the following issues:

- development, validation, utilization and set up of the Greater Toronto Area travel demand models,
- update of delay functions in the GTA EMME/2 networks,
- changes and potential improvements to coding standards in the EMME/2 network.

Modelling Assistance to Consultants

In the fall of 2000, the Steering Committee (TISC) gave approval for experienced DMG staff to participate on applications of EMME/2 with funding agencies and their consultants on a cost recovery basis. Under this arrangement, the DMG staff would be available to any transportation planning agency (local, regional or provincial) in the GTA plus Hamilton and, in particular, to any private consultant working on projects for these agencies. DMG support is also available to any private consultant awarded a contract by a funding agency in the GTA plus Hamilton. However, it must be clear that the DMG is providing technical assistance and is not assuming responsibility for any aspect of the project. The arrangement is an experiment that is subject to review by the Steering Committee.

As part of the new consulting initiatives, DMG's staff participated in two projects in 2000. In 2001, DMG staff spent a total of 24 working days participating in two projects; assisting Lea Consulting Ltd. with modal split proceures and assisting Morrison Hershfield Ltd. with network representation of highway improvements.

COMPUTER SYSTEM SUPPORT

The role of the Data Management Group in information processing and technical support of EMME/2 is made possible by the sharing of a central computing resource at the offices of the DMG. The success of such a concept is dependent on three important conditions; a fast and reliable method to access the central system, ease of use and a level of computing service that is consistent with current technology. Technical support staff at the DMG use these principles to solve problems on a daily basis and as a guide to system improvement. As much as possible, reliable computer system access is provided every day of the week for 24 hours a day. A major challenge in 2001 was to maintain this service while providing computer system support for the Transportation Tomorrow Survey

Access to Computing Services

Access to computing services at the Data Management Group is currently provided in one of two ways. The first method and the one used for the longest period of time, is by modem through a conventional telephone line. The second method is through an internet connection. During 1999 and 2000, the conventional telephone lines were replaced with a series of digital telephone lines (ISDN). In this way, modems that support the V.90 protocol can connect at a much faster speed than was possible previously. The bank of ISDN telephone lines is configured in a 'hunt group' that allocates the next available telephone line to an incoming call. Access by the internet, the second method, continued to grow during 2001 as more and more offices activated internet service for their technical staff. In addition, private consultants working on projects for the funding agencies have found it to be more convenient to initiate an internet connection. The software required for access is provided by the DMG without charge and with complete instructions.

The Transportation Tomorrow Survey site at 500 University Avenue in Toronto was used as a test for the newer high speed connection, which is a business version of the 'high speed Sympatico' currently promoted for residential connections. The test provided a fast and reliable connection between the survey site and the University of Toronto. The new protocol is a likely candidate for improved EMME/2 connections.

System Security

Modem connection continues to be the most secure method of access to our system. The trend for more users to prefer access through the internet raises concern about system security. In an attempt to reach a balance between ease of use by authorized users and protection against unauthorized users, the system requires all users that access the EMME/2 software via the internet to use a secure shell (SSH). The software has been customized for DMG users, including a capability to download files efficiently, and is available to all users on the DMG's secure web site.

Since the DMG provides access via the internet to both data (mainly through a web server) and application software (mainly EMME/2) in addition to direct connections via modems and ISDN, system security is a constant concern. In 2001, over 500,000 data packets of a questionable nature were detected by the DMG system. This represents a total of 15,792 unauthorized connection attempts, where each unauthorized attempt was comprised on average of 35 packets. A packet is a single component of a larger message. Most of these attempts are harmless.

Many of these unauthorized connection attempts were automated scans originating from systems running one of the popular Microsoft Windows operating systems that are infected with a virus. These viruses are programmed to exploit the known vulnerabilities of Windows and propagate the next automated scan from an available address book. Since DMG does not operate Windows on any of its internet servers, the system is not vulnerable to these attacks. Of the 15,792 connection attempts which can be considered potential attacks, only 286 are cause for concern. This represents 274 script attacks, 9 database attacks, and 3 buffer overflow attacks. Although 286 is a tiny fraction of 500,000, this represents a serious probe on the DMG system 2 out of every 3 days throughout the year. Because of this reality, DMG staff work constantly to make certain our servers are not vulnerable to known attacks and applies best practice methods of system management to ensure the highest level of security without choking off necessary services.

System Improvements

The technical staff undertook an investigation in 2000 of strategies for major computer system upgrades. The concept is to significantly improve the computing power and available disk storage to every user of the system. Implementation of the system improvements began in 2001. A new, faster and more powerful server was purchased to replace the existing Sun Ultra 1 that has been the mainstay of the DMG's system for the past several years. The new server is a Sun Blade 1000 with two parallel processors. Once completely integrated into the system, this update should provide significant performance improvements, particularly for EMME/2 applications. At the same time, the disk storage space was improved with the addition of an 8 bay Hot-Swap enclosure with 4 large disk drives having a capacity of 73 GB on each. The DMG was then able to implement an expansion of available disk space to each user of the system. Users will be migrated to new disk space early in 2002.

Given the new configuration uses parallel processing, a change to the EMME/2 licencing agreement was necessary. The new EMME/2 licence, using a new version of the operating system, was installed and tested on the Sun Blade 1000 in the later part of 2001. An appropriate system for testing the new graphical user interface to EMME/2 (ENIF) is now in place. Testing of various hardware and software alternatives for running ENIF will take place in 2002.

Web Site Development

The technical staff developed a web site in 1999 and 2000 to satisfy a combination of needs. The needs are broadly defined as a service to the casual user wanting general information about the DMG (unsecured site), a service to the technical planning staff in the GTA (secure site), and an information site for the 2001 TTS. The web site is now the first entry to iDRS and CCDRS described earlier in this report. This entry is through a secure portion of the site and requires a login name and password. This allows appropriate access restrictions to valuable data bases. The site also describes the procedures necessary to gain access. In addition, this secure portion of the web site contains software that members of the funding agencies can use, such as the secure shell mentioned above.

The unsecured portion of the site operates as two locations with <http://www.jpint.utoronto.ca> containing general information on the DMG, while <http://www.transportationtomorrow.on.ca> contains information particular to the conduct of the 2001 TTS. The DMG's portion of the site provides information on previous TTS as well as providing access to a list of all reports. The report list includes a link to electronic files of all recent reports in a form that can be easily downloaded and printed locally. The TTS site contains information that may be of interest to occupants of households contacted during the conduct of the survey. The site is an attempt to provide confirmation of the importance and authenticity of the survey.

One rough measure of the effectiveness of the web site is the number of times that users attempt to see a page on the site. Every attempt to read a page is recorded as a hit. The number of hits in 2001 on pages of the unsecured site (excluding the TTS location) was approximately 140,000 (compared to 85,000 in 2000) and the corresponding number on the secure site was approximately 55,000 (compared to 50,000 in 2000). It should be noted that many of the recorded hits on the unsecured sites can be attributed to search engines attempting to keep their files current. Understandably, the TTS web site recieved a large number of hits in 2001 during the phase when more than 150,000 households were contacted by telephone. The number of hits on the TTS site increased from 12,300 in 2000 to 85,000 in 2001.

2001 TRANSPORTATION TOMORROW SURVEY

The Transportation Tomorrow Surveys (1986, 1991 and 1996) are currently accepted by all public agencies as a sound information base on the characteristics of travel in the Greater Toronto Area. The combined data set from all survey years is actively used by local, regional and provincial planning agencies. A decision to proceed with a 2001 TTS was taken in 1999 by the Transportation Information Steering Committee (TISC). The responsibility for all policy and funding matters are to rest with TISC. The committee delegated the technical responsibility to the 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 Guelph
City of Hamilton
City of Orillia
City of Peterborough
City of Toronto
County of Peterborough
County of Simcoe
County of Victoria
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 York
Toronto Transit Commission
Town of Orangeville

The technical committee met for the first time in early 2000 and approved a work plan for the first phase of data collection and 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 1996 TTS. The strategy selected was to conduct the interviews for outside agencies in the fall of 2000 from a single site located close to subway access in central Toronto. The smaller survey in 2000 allowed for fine tuning the survey procedures before the larger stage in the fall of 2001. More than 22,500 households in the areas outside the GTA were interviewed successfully in the fall of 2000.

The larger phase of the survey took place in the fall of 2001 with successful interviews from 101,200 households at a site in the same building as the earlier phase. The survey results from both survey phases will now be expanded to the universe of households in the survey area on the basis of the 2001 Canadian Census. Release of the travel data is expected in July 2002.

DMG PUBLICATIONS

Publications generated by the activities of the DMG are placed on our web site at <http://www.jpint.utoronto.ca> in a format suitable for access and printing by the user. The following publications were created in the year 2001.

Miller, E.J., "The Greater Toronto Area Travel Demand Modelling System Version 2.0 - Volume I: Model Overview", Report 86, (January 2001)

Miller, E.J., "The Greater Toronto Area Travel Demand Modelling System Version 2.0 - Volume III: User's Manual", Report 87, (January 2001)

"Data Management Group Annual Report 2000", Report 88 (May 2001)

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 2001

Chan, E., "Analysis of VKT Trends in the GTA", B.A.Sc. (Toronto, Professor E.J.Miller)

Chung, M., "Using 1996 TTS data to Explore Possible 'Hidden Markets' for Transit Riders", B.A.Sc. (Toronto, Professor E.J.Miller)

Chung, W., "The Effect of Roadway Congestion on Surface Transit Speeds", B.A.Sc. (Toronto, Professor E.J.Miller)

Gomes, N., "A Comparison Between EMME/2 and TRANSCAD Traffic Assignment Models", B.A.Sc. (Toronto, Professor A.S.Shalaby)

Lee, J-Y., "Roadway Congestion Effects on the Prediction of Surface Transit Travel Times Within EMME/2 Modelling System", B.A.Sc. (Toronto, Professor E.J.Miller)

Lee, K., "Logit-Based Home-School Mode Split Model for University and College Students", B.A.Sc. (Toronto, Professor E.J.Miller)

Mendonca, N., "An Investigation into the Financial Worth of Residential Properties Located in the New City of Toronto", B.A.Sc. (Toronto, Professor E.J.Miller)

Mok, J., "Logit-Based Home-School Mode Split Model for Secondary School Students", B.A.Sc. (Toronto, Professor E.J.Miller)

Publications and Research

Undergraduate Theses Completed in 2001 (continued)

Nawbett, K., "Validation of EMME/2 Calibration Parameters of the Transit System for the City of Toronto", B.A.Sc. (Toronto, Professor E.J.Miller)

Ng, C., "Assessment of Personal and Travel Characteristics of Telecommuters in the GTA", B.A.Sc. (Toronto, Professor A.S.Shalaby)

Patman, D., "Reducing Congestion in the GTA by Improving GO Rail's Mode Split: Investigations Using GTAModel Version 2.0", B.A.Sc. (Toronto, Professor E.J.Miller)

Qureshi, N., "A Comparative Analysis of Travel Patterns in 2 GTA Activity Centres", B.Eng. (Ryerson, Professor A.S.Shalaby)

Tsang, F., "Comparison of Travel Characteristics between Emerging Suburban Activity Centres and Downtown Toronto", B.A.Sc. (Toronto, Professor A.S.Shalaby) in progress.

Wong, A., "Area Wide Congestion Pricing in the Greater Toronto Area", B.A.Sc. (Toronto, Professor E.J.Miller)

Wu, T., "A Route Level Ridership Model of a TTC Bus Route", B.A.Sc. (Toronto, Professor A.S.Shalaby) in progress.

Wu, W.,"Relationship between Life-Cycle and Person Travel Attributes", B.Eng. (Ryerson, Professor A.S.Shalaby)

Graduate Theses Completed or in Progress in 2001

Ciavarro, M., "GO Transit: Oakville Station Parking, Economic Feasibility and Options", M.Sc. Planning Program (Toronto, Professor E.J.Miller) in progress.

Cugalj, S., "Application of the Chinese Postman Model to the Toronto Transportation Network within GIS-Based Software", M.A.Sc. (Toronto, Professor E.J.Miller)

Eberhard, L., "A 24-Hour Household-Level Activity-Based Travel Demand Model for the GTA", M.A.Sc. (Toronto, Professor E.J.Miller) in progress.

Hadayeghi, A., "Macro Road Safety Models for Transportation Planning", M.A.Sc. (Toronto, Professor A.S.Shalaby) in progress.

Haider, M., "Supply-Demand Interactions in Urban Housing Markets", Ph.D. (Toronto, Professor E.J.Miller) in progress.

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

Houde, R., "Pricing Public Transit: A Model Based Evaluation", M.Sc. Planning Program (Toronto, Professor E.J.Miller) in progress.

Lee, A., "Analysis of Personal-Use Vehicle Emissions in the Greater Toronto Area, 1986-1996", M.A.Sc. (Toronto, Professor E.J.Miller) in progress.

Lee, J., "Assessment of Transit Priority Using Microsimulation", M.A.Sc. (Toronto, Professor A.S.Shalaby)

Mohammadian, A., "Dynamic Modelling of Household Transactions within a Microsimulation Framework", Ph.D. (Toronto, Professor E.J.Miller)

Publications and Research

Graduate Theses Completed or in Progress in 2001 (continued)

Mohammad, B., "Operational Analysis of High-Occupancy Vehicle Lanes using Microsimulation", M.A.Sc. (Toronto, Professor A.S.Shalaby)

Nazar, C., "Options for Replacing the Gardiner Expressway", M.Sc. Planning Program (Toronto, Professor E.J.Miller)

Peiravian, F., "Road Network Modelling for Environmental Impact Analysis", Ph.D. (Toronto, Professor E.J.Miller) in progress.

Poon, W., "An Investigation into Residential Relocation Rules and Processes", M.A.Sc. (Toronto, Professor E.J.Miller) in progress.

Salvini, P., "Properties of Large-Scale Microsimulation Models", Ph.D. (Toronto, Professor E.J.Miller) in progress.

Reports, Publications and Presentations in 2001

Lee, C.H. and E.J. Miller, "A Microsimulation Model of CO_2 Emissions from Passenger Cars: Model Framework and Applications", (poster session) presented at the 80th Annual Meeting of the Transportation Research Board, Washington, D.C., January, 2001.

Miller, E.J. and A. Shalaby, "Historical Trends in Travel Behavior in the Greater Toronto Area and Policy Implications", (poster session) presented at the 80th Annual Meeting of the Transportation Research Board, Washington, D.C., January, 2001.

Miller, E.J., "Travel Trends in the Greater Toronto Area", presented at the CMHC Housing Outlook Conference 2001, Toronto, November 29, 2001.

Miller, E.J., "Spatial Interaction and Location Choice Modelling", presented at the Workshop on Spatial Statistical Analysis, University of Toronto, Toronto, August, 2001.

Miller, E.J., "Analysis Needs for Urban Energy Planning" presented at the Workshop on Urban Energy Tools and CO_2 Planning, Toronto, March 22-23, 2001.

APPENDIX A COMPLEX DATA REQUESTS

In addition to the data requests that are served directly through the on-line interactive TTS Data Retrieval System (DRS), the DMG staff processed the following requests. The diversity of the requests illustrates the robust nature of the Transportation Tomorrow Survey Data sets as currently housed at the DMG.

Participating Agencies

Zone boundaries for Simcoe County and Barrie were provided to the Region of York.

Professor Eric Miller from the University of Toronto requested household, person, trip and transit records from the 1986, 1991 and 1996 TTS database for a Toronto Atmospheric Fund Project "A Personal-Use Vehicle Emissions Audit for the GTA".

The number of respondents, modal split by trip origin and modal split by trip destination were extracted from the 1996 TTS database for three areas within the City of Toronto. These data were provided to Marshall Macklin Monaghan for a Transportation Assessment Project conducted on behalf of the City of Toronto.

Cordon Count data for various years for two Toronto screenlines were provided to Marshall Macklin Monaghan for a Transportation Assessment Project conducted on behalf of the City of Toronto.

A summary of vehicle and person counts by mode was extracted from the Cordon Count database for various years for eight screenlines within Peel Region. These data were provided to McCormick Rankin for a project conducted on behalf of the City of Brampton and Peel Region.

Office of the Vice-President, University of Toronto requested information on the 24 hour trips made by transit to the Scarborough and St George campuses.

Total of full-time and part-time employed persons in Halton Region were extracted from the 1996 TTS dataset for the Region of Halton.

Professor Eric Miller requested auto-driver trip information from the 1986, 1991 and 1996 TTS database for graduate student research.

Private Data Requests

Cansult Ltd. requested origin-destination tables for the am and pm peak periods for various travel modes at an aggregated planning district level with pd's 13, 15 and 16 disaggregated from the 1996 TTS data.

APPENDIX A DATA REQUESTS (continued)

BA Consulting Group Ltd. requested trip matrices for the am and pm peak periods for various travel modes and trip purposes at an aggregated planning district level with pd's 44-46 partially disaggregated from the 1996 TTS data.

BA Consulting Group Ltd. requested trip matrices for the am and pm peak period work trips for various travel modes aggregated at the planning district level with pd 1 disaggregated to traffic zones from the 1996 TTS data.

BA Consulting Group Ltd. requested trip matrices for the am peak period for all trip types and various travel modes at planning district level with pd's 1-4, 8 and 11 partially disaggregated from the 1996 TTS data.

IBI Group requested zone boundary files for Peterborough and Victoria County in MapInfo format.

Itrans requested the 1996 zone boundary files for the Greater Toronto Area in MapInfo format.

Itrans requested the 1991 zone boundary map for the Greater Toronto Area.

IBI Group requested zone boundary files for the City of Peterborough in MapInfo format.

McCormick Ranking requested an am peak hour trip table for transit excluding schoolbus trips from the 1996 TTS data.