Data Management Group
Annual Report
2003

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
Regional Municipality of Halton
Regional Municipality of Peel
Regional Municipality of York
Toronto Transit Commission
Ministry of Transportation, Ontario

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SUMMARY

The Data Management Group (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 data bases. Managing and providing access to the Transportation Tomorrow Surveys continues to be the most significant part of the Group's activities. Access to the original data base files is restricted to DMG staff, however, various methods of access are available to any individual requesting access. The individual is required to sign an agreement form and system security is maintained by giving each user a unique login and password. A majority of users access the data base through an internet connection and the DMG's browser interface. The procedure is reasonably complex, therefore at the request of the funding agencies, a series of instructional sessions were given by DMG staff. During the year the funding agencies and their consultants together with the research community instigated 16,239 data queries during 2,695 computer sessions related to urban travel, compared with 6,924 queries during 1,411sessions in 2002.

The DMG also manages and provides access to a data base containing all the cordon counts undertaken by the funding agencies since 1975. The cordon count program counts vehicles, classified by vehicle type, for each direction on a selection of locations throughout the GTA during the daylight hours on a day in the spring. Considering each direction and each year of a count to be a separate counting station, in 2003 there were 17,957 stations in the data base. For the first time this data base was made available to any individual requesting access in 2003 and is administered in a manner similar to the TTS data. During the year the funding agencies and their consultants together with the research community instigated 2439 data queries during 642 computer sessions related to cordon count data.

Starting with the 1986 Transportation Tomorrow Survey, the Data Management Group has assumed the role of compiling and publishing a series of reports that document and summarize the entire survey process. The data base for the 2001 TTS was finalized in late 2002 and the publication of seven such reports took place in 2003. These reports are published in addition to the four working papers compiled by the Transportation Tomorrow Survey's management team and published by the Data Management Group in 2002. All reports are available in some form on the DMG's web site.

By the year 2003, all funding agencies and several local governments are full funding partners in the sharing of a computer system running transportation planning simulation software. In addition to the support of a computer system for the funding agencies and consultants working for these agencies to run the simulation software, the DMG provides technical support and instruction. In 2003, the DMG changed direction in terms of support in response to a need for more trained technical people in the field of urban transportation planning. The DMG sought and received approval on an on going basis for the establish-

ment of an 'Urban Transportation Planning Intern' to be employed at the Data Management Group for one year.

The role of the DMG in information processing and technical support of shared simulation software 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 2003 was to overcome a number of systems issues caused by the electrical blackout of August 15, 2003.

The research nature of the DMG's activities is conducive to the development of other research projects. 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 the EMME/2 software and technical support in the use of these data and software. In 2003, the result of this collaboration led to 5 undergraduate theses, 13 graduate theses completed or in progress and 10 technical presentations or publications.

INTRODUCTION

The Data Management Group (DMG) 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 DMG began operation in 1988. Under the guidance of the funding agencies, the project has grown from a distribution centre for the 1986 Transportation Tomorrow Survey to an interactive centre where transportation planners can access four travel surveys, over 25 years of traffic counts and access a powerful computer software package for synthesizing urban travel in the Toronto Area. One measure of the DMG's success is the increase in the number of times transportation planning agencies have requested access to the available data. In one calendar year early in the project, the staff would process approximately 40 data requests. In the calendar year 2003, interactive data requests to a greatly expanded database numbered over 19,000.

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.

The activities of the DMG can be grouped as follows:

Information Processing is the 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 regular cordon count surveys.

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.

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

University Research is supported in the form of access to the data bases, access to the resources required to operate the transportation system simulation software, access to related software and technical support in the use of these data and software.

Introduction

The DMG operates with a part-time director, three full-time technical staff, an urban transportation planning intern, part-time technical staff and summer students. Administrative support is provided by the Joint Program in Transportation.

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
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INFORMATION PROCESSING

TRANSPORTATION TOMORROW SURVEYS

Description

The first Transportation Tomorrow Survey in 1986 was a collective project to update urban travel information, which had not been collected in a coordinated fashion since 1964. The project was instigated by a committee called the Toronto Area Transportation Planning and Data Collection Steering Committee (TATPDCSC, subsequently shortened to the Transportation Information Steering Committee, TISC) with the same nine members that have initiated subsequent surveys and continue to oversee the operation of the DMG.

At the conclusion of the survey, the Steering Committee realized the complexity and importance of making this travel information widely available to transportation planners in both the public and private sector. The Steering Committee responded favourably to a proposal by the Joint Program in Transportation to accomplish this and other objectives at the University of Toronto. The DMG began operation in the summer of 1988 and the original and subsequent Transportation Tomorrow Surveys continue to be the most significant part of the Group's activities.

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 data bases with various methods of access. Access to the original files is restricted to DMG staff. 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, and 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 data base reflects not only growth in the area but also an increase in the size of the area surveyed.

Text-based Data Retrieval System 'drs'

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 is being phased out. In the year 2003, development continued to incorporate all the attractive features of drs into the browser-based iDRS.

The 2001 TTS has not been placed into drs in anticipation that the system will need to be discontinued, therefore, the use of drs in 2003 reflects this limitation. The following is a summary of the use of drs during the calendar year 2003 and is compared with a total in 2002.

Summary of Text Based 'drs' Data Requests in 2003

Month	Number of Data Queries	Number of Sessions
January	22	13
February	3	1
March	3	2
April	17	4
May	6	2
June*	0	0
Total 2003	**51**	**22**
Total 2002	**693**	**257**

* 'drs' has been inactive on the system since June, 2003.

Text Based 'drs' Users in 2003

IBI Consulting Group
Ministry of Transportation, Ontario
Totten Sims Hubicki Associates
University of Toronto

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), which is available in Adobe Acrobat format at <http://www.jpint.utoronto.ca/PDF/doc81.html>.

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 data base system. Use of the system was carefully monitored during 2003 to be certain all users were given reasonable service.

The iDRS procedure is reasonably complex, therefore at the request of the funding agencies, a series of instructional sessions were given by DMG staff. Instruction sessions were given on January 13th, 2003 at the offices of the Regional Municipality of Peel, and on March 18th, 2003 at the offices of the Regional Municipality of York.

Access through iDRS, when used in conjunction with the latest data guide "2001 Transportation Tomorrow Survey: Data Guide", Report 96, Joint Program in Transportation (January 2003), is a very powerful and widely used data extraction method. The following is a summary of the use of iDRS during the calendar year 2003 compared with a total in 2002.

Summary of Browser Based 'iDRS' Data Requests in 2003

Month	**Number of Data Queries**	**Number of Sessions**
January	1497	362
February	1414	273
March	1675	310
April	1299	264
May	2470	368
June	1507	219
July	1399	210
August	867	130
September	535	121
October	1980	138
November	992	210
December	604	9
Total 2003	**16239**	**2695**

Total 2002	**6924**	**1411**

Browser Based 'iDRS' Users in 2003

BA Consulting Group
Bate Enterprises
Cansult Limited
Centre for Sustainable Transportation
City of Brampton
City of Burlington
City of Guelph
City of Mississauga
City of Peterborough
City of Toronto
Dillon Consulting Ltd.
Earth Tech
Entra Consultants
GO Transit
Hemson Consulting Ltd.
Humboldt University of Berlin
IBI Consulting Group
iTrans Consulting Ltd.
Lea Consultants
Malone Given Parsons Ltd.
Marshall Macklin Monaghan Ltd.
McCormick Rankin Consultants
McMaster University
Ministry of Transportation, Ontario
Paradigm Transportation Solutions
Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Niagara
Regional Municipality of Peel
Regional Municipality of York
Sernas Transtech
SNC-Lavalin Inc.
Tedesco Engineering
Totten Sims Hubicki Associates
Toronto Transit Commission
Town of Markham
Town of Newmarket
Transplan
University of Toronto
Viacom International Inc.
York University

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 re-

quests in favour of users processing their request through iDRS. There were 3 special data requests from funding agencies and the research community in 2002 and this number increased to 7 in the year 2003. Occasionally, a small number of private firms ask for travel data. These private requests are processed on a cost recovery basis, and there were no such requests in 2002 and one such request in 2003. Brief descriptions of the all special data requests in 2003 are contained in Appendix A.

CORDON COUNTS

Description

The City of Toronto (then the Regional Municipality of Metropolitan Toronto) began in 1975 to collect detailed information on the type and volume of traffic crossing selected points on the road system. 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 data base 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 2003 there were 17,957 stations in the data base. Some improvements to the data base were undertaken in 2003, 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.

CCDRS

Issues associated with the appropriate method of access for users of the cordon count data are similar to those faced in the development of iDRS and access to the Transportation Tomorrow Surveys. At the time of investigating the potential access methods to this pooled cordon count data base, the internet was the preferred method of remote access, a data retrieval system specifically designed for internet access was developed (CCDRS). The retrieval system must allow the analyst the flexibility to summarize information by any definition of the attributes contained in the data base. CCDRS was made fully functional in 1999. For the first time, funding agencies were able to access the complete set of counts from all cordon count programs. 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>.

The CCDRS was developed in a similar fashion to iDRS with early access restricted to staff associated with a funding agency. Interest in gaining access continued to develop and in 2003 access was granted to any individual completing the required agreement form. To promote the opening of CCDRS in August of 2003, the DMG offered a short presentation on the use of CCDRS as part of a Cordon Count seminar arranged by the Ministry of Transportation, Ontario which was attended by over 30 planners from both public and private agencies. In a manner similar to iDRS, system security is maintained by giving each user a unique login and password. In fact, once the necessary agreement forms are completed, the same login and password can be used for both iDRS and CCDRS.

The following is a summary of all uses of CCDRS during 2003 compared with a total for 2002.

Summary of CCDRS Data Requests in 2003

Month	**Number of Data Queries**	**Number of Sessions**
January	394	137
February	191	57
March	135	50
April	229	45
May	233	55
June	398	32
July	122	41
August	158	36
September	197	42
October	119	46
November	152	76
December	111	45
Total 2003	**2439**	**642**

Total 2002	**5596**	**931**

CCDRS Users in 2003

Bate Enterprises
Cansult Limited
City of Mississauga
City of Toronto
IBI Consulting Group
iTrans Consulting Ltd.
Lea Consultants
McCormick Rankin Consultants
Ministry of Transportation, Ontario
Morrison Hershfield Group Inc.
Paradigm Transportation Solutions
Peter Dalton Consulting
Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Peel
Regional Municipality of York
Toronto Transit Commission

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. There were 2 special data requests in 2003, one from a funding agencies and one from the research community. Brief descriptions of the two special data requests in 2003 are contained in Appendix A.

2001 TRANSPORTATION TOMORROW SURVEY

Starting with the 1986 Transportation Tomorrow Survey, the DMG has assumed the role of compiling and publishing a series of reports that document and summarize the entire survey process. The 2001 TTS data base was finalized in late 2002 and the publication of these reports took place in 2003. These reports are published in addition to the four working papers compiled by the Transportation Tomorrow Survey's management team and published by the DMG in 2002.

"2001 Traffic Zone Boundaries, Report 94"
A report presenting the definition of the widely used 2001 traffic zone system defined by the participating agencies. The report is in several parts in an effort to facilitate downloading a file that is predominantly made up of graphic images. The reports are available at <http://www.jpint.utoronto.ca/PDF/doc94.html>

"2001 Transportation Tomorrow Survey: Design & Conduct of the Survey, Report 95"
A report outlining the implementation details of the 2001 Transportation Tomorrow Survey, describing all aspects of conducting a survey of this magnitude including: planning and organisation, software development, equipment, conduct of the survey, completion statistics, coding, survey budget and costs, conclusions and recommendations. Available at <http://www.jpint.utoronto.ca/PDF/doc95.html>

"2001 Transportation Tomorrow Survey: Data Guide, Report 96"
A report providing a detailed description of the household, person and trip variables collected in the survey. The report is a necessary resource for anyone attempting a detailed analysis of the travel information contained in the data base. Available at <http://www.jpint.utoronto.ca/PDF/doc96.html>

"2001 Transportation Tomorrow Survey: Data Validation, Report 97"
A report describing the use of exogenous information, in particular the 2001 Census and relevant traffic counts, to investigate how well the sample in the travel survey is representing the universe of households, persons and trips. Available at <http://www.jpint.utoronto.ca/PDF/doc97.html>

"2001 Transportation Tomorrow Survey: 2001 & 1996 Travel Survey Summaries, Report 98"
A report summarizing the findings by regional authority in the GTA plus Hamilton and by funding agency in the surrounding area for the two surveys with an expanded survey area. This report is available in hard copy only, however, a presentation of the data is located at <http://www.jpint.utoronto.ca/tts01/tts01.html>

"2001 Transportation Tomorrow Survey: 2001, 1996 & 1986 Summary Report of the GTA, Report 99"
A report summarizing the findings by local areas within the regions of the GTA plus Hamilton for three survey years. This report is available in hard copy only, however, a presentation of the data is located at <http://www.jpint.utoronto.ca/gta01/gta_sum.html>

"2001 Transportation Tomorrow Survey: Summary by Wards, Report 100"
A new summary report summarizing the findings for the current travel survey by provincially defined ward boundaries. The report was prepared in response to a need for presenting appropriate information to political decision makers. The report is available for each region in the GTA plus Hamilton at <http://www.jpint.utoronto.ca/tts01_wards.html>

RELATED ACTIVITIES

The DMG's web site is very important to the efficient distribution of information to both frequent and infrequent users. The web site evolved over a period of years and was never reviewed until 2003. The DMG undertook a complete review of the web site and subsequently made a series of changes in an effort to make the site easier to use, particularly for the infrequent user.

The delay time when an iDRS or DRS user submits a query until an answer is provided is reviewed at regular intervals. An experiment was undertaken in 2003 to replicate the Oracle data base on MySQL and investigate potential improvements. Although the results were inconclusive, experience with the simpler MySQL has led to other applications. MySQL was used in 2003 to establish a method of tracking users according to the method they use to access the system. In addition, MySQL is being seriously considered in the rewrite of the software supporting a possible 2006 Transportation Tomorrow Survey.

Many transportation planners wish to trace changes in travel characteristics through time. A necessary part of doing this is to have the various years of the Transportation Tomorrow Surveys available in a common spatial definition, usually a traffic zone system. However, there are several traffic zone systems in the GTA that have been defined at different points in time. All Transportation Tomorrow Surveys were first released with the 1996 traffic zone system as the base. During 2003, the 1991 and 1996 TTS data was assigned to the new 2001 traffic zone system. The 1986 TTS data are to be assigned to this zone system as soon as possible.

At the conclusion of the 2001 TTS, the management team recommended a review of the software used to support the conduct of a travel survey of this magnitude. The DMG in 2003, with participation by senior managers of the 2001 TTS and the developer of the original software, undertook a complete review and recommended new software be developed. The Steering Committee (TISC) granted approval in 2003 for the DMG to undertake this software development project. The project began in late 2003 and the first prototype should be available in September 2004.

TECHNICAL SUPPORT

DESCRIPTION

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 are full funding partners in the sharing of a computer system supporting three licences of the EMME/2 transportation planning simulation software. 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 on going technical support to existing and authorized new users of the simulation software. In addition, the Group investigates possible improvements to the service provided to remote users.

EMME/2

The experience and interest of a staff member at the DMG has allowed the Group to provide intensive support at a technical level in addition to providing innovative development. With the resignation of this staff member, and in consultation with the technical committee (TRADMAG) of the funding agencies, a complete evaluation of the support required by the funding agencies was undertaken in 2003. The conclusion was that sound technical support was necessary on matters relating to setting up and running EMME/2 in addition to supporting important inputs such as matrices and networks, less technical support was needed in technical matters relating to models and forecasting.

In addition, the funding agencies felt a need for more trained technical people in the field of urban transportation planning that had some practical experience with EMME/2 and other aspects of the activities at the DMG. Consequently, in 2003 the Group sought and received approval for the establishment of an 'Urban Transportation Planning Intern' to be employed at the DMG for one year. It is anticipated that a new intern would be hired every graduating year, probably in May.

One task completed in 2003 and related to the provision of input to EMME/2 was the creation of a central location on the DMG's computer system and accessible to all users for frequently used data files. The data files include boundary file definitions, commonly used annotation sets and frequently used equivalence files. An initial set of files were established in 2003 and are located in /common.

ENIF

INRO, the developers of EMME/2, made a first release of a new graphical interface in 2003 called ENIF that will provide a richer potential in the presentation of results of travel simulation. In anticipation of interest by the funding agencies and the research community, the DMG gave two demonstrations of the capabilities of the new software at the University of Toronto. On Monday, February 17, a presentation and trial run was made to the research community. On Wednesday, February 19, a presentation was made to interested parties from the funding agencies. The software was then made available to any funding agency wanting to try the new graphical procedures.

A major concern with ENIF, which was designed primarily to operate on personal computers, is performance when the software is operated remotely in a shared environment. Extensive experiments with different configurations of running the software locally versus remotely were carried out in 2003. The results were inconclusive except it would appear the software does not operate efficiently in a shared environment. More test are to be carried out in 2004.

NETWORKS

A representation of the road and transit network as it existed in 2001 was developed with the cooperation of the funding agencies. The task began in the year 2000 and the first practical test of the complete network was carried out in 2003 as part of the validation process for the trips contained in the 2001 Transportation Tomorrow Survey data base. A complete linkage was established as part of this process between the EMME/2 network and the relevant cordon counts.

Documentation of the GTA network coding standards was prepared and the final report should be available in 2004.

COMPUTER SYSTEM SUPPORT

DESCRIPTION

The role of the DMG 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 2003 was to overcome a number of systems issues caused by the electrical blackout of August 15, 2003.

ACCESS TO COMPUTING SERVICES

Access to computing services at the DMG is provided primarily via remote network connections through the internet. There are a number of different types of services which are given access in this way, with the two broadest categories being remote connections to the DMG's internal servers and access to our 'online' services provided over the internet. Online services are largely public-access operations which include the Internet Data Retrieval System (iDRS), the Cordon Count Data Retrieval System (CCDRS) and the general maintenance of the DMG web sites (both the unsecured site for general access and the secure site used by technical planning staff). Some measure of the importance of the web site to the operation of the DMG is the number of times a web page has been accessed. The number of access requests in 2003 numbered 293,903 on the unsecured site and 116,872 on the secured site. Although the number of attempts on the unsecured site have remained reasonably constant over the last two years, the number of attempts on the secured site have more than doubled. As the secure site is the location of both iDRS and CCDRS, the increase reflects the increased use of the site as a result of a more liberal access policy.

Remote connections to the DMG's internal servers comprise the vast majority of computing systems access support resources. These connections come in the form of direct access to servers for the manipulation and storage of user data as well as the execution of transportation planning software. Inherent to this type of system access are the ever-critical issues of reliability and security.

To improve the security of remote access to the DMG servers, the use of version 2 of the Secure Shell protocol (SSH2), which is a much more secure version of the SSH protocol, was implemented throughout the 2003 year. To accommodate this newer version of the protocol, the recommended Windows-based SSH client was fully migrated from Teraterm-SSH (TTSSH) to PuTTY, a free Telnet/SSH client. For the purposes of remote file transfers, which are also subject to use

of the SSH2 protocol, the recommended Windows-based FTP (file transfer protocol) client became WinSCP2. Finally, X-Win32, a new Windows X-server client application used to display graphics from the DMG servers remotely on an end-users local system, was adopted in 2003. All of these migrations required additional resources to be invested by DMG technical staff in both their initial launch and support.

INTERNAL SYSTEM IMPROVEMENTS

As the data storage needs of the DMG's remote users continues to increase, the reliability of data backups continues to be of primary concern. To ensure this reliability, two new tape backup drives were purchased in 2003, along with new sets of corresponding tapes. This upgrade not only increased the dependability of the backups performed, but has also increased the speed at which data retrieval and recovery may be performed when required.

Testing was conducted in 2003 on the migration of the DMG's central data bases from their current proprietary database management system (Oracle) to an open source, high performance solution, which is MySQL software running on a Linux system. The data bases were successfully migrated to this new platform/application, confirming the possibility of pursuing such a conversion in the future and serving as a backup of the DMG data bases in the meantime.

The DMG's two primary servers, dmg and jptdmg2, both underwent an operating system upgrade to bring them up-to-date with current versions. The systems continue to run under the Sun operating environment, which was reinstalled as Solaris 9. This was a multi-version upgrade resulting in the introduction of a number of new and improved services and functions available for use both internally and by remote users.

Services of two DMG servers were reassigned in late 2003. The DMG's domain name server (DNS) was re-configured for use as a student machine, and an alternate DNS was put into place. Assigning a server for use especially by students ensures that any operations performed by these individuals do not affect that of other users. The goal of this is to assure optimum performance levels and provide another measure of security for technical planning staff.

SYSTEMS SECURITY

The level of unauthorized attempts to access the DMG's computer system in 2003 remained at a similar level to the year 2002. This activity directed at DMG servers continues at levels typical for most internet hosts. The number of unauthorized connection attempts was in excess of 17,000. While the number of system scans, which can be anything from a search engine looking to update their files to automated procedures looking for vulnerability in our systems, numbered well over 50,000. A continuing security audit of all the servers found no evidence of a security compromise.

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 2003.

"2001 Traffic Zone Boundaries", Report 94, (January 2003)

"2001 Transportation Tomorrow Survey: Design & Conduct of the Survey", Report 95, (January 2003)

"2001 Transportation Tomorrow Survey: Data Guide", Report 96, (January 2003)

"2001 Transportation Tomorrow Survey: Data Validation", Report 97, (February 2003)

" 2001 Transportation Tomorrow Survey: 2001 & 1996 Travel Survey Summaries", Report 98, (March 2003)

" 2001 Transportation Tomorrow Survey: 2001, 1996 & 1986 Summary Report of the GTA", Report 99, (March 2003)

" 2001 Transportation Tomorrow Survey: Summary by Wards", Report 100, (May 2003)

"Data Management Group Annual Report 2002", Report 91 (June 2003)

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 2003

Lam, S., "Time-series analysis of access walking distance to transit in the GTA", B.A.Sc. (Toronto, Professor A. Shalaby)

Lee, R., "Analysis of Changes in Trip Generation Rates in the GTA Using Time-Series Survey Data and Their Implications for Forecasting", B.A.Sc. (Toronto, Professor E.J.Miller)

Li, Francis Lam Chit, "Analysis of transit assignment parameters", B.A.Sc. (Toronto, Professor A. Shalaby)

Ngau, A.Y.G., "Analysis of Trends: Retail Trip Distribution in the Greater Toronto Area", B.A.Sc. (Toronto, Professor E.J.Miller)

Ormonde, J., "Analysis of Trends in GTA Modal Splits", B.A.Sc. (Toronto, Professor E.J.Miller)

Graduate Theses Completed or in Progress in 2003

Carrasco, J. "Advanced Travel Modelling Methods", Ph.D. (Toronto, Professor E.J.Miller)

Gibson, A. "Integrated Mobility System Implementation in York Region", M.Sc.Pl. (Toronto, Professor E.J.Miller)

Haider, M. "Spatio-Temporal Modelling of Housing Starts in the Greater Toronto Area", Ph.D. (Toronto, Professor E.J.Miller)

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

Mamun, S. "Modelling Express Bus Services", M.A.Sc. (Toronto, Professor E.J.Miller)

Parveen, M., "Calibration of transit assignment models using Genetic Algorithms", M.A.Sc. (Toronto, Professor A. Shalaby)

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

Riesen, E. "Assessment of the 'Station Car" Concept in the GTA", M.Sc.Pl. (Toronto, Professor E.J.Miller)

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

Salvini, P. "Design and Development of the ILUTE Operational Prototype: A Comprehensive Microsimulation Model of Urban Systems", Ph.D. (Toronto, Professor E.J.Miller)

Shih, A., "Temporal analysis of trip modal split", M.A.Sc. (Toronto, Professor A. Shalaby)

Sousa, P. "Performance-Based Transit Funding", M.A.Sc. (Toronto, Professor E.J.Miller)

Tsang, F. "Accessibility and Economic Productivity" M.A.Sc. (Toronto, Professor E.J.Miller and C.A. Kennedy)

Reports, Publications and Presentations in 2003

Guan, J., M.J. Roorda and E.J. Miller, "Approximation of 24 Hour Travel Times in the Greater Toronto Area", pre-print CD, 83rd Annual Meeting of the Transportation Research Board, Washington, D.C., January, 2003.

Hadayeghi, A., A. Shalaby and B. Persaud, "Accident Prediction Models for Safety Evaluation of Urban Transportation Networks", Journal of Transportation Research Record, 1840:87-95.

Miller, E.J., M.J. Roorda and J.A. Carrasco, "A Tour-Based Model of Travel Mode Choice", presented at the 10th International Conference on Travel Behaviour Research, Lucerne, Switzerland, August, 2003.

Salvini, P.A. and E.J. Miller, "ILUTE: An Operational Prototype of a Comprehensive Microsimulation Model of Urban Systems", presented at the 10th International Conference on Travel Behaviour Research, Lucerne, Switzerland, August, 2003.

Miller, E.J. and C.A. Kennedy, "Assessing the Effects of Congestion on the GTA Economy", presentation to the Infrastructure Committee, Toronto Board of Trade, Toronto, June 18, 2003.

Miller, E.J., "Recent Trends in GTA Travel Demand", presented at the GTA Transportation Summit, Toronto: March 25, 2003.

Miller, E.J. and M.J. Roorda, "A Prototype Model of Household Activity/Travel Scheduling", presented at the 82nd Annual Meeting of the Transportation Research Board, Washington, D.C., January, 2003.

Reports, Publications and Presentations in 2002 (continued)

Mohammadian, A. and E.J. Miller, "Dynamic Modeling of Household Automobile Transactions", presented at the 82nd Annual Meeting of the Transportation Research Board, Washington, D.C., January, 2003.

Mohammadian, A. and E.J. Miller, "Empirical Investigation of Household Vehicle Type Choice Decisions", presented at the 82nd Annual Meeting of the Transportation Research Board, Washington, D.C., January, 2003.

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 2003.

Participating Agencies

The City of Toronto requested person, household and trip data relating to the St. Clair West Corridor between Yonge Street and Scarlett Road from the 2001 TTS database.

City of Guelph requested start time and primary mode of travel information at the traffic zone level for all trips between Guelph and Waterloo from the 1996 and 2001 TTS databases.

Prof. Amer Shalaby requested 2001 Cordon Count data for several stations in the City of Toronto for graduate student research.

The number of trips by mode and trip purpose of destination made to the St. Clair West corridor was extracted from the 2001 TTS database. These data were provided to Marshall Macklin Monahan for a study undertaken on behalf of the City of Toronto.

The City of Hamilton requested population, employment and employed labour force data for the GTA at a zonal level, and origin destination matrices aggregated at the zone level in Hamilton and aggregated to the Planning District level outside of Hamilton from the 2001 TTS database.

York Region requested mean trip length (Manhattan distance) from the 1986, 1991, 1996 and 2001 TTS, for first work trips made by residents of York Region.

2001 TTS Oakville transit mode split data made by Oakville residents in the morning peak, afternoon peak and 24-hour periods, were requested by the Town of Oakville.

Prof. Eric Miller requested the 2001 TTS database records for households within the GTA for his GTA model calibration.

2001 TTS database records for households that made transit trips were requested by the Toronto Transit Commission.

Private Data Request

Total numbers of primary shopping trips and shopping trips from home in and from York Region during PM peak period were requested by iTrans Consulting Ltd.