INTRODUCTION

BACKGROUND

The 2006 Transportation Tomorrow Survey (TTS) is the largest and most comprehensive travel survey ever conducted in Ontario or perhaps anywhere in North America. The survey was conducted on behalf of 21 local, regional, provincial and transit operating agencies in the Greater Toronto Area and surrounding regions. The TTS data contains detailed demographic information on all members of a surveyed household and a ledger of travel information over an entire weekday.

The 2006 survey is the fifth in a series of surveys conducted every five years. The first Transportation Tomorrow Survey, conducted in 1986, collected information for more than 61,700 households in the Greater Toronto & Hamilton Area (GTHA). The GTHA consists of the Cities of Toronto and Hamilton (formerly Metropolitan Toronto and the Regional Municipality of Hamilton-Wentworth) and the Regional Municipalities of Durham, Halton, Peel and York. The 1986 TTS was the most comprehensive travel survey in the Toronto area since the 1964 Home Interview Survey for the Metropolitan Toronto and Region Transportation Study (MTARTS).

In 1991, the second TTS was conducted as an update survey for the 1986 data. Recognizing the importance of inter-regional travel, the 1991 survey area was expanded to include local municipalities adjacent to the GTHA boundary. Approximately 22,300 households in the GTHA and 2,200 households at the fringe of the GTHA were successfully interviewed. The survey captured the travel condition in the GTHA after five years of active changes, with particular emphasis on areas that experienced rapid population growth between 1986 and 1991. The 1991 survey data provided a clear measure of global trends on urban travel characteristics. One of the most significant observations was the shift of urban population and employment growth from the City of Toronto to the surrounding regions and its impact on travel demand and modal choice.

The 1996 TTS expanded its focus from the GTHA to include a large part of south central Ontario. The resulting survey now involved cooperation from twelve regional and county governments, three cities, one town, two transit operators and one provincial ministry. Based on Census information, the survey area covered 60 percent of Ontario's total population. A total of 115,200 households, or five percent of all households in the survey area, were successfully interviewed. The survey provided sample information on an estimated 13 million daily trips in the survey area.

The 2001 TTS survey covered much of the same area as the 1996 survey excluding the Regional Municipality of Waterloo whilst expanding into other counties outside of the GTHA. The survey again involved cooperation from seven cities, eight regional and county governments, one town, two transit operators and one provincial ministry. Altogether approximately 137,000 households were successfully interviewed. The survey provided sample information on an estimated 14 million daily trips in the survey area.

The 2006 TTS covered all of the area involved in the 2001 survey plus the Regional Municipality of Waterloo, which had previously been surveyed in 1996 but not 2001, and the City of Branford and County of Dufferin which had not been surveyed in previous versions of the TTS. The survey involved co-operation from seven cities, ten regional and county governments, one town, two transit operators and one provincial ministry. Altogether approximately 149,000 households were successfully interviewed. The survey provides sample information on an estimated 16.5 million daily trips in the survey area.

Unlike data sources such as regular traffic counts which measure the change in magnitude of travel demand, the TTS provides information on the characteristics of these changes. As a transportation time series database, the TTS enables analysis on how factors such as flexible work hour programs, relocation of manufacturing employment, increasing female participation in the labour force, and aging population influence how people travel, how often and the purpose of their trips.

In addition to providing time series travel information for the GTHA and its surrounding areas, the

2006 TTS data is an important data source for transportation planning. It provides a clear description on existing travel patterns and how travel demand is influenced by current demographic and socio-economic factors. This is especially useful for areas which do not have previous travel survey data. Furthermore, because of the scope of the survey coverage, the 2006 data is also a key datum for understanding the interdependence of communities in south central Ontario.

PURPOSE OF THIS REPORT

The purpose of this report is to summarize the 2006, 2001 & 1996 Transportation Tomorrow Survey data according to municipal boundaries. The summary is presented in tabular and graphic formats at different levels of detail, namely the entire TTS area and each local regional municipality of the participating agencies. The information presented includes socio-demographic and travel characteristics. In addition to presenting the magnitude of the trips coming into and leaving an area, the summary tables and figures also describe travel characteristics such as travel purpose, trip start time, travel distance and travel mode choice.

The information presented in this report is based on Version 2.1 of the 1996 TTS database, Version 1.0 of the 2001 TTS database and Version 1.0 of the 2006 TTS database. For a comparison of data with previous TTS results, please refer to the fifth report in the 1996 Transportation Survey series entitled, *1996, 1991 & 1986 Travel Survey Summaries for the Greater Toronto Area* and the fifth report in the 2006 Transportation Tomorrow series entitled *2006, 2001, 1996 & 1986 Travel Survey Summaries for the Greater Toronto and Hamilton Area.*

THE TTS DATA

DESIGN AND CONDUCT OF THE SURVEYS

1996 Survey

The 1996 TTS, with approximately 115,200 completed household interviews, covered a large portion of south central Ontario. The survey area consisted of the Cities of Toronto (formerly Metropolitan Toronto), Hamilton (formerly the Regional Municipality of Hamilton-Wentworth), Barrie, Guelph, Peterborough and Kawartha Lakes (formerly the County of Victoria), the Regional Municipalities of Durham, Halton, Niagara, Peel, Waterloo and York, the Town of Orangeville and partial coverage of the Counties of Peterborough, Simcoe and Wellington.

The 1996 TTS was conducted over two time periods. At the request of the Regional Municipality of Waterloo, households in the Waterloo area were surveyed in the fall of 1995 while the main survey was conducted in the fall of 1996. There were no changes in survey methodology or questionnaire between survey periods and the two data sets are combined for all expansion and analytical processes.

The approach taken in the 1996 survey was a continuation of the experience and development gained from previous surveys done in 1986 and 1991 surveys. A random sample of households in the study area was selected from Bell Canada's files containing information on residential subscribers. The Bell files contain the name, address and telephone number of households listed in the telephone directory. Households with unlisted telephone numbers were not included in the sample but are believed to be uniformly distributed throughout the study area and with no obvious correlation to socio-economic status. The target for the survey was to obtain a random sample of five percent of the households in the study area. The actual sampling rate in each Forward Sortation Area (defined by the first three characters of the postal code) was reviewed to ensure an even distribution of sample rates across the sample area.

An advance letter was mailed to the sample household before the actual interview took place. The purpose was to introduce the survey, outline the survey process and impress upon the household the legitimacy and importance of information that would be collected in the interview.

Interviewers telephoned each sample household to collect travel information for the preceding day and recorded the data directly on computer files using a direct data entry program. As the information was entered, the program carried out spelling checks on street names, validation checks on transit routes and many other checks on the consistency and completeness of the information. The sample rates were monitored daily by sample control software to ensure even coverage of the study area during the survey period. The locations of households, places of work and school, trip origins and destinations were coded to a geographic reference system.

Geographic coding enables the survey results to be studied at aggregated levels which are both flexible and accurate.

2001 Survey

Similar to the 1996 survey, the 2001 survey with approximately 137,000 household interviews was a new, full survey with a target of a five percent random sample of households throughout the survey area. The survey area in 2001 was similar to that in 1996 except that the Regional Municipality of Waterloo was not surveyed, while the City of Orillia and full coverage of Simcoe County were added.

The approach taken in 2001 followed that taken in 1996 with additional logic checks and quality control mechanisms built into the conduct of the survey for enhanced accuracy.

The 2001 survey was conducted over three time periods. Areas external to the GTHA were surveyed in the fall of 2000 and the GTHA was surveyed in the fall of 2001. In May 2002, additional interviews were conducted in the GTHA to amend a sample bias, due to the under-representation of apartment buildings in the sample, which was discovered after the first two survey periods. There were no changes in the survey methodology or questionnaire between survey periods and all data was combined for all expansion and analytical processes.

2006 Survey

The 2006 survey with approximately 149,000 household interviews is another full survey with a target of a five percent random sample of households throughout the survey area. The survey area has expanded from 2001 to include the Regional Municipality of Waterloo, Dufferin County and the City of Brantford. In order to provide contiguous coverage in the area surveyed, Brant County was also surveyed during the training of interview staff.

The survey methodology and questionnaire in the 2006 survey was the same as the previous surveys. However, the sample control, interview and geocoding software were rewritten to provide better performance and quality control. The survey was divided into two phases. The first phase was conducted in the fall of 2005 and included interviews for the areas outside the GTHA, while the second phase was conducted in the fall of 2006 and included only households within the GTHA. As in previous surveys, the two datasets were combined into one database at the end of the survey for data expansion and validation.

Detailed documentation of the planning and implementation of the surveys is contained in the Design and Conduct of the Survey reports for each corresponding survey year.

INFORMATION COLLECTED

1996 Survey

All three surveys, 1996, 2001 and 2006, collected similar demographic and travel information. Demographic data were collected for the households and each member of the household. Travel information was usually for the weekday just prior to the day of the interview. The 1996 database may be summarized as follows:

Demographic Information

- Household Characteristics
  - Location of residence
  - Dwelling unit type
  - Number of persons living in the household
  - Number of vehicles available for personal use

- Person Characteristics
  - Age
  - Gender
  - Employment and student status
  - Possession of a driver's license
  - Possession of a transit pass
  - Location of usual place of work
  - Location of usual place of school
  - Availability of free parking at usual place of work
  - Occupation Type
  - Whether or not the person worked at home on the trip day (only asked if a person employed full time outside the home did not make a work trip on the survey day)

Travel Information

- Nature of trip
  - Start time
  - Purpose of trip
  - Origin and destination points
- Means of travel
  - Travel mode
  - Detailed transit routes

A trip was defined as a one-way movement between two locations for a single purpose. For example, a trip may be made to work, to serve the needs of a passenger, or to return home. The survey collected trip information for all persons of age 11 years or older over a 24-hour period. To reflect travel activities on an average work day, only trips made on Monday to Friday were recorded. The survey results indicated an equal coverage of trips on each of the five weekdays.

A walk trip was recorded only if it was made to or from a place of work or school.

All children between the ages of 6 and 11 were assumed to be full time students.

2001 Survey

In addition to the information collected in the 1996 survey, the 2001 survey also collected the following for each person in the household:

- School name
- Boarding and alighting stations for all GO Train and subway trips

2006 Survey

The information collected in 2006 remained the same as that collected in 2001.

A comprehensive description of the contents and structures of the TTS database is contained in the Data Guides for each individual survey year.

SAMPLE EXPANSION METHODS

1996 Survey

Including the Waterloo Region survey, approximately 88,900 households in the GTHA and 26,290 households outside the GTHA were successfully interviewed in the 1996 survey. Based on the 1996 Census count of 1,802,700 households in the GTHA and 499,000 households in the remaining survey area, the 1996 survey achieved its target of a five percent global sample of all households.

To represent the total population in the TTS area, each sample household was given an expansion factor. The factors were defined as the ratio of the number of Census dwelling units to the number of surveyed household units in a census tract (CT). Census tracts were aggregated, where necessary, for statistical reliability. For areas not covered by census tracts, expansion factors were based on municipality if the total number of households surveyed was less than 450.

The sample selection for the survey was based on Bell Canada's residential phone listings. Institutions such as retirement homes and reformatories were not included in the survey. As a result,

while the expansion procedure ensures that TTS data represent total census dwelling units, population counts by TTS are usually less than those reported by census. The overall under-reporting of the GTHA population in 1996 was 2.7 percent.

2001 Survey

In 2001, approximately 113,600 households in the GTHA and 22,700 households outside the GTHA were successfully interviewed. Based on the 2001 Census count of 1,968,700 households in the GTHA and 438,400 households in the remaining survey area, the 2001 survey achieved its target of a five percent global sample of all households.

The 2001 TTS differed from previous surveys in that the data did not consist of a random selection of households throughout the survey area. The initial sample selection and sample control process were based on Forward Sortation Areas (FSAs) - the first three characters of the postal code. In 2001 expansion factors were applied to the data at the FSA level as opposed to census tract which was used in 1996. Within most FSAs, apartment buildings were known to be under-represented relative to other types of housing. Hence, different expansion factors were applied within individual FSAs depending on the type of housing (apartment versus non-apartment).

As with 1996, institutions such as retirement homes and reformatories were not part of this survey and the population counts by TTS were again less than those reported by Census. The overall under-reporting of the GTHA population in 2001 was 3.2 percent.

2006 Survey

There were approximately 112,500 households in the GTHA and 37,100 households outside of the GTHA successfully interviewed in the 2006 TTS. Based on the 2006 Census, there were 2,160,100 households in the GTHA and 711,200 households in the remaining survey area. Therefore, the target of a five percent sample was achieved.

Similar to previous surveys, sample selection and sample control processes were based on FSAs. According to past experience, apartment buildings are under-represented in TTS. Hence, a higher sample rate for apartments was used. Unlike the 2001 TTS, no differential expansion process was used for apartments.

Institutions such as retirement homes and reformatories were not included in the survey. As a result, the overall population count for the GTHA by TTS is 3.1% less than that reported by Census.

The sample expansion procedures for the three surveys are described in detail in the TTS Data Expansion reports for the three years.

QUALITY OF THE DATA

1996 Survey

Tests on the validity of the 1996 survey information using data from other sources are described in the 1996 TTS report *Data Validation*. Analysis of the 1996 survey data indicates that the data are reliable and representative. Comparisons done with Cordon Count Programs and transit ridership counts show a good match with 1996 TTS data especially during the morning peak period. During off-peak travel some under-reporting of trips occurs which is predominately associated with automobile trips. In general public transit trips are well represented by TTS data with the exception of some off-peak under-reporting in the Toronto downtown area associated with streetcar usage.

The TTS tends to under-report infants and elderly persons in comparison with Census data. The exclusion of collective homes, such as hospitals and nursing homes, from the survey is likely a contributing factor in the under-representation of the elderly. Furthermore, due to the difference in sample periods between the TTS and Census, the spatial distribution of persons aged 18 to 27 differ between the two databases. This in turn affects the estimation of post-secondary students for portions of the survey area.

A detailed analysis on trip rates between informants and non-informants of surveyed households indicate no significant differences on the home-based work and school trips. Differences in trip rates between informants and non-informants are mainly associated with non-home-based and home-based discretionary trips by auto driver mode.

For further discussion on the validation of the 1996 data, refer to the Data Management Group's report entitled, *1996 Transportation Tomorrow Survey Discretionary Travel* and the 1996 TTS report, *Data Validation*.

2001 Survey

Analysis of the 2001 survey data indicates that, as with previous years, the TTS data may be used with a high degree of confidence. With respect to peak-period travel there is no evidence of under-reporting of trips made in the A.M peak period. Public transit trips are accurately represented through the day and any under-reporting which occurs is primarily associated with off-peak automobile trips.

TTS tends to under-represent the overall population of the survey area compared to Census data. The under-representation is most noticeable in infants and elderly persons. The exclusion of collective homes, such as hospitals and nursing homes, from the survey is likely a contributing factor in the under-representation of the elderly. Also as in 1996, the spatial distribution of persons aged 18 to 27 differ between the two databases. This can again be attributed to the timing and definition of the survey relative to the census and the effect this has on post-secondary school students.

TTS data accurately reflects the number of full-time students in most parts of the survey area. Initial comparisons with university and college enrollment data suggest that there might be some under-representation of students at McMaster, Guelph and Trent Universities.

For further discussion on the validation of the 2001 data, refer to the 2001 TTS report, *Data Validation*.

2006 Survey

Preliminary analysis of the 2006 survey data indicates that the quality of the data is consistent with those of previous surveys and can be used with confidence. Peak period travel corresponds with the 2006 Cordon Count survey data and transit trips are comparable to the ridership data provided by transit agencies.

As in previous surveys, population was under-represented by the 2006 TTS as compared to the Census data. The exclusion of collective homes such as hospitals and nursing homes from the survey likely contributes to the under-representation of the elderly. There is also an under-repre-

sentation of people aged 18 to 27. This can be attributed to the timing and definition of the survey relative to the census and its effect on post-secondary school students. The growing use of cell phones in place of land lines in this age group might also account for the under-representation.

For further discussion on the validation of the 2006 data, refer to the 2006 TTS report, *Data Validation*.

REPORT CONTENTS

OVERVIEW

This report presents data from the 1996, 2001 and 2006 TTS Survey. The data in this report are presented in two sections. The first section provides demographic characteristics and travel pattern data information for each of the participating municipalities and the whole survey area. The second section provides a set of trip matrices for each survey year. The origin-destination trip matrices and home to work trip matrices are summarized by municipality.

The demographic and travel pattern data are presented on two pages for each area of interest. On the left-hand page are data pertaining to employment and work trips for 2006. The right-hand page presents a time series comparison for the 2006, 2001 and 1996 surveys in summary tables. Data for all of the municipalities included in this report does not exist for each survey year as some municipalities were just recently added to the survey area.

To reflect the fact that all numbers presented in this report are estimates based on expanded survey data, all numeric figures are rounded. Totals and subtotals are rounded to the nearest 100 for all data presented. All percentages are rounded to the nearest integer. No information is presented for categories that have less than four observations or survey records. These categories are denoted by an asterisk (*).

Invalid survey responses are dealt with in two ways. The response is grouped under the "other" category if one is available (travel mode, for example). Otherwise, invalid responses are distributed proportionately (based on the valid responses) between the available categories.

Although Brant County was not officially part of the survey area, data for this region was collected during the interviewer training portion of the survey and is included in this report.

All data presented in this report are limited to the residents of the survey area. It should be noted though that the entire survey area has shifted in its boundaries in every survey year.

2006 STATISTICS

Employment Location

The chart on the left-hand page shows the distribution of employment locations for residents of the area and the distribution of home locations for persons working in the area. At the entire survey area level, total employment and employed labour force are presented for each municipality. The distribution of employment within the municipality is presented on the map in the lower right corner where applicable.

Employment location is measured in the survey by the response to the usual place of work question. Therefore, employment does not include positions that may be vacant or are held by residents external to the survey area. The chart is sorted by the employment location of the residents in descending order of magnitude.

Work Trip Origins and Destinations

Work trip origin and destination distributions are presented together on the same plot on the right half of the page. The distributions are presented by the twenty areas in the TTS.

The origin distribution illustrates the distribution of trip origins for work trips destined for the highlighted area. The destination distribution shows the distribution of destinations for work trips made by residents of the highlighted area. For the destination distribution, trips made by the residents can originate anywhere.

The origin and destination distribution percentages are presented side by side on each plot for comparison purposes. Note that the work trips are for a 24-hour period and include only the first work trip of the day for each person. The number of work trips to an area is less than the total employment since not all employed persons make a work trip on a given day.

TIME SERIES SUMMARY TABLES

Demographic characteristics and travel patterns are presented on the right-hand page in four tables. Information from the 2006 survey is presented in black followed by information from the 2001 and 1996 surveys in green.

Demographic Characteristics

Demographic data are presented in two tables on the top half of the page, one summarizes the data by household and the other summarizes the data by person.

Household characteristics include:

- Total number of households in the area. The data expansion procedure ensures a close match with the census
- Distribution of households by dwelling type: house, townhouse or apartment
- Distribution of households by number of persons in residence at the time of the interview
- Distribution of households by number of vehicles available to the household for personal use

- A series of ratios that reflect the general characteristics of households in the area:
  - Persons - Total population divided by total number of households
  - Workers - Total number of employed persons (full-time, part-time or work at home) divided by total number of households
  - Drivers - Total number of persons in possession of a driver's license divided by the total number of households
  - Vehicles - Total number of vehicles available for personal use divided by total number of households
  - Trips/day - Total number of trips by persons of age 11 and over divided by total number of Households

Personal characteristics include:

- Total population in private residence in the area at the time of the interview
- Population by gender
- For each gender category, the percentage of persons in possession of a valid transit pass, a valid driver's license and distribution by employment status. Employment categories are

full-time out side the home, part-time outside the home, work at home full time and work at home part time and student (full or part-time).
- Median age, the age where 50 percent of the population is older and 50 percent is younger
- Distribution by age cohort
- Daily trips per person calculated by the number of trips made by persons aged 11 and over divided by the number of persons aged 11 and over

Travel Patterns

The two tables on the lower half of the page present travel pattern information in two categories; trip purpose and mode of travel. The top table is summarized by trips that were made by residents of the area and the lower table is summarized by trips with a destination in the area. Trips made by residents of an area are a measure of mobility and thus all trips regardless of trip origin or destination are included. The number of trips made to an area is a measure of the area's attractiveness and therefore includes trips made by both residents and non-residents of the area.

The time periods dealt with are the 24-hour period and a 3-hour morning peak period. The morning peak period has been chosen to minimize the number of non-work trips that are included in the summary. In general, the composition of the morning peak is dominated by trips to work and school. Although the period chosen for the morning peak is indicated as 6:00 a.m. to 9:00 a.m., the data actually comprises trips starting at 6:00 a.m. to 8:59 a.m. The reason for excluding trips starting at exactly 9:00 a.m. is that respondents tend to round off the times they reported to the nearest quarter or half hour. If data for both 6:00 a.m. and 9:00 a.m. are included the actual number of morning peak period trips would be overrepresented.

Trip Purpose

For trips made by residents of an area, the home location is the link between the commuter and the area of interest. Consequently, trip purpose categories are defined as:

- Home to work and work to home (home-based work, HB-W) trips
- Home to school and school to home (home-based school, HB-S) trip
- All other home-based (home-based discretionary, HB-D) trips
- All trips where neither trip end is the home (non-home-based, N-HB)

The magnitude of the trips made to an area gives an indication of the attraction of land use in the

area. The destination purposes are defined as:

- Work
- School
- Home bound
- Other or discretionary trips such as shopping, entertainment, etc.

Mode of Travel

The travel mode categories are:

- Automobile driver
- Automobile passenger
- Local transit
- GO Train
- Walk and Bicycle
- Other, which includes motorcycle, taxi, school bus and other modes

If a trip uses more than one mode category which includes public transit then public transit is given preference. In cases where both GO Train and local transit were used, GO Train is the dominant classification.

The 2006, 2001 and 1996 data include all bicycle trips whereas only bicycle trips for work or school were collected in 1986. In general, only walk trips to and from work or school are included.

Trips Made by Residents of an Area

In addition to the travel information by trip purpose and travel mode, the summary tables also include statistics on the percentage of internal trips and median trip lengths.

The percentage of trips made entirely within an area by residents of the same area is a measure of the degree of self-containment for the area of interest. The percentages are calculated for the 24-hour period and a 3-hour morning peak period.

Median trip lengths are calculated as the trip distance of which 50 percent of the trips are longer and 50 percent are shorter. Trip length is measured as the straight line distance between origin and destination points. Trips with origin or destination outside the TTS area not included since these coordinates are approximations. The figures presented are by travel modes for the 24-hour period.

ORIGIN-DESTINATION TRIP MATRICES

Two kinds of origin-destination trip matrices are presented in this section. Both include all travel modes and cover the 24-hour period and a 3-hour peak period. The first type is the origin-destination matrix which presents all trip purposes and includes all trip records in the database.

The second type is the home to work trip matrix which presents the first work trip for each person. The destination is the actual destination of the work trip, however, the trip origin, as recorded in the survey, is replaced by the home location of the commuter. This definition differs from the Place-Of-Work (POW) information from Statistics Canada in that the Census data uses home to work linkages, not trips.

The trip matrices are presented separately for each survey year and are summarized by the TTS municipalities. Trips made to or from areas external to the TTS area are not included in the tables. Therefore, these totals and subtotals are less than those presented in the summary pages for each area.

Values have been rounded as to the nearest 100 trips for all data presented.