

# **2011 Transportation Tomorrow Survey**

## **Revisions to the 2006 Survey Methodology**

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## **FORWARD**

The objective of this report is to recommend a basic strategy and to provide some background information, should TISC decide to proceed with another TTS in 2010/2011 using the same basic methodology (Large sample random selection) as in previous surveys. The issues as to whether or not there should be a survey in 2010/2011 and whether or not there should be a fundamental change in the methodology used in future surveys are not addressed here. The issues and options are presented as a framework for discussion mostly without extensive technical detail or supporting information. The ideas and opinions expressed are those of the author and do not necessarily reflect those of staff at the Data Management Group or any of the agencies involved in the TTS.

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## 1) Problem description

There are three problems that need to be addressed if the same basic methodology (large sample telephone survey) is to be used in future surveys.

1. Cell phones. The previous TTS have been based on the assumption that listed residential telephone numbers are representative of the household population in the survey area. That assumption has become questionable with the widespread use of cell phones including their use as a substitute for land lines. Cell phone numbers are generally unlisted. Little data is available as to how the exclusion of those using cell phones, as a substitute for land lines, is likely to affect the results of the survey in terms of either demographics or travel behaviour. Cell phones also tend to be personal, belonging to one individual, where as the basic sample unit in the TTS has always been the household.
2. Apartment Numbers. The distribution of telephone lists extracted from telephone directory information is governed by CRTC regulations that do not permit the inclusion of information not contained in the white pages. As a general rule apartment numbers are not included in the white pages. As a result most people who live in apartments do not receive the advance letter sent to each household prior to being contacted by phone. Receipt of the advance letter reduces the probability that the recipient will refuse to participate in the survey and generally speeds up the interview process. The fact that one segment of the population does not receive the letter therefore introduces the possibility of systematic bias in the survey results.
3. Voice mail. The widespread use of voice mail, often used as a screening device for incoming calls, is making it significantly harder to establish initial voice contact with potential survey respondents.

## 2) 2006 Results

The following table shows two measures that are factors in determining both productivity and the quality of the survey results.

	Calls per completed interview	Overall Response Rate
1986 TTS	not available	60%
1991 TTS	not available	72%
1996 TTS	3.71	70%
2001 TTS	4.74	64%
2006 TTS	6.71	45%

The average number of phone calls made per completed interview in conducting the 2006 TTS was 40% higher than in the 2001 TTS and 80% higher than in the 1996 TTS. More calls per completed interview translate into the need for more interviewers, more equipment, more training and more supervision. Quality control inevitably suffers due to production pressures and the finite resources available.

Overall response rate is the number of completed interviews divided by the number of households where contact was attempted. The lower the response rate the greater the potential for hidden biases in the survey results in addition to any bias that might be present in the original sample frame.

Although the original sample information did not contain apartment numbers, those records with an address that was repeated 6 or more times in the complete database from which the sample was drawn were flagged as multi-unit addresses. During phase 1 (external areas) of the 2006 TTS it was noted that the response rate for those “flagged” records was 20% lower than for non flagged records. In phase 2 (GTAH) “flagged” records were sampled at a 20% higher rate than non-flagged records to compensate for the expected

difference in response rate. Subsequent analysis showed that in some areas the difference in response rate was significantly greater than 20%. Within the City of Toronto it was about 35%.

Validation of the expanded survey data included demographic comparisons with data from the 2006 Canada census. Two significant differences were identified:

1. An under representation of apartment units relative to houses and townhouses. Precise estimates of the degree of under representation are not possible due to differences in definition between the census and TTS. Statistics Canada has made changes to the enumeration process used to classify dwelling unit type since the previous census and it would appear that this has led to the re-classification of a significant number of dwelling units in some areas, most notably the City of Toronto.
2. In the TTS the population in the 20 to 30 age range is under represented by 20% relative to the census with a corresponding over representation in other age groups. These discrepancies in age distribution are much larger than in previous surveys.

The nature of the above discrepancies is consistent with the problems previously identified but there may well be other factors that contribute to hidden bias. The comparisons do not identify “cause” and “effect” needed to estimate the impact of each problem factor.

The fact that there are discrepancies between the census and TTS with regard to demographic data does not necessarily mean that there are similar problems with the travel information. In fact comparisons made with cordon and transit ridership counts suggest that the 2006 TTS data is at least as good, and possibly better, than previous surveys with respect to aggregate travel patterns especially public transit use.

The concern with the low response rate is that there could be other hidden biases that are not revealed in the validation. In addition the underlying problems can only be expected to get worse in future surveys.

### **3) Sample Options for Future Surveys**

No detailed evaluation has been carried out as to the steps that would be involved in obtaining sample listings from other sources or how their provision might be affected by privacy laws including CRTC regulations. The following provides a summary of potential sources of sample lists based on the limited amount of information that is currently available.

#### ***Bell Canada white pages***

White page phone listings include residential phone numbers for geographic areas not served by Bell Canada but exclude unlisted phone numbers as well most cell and some internet phone numbers. As a general rule the information contained in the white pages does not include apartment numbers. Bell Canada sub contracts the maintenance of the white pages and the distribution of phone listings to 3<sup>rd</sup> parties. The distribution of white page listings is governed by those 3<sup>rd</sup> party agreements and by CRTC regulations.

#### ***Bell Canada billing records.***

Bell Canada billing records include apartment numbers in addition to the information contained in the white pages. The sample for the 1986 TTS was obtained directly from Bell Canada and was drawn from their billing records. Bell Canada is no longer willing to provide that service and may be legally prevented from doing so by its 3<sup>rd</sup> party agreements and by CRTC regulations. Bell Canada billing records would presumably not include information for geographic areas not served by Bell Canada.

### ***Phone & Mailing List Specialists.***

A number of private companies specialize in the maintenance and distribution of listings to the market research and telemarketing industries. TTS has experience with two of them.

#### **Cornerstone**

Cornerstone supplied the sample listings for the 1996 and 2001 TTS and for similar surveys in Ottawa, Montreal and elsewhere across Canada. They are the primary distributor of white page listings and have a semi exclusive agreement with Bell Canada. Their master database is updated monthly. It does not include apartment numbers. They are able to “flag” apartment units but the flag is based on the number of times the same address is repeated in the database. The TTS has had bad experience in dealing with Cornerstone – most notably the problems in the 2001 sample selection that led to the extension of the survey.

#### **InfoCanada**

InfoCanada supplied the sample for the 2006 TTS. Their database would appear to be very similar to Cornerstone’s although they are unwilling to reveal the details as to how they acquire the information. Records are flagged as “multi-unit” if the same address information is repeated 6 or more times in their main database. The service they provided for the 2006 TTS was excellent. They have software to compare lists using spell check and address correction routines to increase the likelihood of being able to identify matching records. That software could be used to append phone numbers to a mailing list obtained from a different source.

#### ***Statistics Canada***

Statistics Canada is exempt from some CRTC regulations and has the authority to obtain billing records and other information from Bell Canada. It has its own stringent policies regarding personal privacy and the release of information.

#### ***Electoral Rolls***

The electoral rolls, maintained by Statistics Canada, are continuously updated and should therefore provide a comprehensive listing of all households containing Canadian citizens. We have not investigated what restrictions apply to the use and distribution of electoral roll information. The data most likely does not include phone numbers and may well exclude non Canadian citizens.

#### ***Municipal Property Assessment Rolls***

The property assessment rolls, maintained by MPAC, contain address information for every property in Ontario including the names of both owners and tenants. Tenant registration is required for the assignment of school taxes. Phone numbers are unlikely to be available.

#### ***Canada Post***

Canada Post maintains an inventory of the number of separate addresses it delivers to on each postal walk (postal code) stratified by the type of dwelling unit (house, farm, apartment unit, mobile home etc.) and method of mail delivery. This information is readily available and is used primarily for the preparation of bulk, non-addressed, ad mail.

## 4) Alternative Methodologies for Making Contact

The following is a list of the most commonly used methods, other than the current TTS methodology, for making initial contact with a household and/or conducting large scale surveys.

### ***Telephone without any advance letter***

Not sending advance letters to any household could reduce the potential for survey bias associated with missing apartment numbers but would likely result in a lower overall response rate and a loss in productivity. While there is clear evidence that the advance letter is effective in lowering the overall refusal rate the most significant factor in that regard is the skill of the interviewer. Top interviewers have a less than 10% refusal rate regardless of whether or not the advance letter was received. Unfortunately it is not possible to only hire interviewers of that caliber. The more interviewers that are required the lower the cut off standard has to be. Any measure that results in a lower response rate should be avoided. Abandoning the advance letter is therefore not a recommended option.

### ***Random Digit Dialing (no advance letter)***

This technique is used in the market research industry and should yield a randomly distributed sample within the designated calling area defined by exchange codes including cell phone and internet numbers. This approach, however, is likely to be highly inefficient producing a high proportion of invalid numbers and a low response rate – not recommended.

### ***Mail back survey***

A Mail back survey, in which respondents are asked to fill out a written questionnaire and to return it by mail, would permit the use of a sample database that does not include phone numbers thus addressing the cell phone issue. The mail back methodology was tested in conjunction with the 1986 TTS and was also used the 1986 Ottawa survey and the 1987 Niagara, Waterloo, London survey. In all three cases the mail back methodology was rejected in favour of telephone interviews for subsequent surveys. Problems encountered include:

- Low response rate
- No easy follow up procedure with respect to incomplete, inaccurate or ambiguous responses
- A high proportion of partial responses (Data not supplied for all members of the household)

### ***In person interviewing***

In person interviews, where the interviewers go house to house, are widely used in parts of the world where the number of households with telephones is limited. While portable computer technology may have contributed to some improvements in efficiency the cost is likely to be too high to be considered a viable option for TTS. This methodology might conceivably be used in large apartment buildings or student residences but there are many questions which would need to be addressed with respect to sampling procedure, response rates and integration with other methodologies.

### ***Internet survey***

Internet surveys are used extensively, and with increasing frequency, by the market research industry. The TTS is, however, vastly more complex than the typical market research survey. Interviewers require up to 3 evenings of training to conduct an interview efficiently and to fully understand the content and its subtleties. Questions that need to be answered before the internet can be considered a viable option include:

- The ability to make the software “user friendly” to the extent needed for a self administered survey.
- The amount of time needed to complete the survey must be reasonable. The average time taken to complete a household interview done by telephone is about 7 minutes.
- Is the computer power available to do the necessarily logic and spell checks in an on line environment in a timely manner.
- The need to develop a new set of review and follow up procedures (most likely using email).
- Assessment of response rates and the potential for bias.

While the internet may well be the wave of the future the amount of development work that needs to be done and the associated unknowns make it a high risk option as the primary method of contact in 2011.

### ***Contract out to the Market Research Industry***

The conduct of most large scale travel surveys done elsewhere in Canada and the United States is contracted out to private companies in the market research industry. While contracting out would not, of itself, result in a change in methodology it could lead to the infusion of some new ideas and would certainly change the role of both the Data Management Group and the Steering Committee. The obvious advantage of contracting out is the resources, in terms of both staff and equipment, which would be immediately available. The primary concern is quality control and consistency. The TTS is more complex than most surveys requiring judgment and understanding on the part of the interviewers. More emphasis is put on collecting as much information as possible in a short period of time rather than following a set script as is the case in most market research surveys. The 1986 TTS was contracted to a market research company. It was the 1986 survey experience that led to the conclusion that a) the interview staff needs to be trained and supervised by individuals with a clear understanding of the planned end use of the data, and b) that it is necessary to pay premium wages to attract the caliber of interview staff needed to conduct such a survey. Those principles are likely to be just as important, and possibly more so, in implementing any change in methodology.

## **5) Recommended Approach for 2010/2011**

In order to improve the response rate and to reduce the potential for bias in the survey results it is essential to gain access to a more representative cross section of households than that provided by listed phone numbers. Property assessment and electoral rolls are two potential sources of that information but we do not yet know how reliable the data is or the restrictions on its use that might exist due to privacy issues. Any discussion of privacy issues may require high level political input. It is therefore important that staff from the agencies on the steering committee, and in particular the MTO, become directly involved in the process at both the technical and political level.

A multi-pronged approach is suggested with respect to the method of contact with each household. The advance letter followed by a phone call should remain the preferred method of contact if full address information and phone number are available. The original sample list should be cross referenced to the telephone white pages to obtain as many phone numbers as possible. InfoCanada, and possibly others, can provide that service obviating the need to purchase complete white page listings and the development of custom software. For those households for which no phone number is found the initial contact will need to

be by mail using a different letter from the one sent in advance of phone contact. Those households where contact is by mail only should be given an option as to how they respond to the survey:

- a) by phone (call in) – preferred,
- b) by completing the survey on-line through the internet, or
- c) mailing back a completed survey form

Time is of the essence if a new approach is to be adopted in time for the 2011 TTS (starting in 2010). The investigation of evaluation of alternative sources of sample information needs to begin immediately as does the development of software for any on-line component of the survey.

It should be anticipated that the cost per completed interview will be significantly higher than for previous TTS's. Factors contributing to higher costs include:

- development costs associated with the on-line component and other software modification
- continuation of the downward trend in productivity associated with the telephone components
- higher per unit costs associated with the mail only component
- additional sample, pre-processing and post-processing costs associated with the increased complexity of the survey.