TRANSPORTATION TOMORROW SURVEY

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DATA VALIDATION

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Prepared for the
Toronto Area Transportation Planning
Data Collection Steering Committee

by the

Data Management Group
Joint Program in Transportation
University of Toronto

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Participating Agencies:
Ministry of Transportation, Ontario · GO Transit · Municipality of Metropolitan Toronto
Toronto Transit Commission · Regional Municipality of Durham
Regional Municipality of Halton · Regional Municipality of Hamilton-Wentworth
Regional Municipality of Niagara · Regional Municipality of Peel
Regional Municipality of Waterloo · Regional Municipality of York · Town of Orangeville
Peterborough County · Simcoe County · Victoria County · Wellington County
City of Barrie · City of Guelph · City of Peterborough

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Dwelling Units

Dwelling unit counts from the 1996 census were used as control totals for the purpose of expanding the 1996 TTS data to represent the total population of the survey area. Therefore there is a precise match in dwelling unit totals between the census and TTS for most municipalities. Differences occur in municipalities which were aggregated for the purpose of calculating expansion factors because one, or more, of the municipalities contained too few records to meet the minimum criterion set for a single expansion zone. In these locations the TTS data should not be used for analysis specific to a single municipality. Sufficient data exists for all of municipalities which make up the Greater Toronto Area (GTA) including the regional municipality of Hamilton-Wentworth. Other differences in the total number of dwelling units occur due to discrepancies in boundary definition. These differences are minor and should not affect the overall utility of the TTS data, the most significant difference being a 2.8% over representation of households in the town of Ajax and a corresponding 2.3% under representation in the town of Pickering.

Population

The survey under represents the population of the survey area by an average of 2.8%. The under representation occurs in all regions and is attributable primarily to the exclusion of collective homes, such as hospitals, nursing homes and prisons. Babies less than 1 year old are under represented by 50% and persons over the age of 68 are under represented by an average of 16%. These two age groups account for 80% of the under representation of total population. Women are under represented slightly more than men (3.2% vs. 2.3%) due to the high proportion of women in the over 68 age group. These differences in total population and age distribution need to be considered when using the TTS data for demographic purposes but should have minimal or no effect on the reliability of the trip data. There is a smaller (7%) under representation of the 18 to 27 age group and the geographic distribution of that age group is somewhat different from the census data. The difference in geographic distribution can be attributed to the timing of the survey relative to the census and the effect that has on the location of post secondary school students.

Employed Labour Force and Employment

The Canada Census provides reliable information on place of employment, however, the data from the 1996 census will not be available until 1998. It is recommended that further validation of the TTS data be done at that time. Previous validation of the 1986 and 1991 TTS suggest that the 1996 TTS will prove to be a reliable source of information on both employed labour force and employment.

Post Secondary School Students

The TTS data accurately reflects the number of full time post secondary school students in most parts of the survey area. Initial comparisons with University and College enrollment data suggest that there may be under representation of students at McMaster, Guelph, Wilfred Laurier and Trent Universities and at Seneca College. Students at Brock University may be over represented. Further investigation of these differences, and the validity the data used in the comparisons, should be carried out before the TTS data is used for any analysis that is specific to these institutions. Comparison of the TTS data with part time enrollment at post secondary schools is not meaningful without more detailed information on the nature and location of the courses being offered.

Travel Data

The TTS data may be used with a high degree of confidence for the analysis of peak period travel patterns and travel behaviour characteristics specific to the peak period. There is no evidence of any under reporting of work or school trips or of other trips made in the a.m. peak period. Total daily travel on the TTC Subway, GO Rail, GO Bus and most municipal bus services are accurately represented by the survey data. The survey data under represents total daily automobile travel by 20% to 25% and streetcar use in downtown Toronto by 33%. Total daily bus use in Hamilton and Toronto may be under represented by as much as 15%. These differences need to be considered when using the TTS data for the analysis of off peak or total daily travel. The detailed transit route information contained in the TTS database should be verified against actual boarding counts prior to using it for analysis of ridership characteristics at the individual route level.

The above findings are highly consistent with the results of the validation exercises performed for the 1986 and 1991 TTS. The data from the three surveys may therefore be used for almost any type of time series analysis for which there is sufficient data to ensure statistical accuracy.

1.0 Introduction

The 1996 TTS consists of demographic and travel information collected from a 5% random sample of households throughout the survey area. The sample frame is listed residential telephone numbers. The survey data has been expanded to represent the total population of the survey area by applying an expansion factor to all of the household, person and trip data associated with each household. The expansion factors are calculated by geographic area using total dwelling unit counts from the 1996 Canada Census. The calculation of the expansion factors is described in the 1996 Transportation Tomorrow Survey Working Paper #5, Data Expansion.

Chapter 2 of this reports provides a discussion of potential sources of errors and bias due to the survey methodology and expansion process. Chapter 3 is devoted to data validation consisting primarily of comparisons made between the survey results and data obtained from a number of other independent sources. Those sources and data items include:

Canada Census
- Dwelling units
- Population by age and gender
- Employment (Not available until 1998)

Universities & Colleges
- Student enrollment

Municipal Cordon Counts
- Traffic volumes

Transit Operators
- Transit ridership

The comparisons identify significant differences between the TTS and other data but the comparisons, of themselves, do not identify either the reason for the difference or which data set is likely to be the most reliable. Subjective evaluations, both as to the quality of the data being compared with and the reason for the differences, are provided where appropriate.

Except as noted the comparisons have been made using version 2.1 of the 1996 TTS database. Some of the earlier comparisons were done using version 2.0. The differences between the versions are not significant in the context of the validation.

2.0 Potential Sources of Error and Bias

2.1 Sample Frame

Listed residential phone numbers do not provide total representation of all the households in the survey area. Households without phones or with unlisted numbers are excluded, as are most institutions such as prisons and hospitals. Households with more than one listed phone number will be over represented in the sample. The potential for survey bias exists to the extent that households excluded from or over represented in the sample frame have different demographic and travel characteristics from the other households in the sample frame.

The number of households without phones is small and has not been a major cause of concern in the TTS.

Unlisted phone numbers account for 5% to 10% of all households. Validation done for the 1986 TTS revealed that households with unlisted phone numbers tend to be concentrated at the two opposite extremes of the economic spectrum with regard to household income. It was not possible to identify any specific

characteristics that might translate into bias in terms of either demographics or travel behaviour. No further investigations of the effect of excluding unlisted numbers have been carried out for either the 1991 or 1996 TTS.

The exclusion of institutions and other "collective homes" from the sample frame is not a major concern for the purposes of transportation planning since the residents are not likely to be making a large number of trips. The effect on total population and age distribution is discussed in chapter 3.

2.2 Timing of Sample Selection

The household composition of the survey area changes continuously as people move and new houses are built. The data files from which Bell Canada draws the sample are updated once a month and the lead time required to obtain and process the sample in advance of the survey is several weeks.

The sample for the GTA was obtained in August 1996 based on phone listings at the end of July. Areas outside the GTA, with the exception of the Regional Municipality of Waterloo, were sampled in October 1996 based on the phone listings at the end of September. The Regional Municipality of Waterloo was surveyed in the fall of 1995. The sample for the City of Waterloo was based on the phone listings at the end of September 1995 and the rest of the Region at the end of August 1995. The sample selection was staggered to ensure a reasonable representation of the student population in the cities outside the GTA with universities and other post secondary school facilities. The sample for the GTA was drawn at a single point in time for consistency with the 1986 and 1991 surveys.

The Canada Census was carried out at the end of May 1996 and may therefore represent a slightly different population from that of the survey. The most significant difference is likely to be in the number and distribution of post secondary school students. These differences, and the effects on the results of the survey, are discussed in chapter 3.

2.3 Bias Due to Non Response

The survey results could be biased if there are significant differences between the demographic and travel behaviour characteristics of households that respond to the survey relative to those that do not. A high response rate minimizes the potential for bias. Non response may be due to failure to make contact with a household or their refusal to participate. The ease with which each household is contacted could be correlated to household size and frequency of trip making. Approximately 5% of the households in the sample were not contacted despite a minimum of 8 attempts. The potential bias due to that level of non response is small.

Approximately 22% of the households contacted refused to participate in the survey. Although the number is significantly greater than for non contact, there is no clear evidence to suggest that the demographic and travel characteristics of these households differ significantly from those that did participate in the survey. Follow up investigations of non responders, done for other surveys, have generally been inconclusive.

2.4 Under Reporting of Trips

The reliance on one member of each household to report person and trip information for all members of the household is a potential source of error and, more significantly, the under reporting of trip information. Separate studies comparing trip rates for "informants" and "non informants" have been done for both the 1986 and 1996 TTS. These studies showed a significant difference in reported trip rates for discretionary (non work or school related) travel by automobile. There was no significant difference in reported trip rates

for travel to and from school or work or for discretionary trips by public transit. The total extent of the under reporting of trip information is addressed in chapter 3.

2.5 Incorrect Information

Individual items of information contained in the TTS may be incorrect due to errors made by respondents in answering the survey questions, mistakes made by the interviewers in recording the information or the inability of coding staff to assign the correct coordinates on the basis of the geographic information provided. Close monitoring and built in logic checks in the interview and coding software minimize, but do not eliminate, the potential for error.

3.0 Data Validation

3.1 Dwelling Units and Population

The Canada Census provides very accurate and detailed information on the number of households and the distribution of population throughout the country. It is for that reason that the dwelling unit counts from the census are used as the base for expansion of the TTS data. TTS Working Paper #5, Data Expansion, contains the results of the initial validation of the 1996 TTS data in which the expanded house and person totals, aggregated by municipality, were compared with the census dwelling unit and population data at the Census Sub-Division (CSD) level. In most cases there is a one to one correspondence between CSDs and municipalities. The results of the comparison are reproduced in Table 1 together with a summary by regional municipality.

There should be a precise match at the municipal level between the expanded number of households in the TTS and the census dwelling unit count. Discrepancies occur for one of five reasons. In order of magnitude they are:

1. The numbers of surveyed households in the majority of the local townships in the counties of Peterborough, Victoria and Wellington, were insufficient to provide statistical reliability in the calculation of individual expansion factors. As a general rule these municipalities were combined to give a minimum geographic aggregation of 100 households for the calculation of an expansion factor. **The TTS data should not be used for analysis at the municipal level, or below, in these locations.** A 20% sample rate would be required to provide that level of statistical accuracy in many of the smaller townships outside the GTA.

2. A specific coding problem has been identified with respect to the townships of Guelph, North Monaghan and Ops. The postal address for some households in these townships does not permit the location of the household to be accurately determined relative to the boundary between the township and the adjacent urban centres of the City of Guelph, City of Peterborough and the Town of Lindsay. It appears likely that some of these households may have been incorrectly assigned to the larger urban centre without it being possible to determine which households are inaccurate. The small number of records for Guelph Township and North Monaghan necessitated that those areas be aggregated with adjacent zones in the Cities of Guelph and Peterborough prior to expansion. **The number of records involved has a minimal effect on the data for the Cities of Guelph and Peterborough but the TTS cannot be used for any analysis specific to the Townships of Guelph and North Monaghan. The data for the Township of Ops has been expanded separately from the town of Lindsay but must be considered unreliable due to the small sample and the potential bias in regard to the households coded as part of Lindsay.**

3. The expanded number of dwelling units in the town of Orangeville exceeds the number given by the census due to the inclusion of adjacent areas in the county of Dufferin. **The difference in definition must be taken into account when comparing the TTS with other sources such as the census.**

4. The expanded number of dwelling units in St. Catharines and Peterborough exceeds the number given by the census due to the calculation of separate expansion factors for students in specific university residences. These students would not have been in residence at the time of the census.

5. In a few isolated locations census tract boundaries do not coincide exactly with planning district or municipal boundaries. The resulting differences are minor and should not affect the use of the TTS data for transportation planning purposes. The largest discrepancy occurs between Pickering (-2.3%) and Ajax (+2.8%).

A primary source of differences between the expanded TTS population and census population is the exclusion of institutions and collective dwelling units (hospitals, nursing homes, prisons etc.) from the survey. Institutions are included in the census population data but not in the dwelling unit count. The exclusion of institutional residents from the TTS does not necessarily result in a similar under reporting of total travel since most institutional residents do less traveling than the population in general. The difference in the total population of the survey area, at 2.8%, compares with differences of 2.2% and 2.5% recorded in the 1986 and 1991 TTS respectively. The higher percentage in the more recent surveys is consistent with an increase in the average age of the population which has, presumably, resulted in an increase in the population of institutions such as nursing homes.

Some of the variations between regions and individual municipalities may be attributed to the number and location of the institutions involved. The difference in timing between the census and the survey may also affect the distribution of population, particularly with respect to post secondary school students. This factor is discussed further in section 3.2.

Table 1 - Comparison of Expanded Totals by Municipality

	TTS Records		TTS Expanded Totals		Mean	Census		Difference	
Municipality	House	Person	House	Person	exp. fac.	House	Person	House	Person
1 PD1	3934	7370	78481	146644	19.95	78483	154369	0.0%	-5.0%
2 PD2	4112	10054	82103	199591	19.97	82104	203876	0.0%	-2.1%
3 PD3	4229	11122	88631	232683	20.96	88218	237108	0.5%	-1.9%
4 PD4	4610	9648	92087	192125	19.98	92477	198598	-0.4%	-3.3%
5 PD5	2104	5396	43686	112235	20.76	43707	114615	0.0%	-2.1%
6 PD6	4301	10308	86519	207286	20.12	86519	211287	0.0%	-1.9%
7 PD7	1095	2509	24061	55044	21.97	24062	55481	0.0%	-0.8%
8 PD8	3368	8707	68930	177910	20.47	68928	179723	0.0%	-1.0%
9 PD9	1308	4043	27463	84725	21.00	27465	93514	0.0%	-9.4%
10 PD10	2204	6561	48613	144539	22.06	48657	152428	-0.1%	-5.2%
11 PD11	2747	6937	56589	142836	20.60	57036	145968	-0.8%	-2.1%
12 PD12	1396	4088	26864	78665	19.24	26865	80286	0.0%	-2.0%
13 PD13	3533	9631	72588	197646	20.55	72517	203579	0.1%	-2.9%
14 PD14	1175	2913	23644	58575	20.12	23855	62322	-0.9%	-6.0%
15 PD15	1279	3878	25034	75577	19.57	24897	78140	0.6%	-3.3%
16 PD16	3248	10266	63211	199475	19.46	63206	214919	0.0%	-7.2%
17 Brock	227	622	4172	11432	18.38	4172	11705	0.0%	-2.3%
18 Uxbridge	211	580	5336	14668	25.29	5387	15882	-0.9%	-7.6%
19 Scugog	273	798	6461	18887	23.67	6460	18837	0.0%	0.3%
20 Pickering	1238	3915	23503	74177	18.98	24048	78989	-2.3%	-6.1%
21 Ajax	1064	3285	20956	64879	19.70	20388	64430	2.8%	0.7%

Table 1 (Cont.): Comparison of Expanded Totals by Municipality

Municipality	TTS Records		TTS Expanded Totals		Mean	Census		Difference	
	House	Person	House	Person	exp. fac.	House	Person	House	Person
22 Whitby	1219	3660	24038	72207	19.72	24037	73794	0.0%	-2.2%
23 Oshawa	2368	6395	49716	133507	20.99	49691	134364	0.1%	-0.6%
24 Clarington	969	2917	20106	60597	20.75	20127	60615	-0.1%	0.0%
25 Georgina	592	1633	12335	34019	20.84	12335	34978	0.0%	-2.7%
26 East Gwillimbury	345	1059	6128	18826	17.76	6128	19770	0.0%	-4.8%
27 Newmarket	916	2737	18183	54198	19.85	18181	57125	0.0%	-5.1%
28 Aurora	576	1794	11165	34786	19.38	11165	34857	0.0%	-0.2%
29 Richmond Hill	1578	4869	31472	97400	19.94	31521	101725	-0.2%	-4.3%
30 Whit.-Stouff.	268	774	6622	19126	24.71	6621	19835	0.0%	-3.6%
31 Markham	2645	8758	49421	163484	18.68	49368	173383	0.1%	-5.7%
32 King	241	728	5965	18018	24.75	5941	18223	0.4%	-1.1%
33 Vaughan	1897	6578	36912	127833	19.46	36914	132549	0.0%	-3.6%
34 Caledon	537	1616	12672	38146	23.60	12665	39893	0.1%	-4.4%
35 Brampton	3938	12454	80974	255656	20.56	81178	268251	-0.3%	-4.7%
36 Mississauga	8653	26018	172896	518710	19.98	172724	544382	0.1%	-4.7%
37 Halton Hills	667	1828	14349	39503	21.51	14348	42390	0.0%	-6.8%
38 Milton	523	1541	10502	30997	20.08	10503	32104	0.0%	-3.4%
39 Oakville	2213	6364	43130	123640	19.49	43130	128405	0.0%	-3.7%
40 Burlington	2462	6557	50422	134124	20.48	50424	136976	0.0%	-2.1%
41 Flamborough	425	1251	11220	33106	26.40	11336	34037	-1.0%	-2.7%
42 Dundas	461	1167	8661	21955	18.79	8511	23125	1.8%	-5.1%
43 Ancaster	365	1136	7528	23479	20.62	7561	23403	-0.4%	0.3%
44 Glanbrook	179	557	3489	10856	19.49	3488	10564	0.0%	2.8%
45 Stoney Creek	969	2781	18188	52036	18.77	18186	54318	0.0%	-4.2%
46 Hamilton	6236	15483	129995	320559	20.85	129990	322352	0.0%	-0.6%
51 Grimsby	348	992	6845	19513	19.67	6846	19585	0.0%	-0.4%
52 Lincoln	282	809	6444	18486	22.85	6445	18801	0.0%	-1.7%
53 Pelham	202	572	5078	14380	25.14	5078	14343	0.0%	0.3%
54 Niagara-O-T-L	224	541	4787	11561	21.37	4787	13238	0.0%	-12.7%
55 St. Catharines	2964	7179	52971	128658	17.87	52742	131163	0.4%	-1.9%
56 Thorold	341	938	6636	18253	19.46	6635	17883	0.0%	2.1%
57 Niagara Falls	1528	3968	30086	78084	19.69	30085	76917	0.0%	1.5%
58 Welland	964	2410	19100	47681	19.81	19099	48411	0.0%	-1.5%
59 Port Colbourne	385	968	7450	18731	19.35	7448	18451	0.0%	1.5%
60 Fort Erie	590	1425	11393	27504	19.31	11392	27183	0.0%	1.2%
61 West Lincoln	158	549	3602	12517	22.80	3602	11513	0.0%	8.7%
62 Wainfleet	104	304	2172	6348	20.88	2171	6253	0.0%	1.5%
63 Waterloo	1659	4575	30192	83591	18.20	30216	77949	-0.1%	7.2%
64 Kitchener	3386	8801	67725	175532	20.00	67703	178420	0.0%	-1.6%
65 Cambridge	1695	4662	35534	97512	20.96	35526	101429	0.0%	-3.9%
66 North Dumfries	109	328	2530	7613	23.21	2539	7817	-0.4%	-2.6%
67 Wilmot	261	722	4706	13018	18.03	4707	13831	0.0%	-5.9%
68 Wellesley	120	419	2449	8552	20.41	2449	8664	0.0%	-1.3%
69 Woolwich	265	752	5756	16333	21.72	5755	17325	0.0%	-5.7%
70 City of Guelph	2114	5419	36982	94455	17.49	36264	95821	2.0%	-1.4%
71 Puslinch	36	99	1897	5216	52.69	1897	5416	0.0%	-3.7%
72 Guelph Twp.	15	44	320	940	21.33	1037	3282	-69.1%	-71.4%
73 Pilkington	28	92	763	2507	27.25	763	2577	0.0%	-2.7%
74 Elora	88	222	1228	3097	13.95	1228	3346	0.0%	-7.4%
75 Nichol	32	106	1315	4356	41.09	1315	4223	0.0%	3.1%
76 Fergus	215	596	3249	9006	15.11	3249	8884	0.0%	1.4%
77 West Garafraxa	29	94	1294	4194	44.62	1294	3777	0.0%	11.0%

Table 1 (Cont.): Comparison of Expanded Totals by Municipality

Municipality	TTS Records House	TTS Records Person	TTS Expanded Totals House	TTS Expanded Totals Person	Mean exp. fac.	Census House	Census Person	Difference House	Difference Person
78 Eramosa	125	359	2111	6064	16.89	2111	6317	0.0%	-4.0%
79 Erin	145	411	3534	10016	24.37	3533	10657	0.0%	-6.0%
80 Orangeville +	438	1319	7788	23452	17.78	7275	21498	7.1%	9.1%
81 Barrie	1565	4153	28560	75326	18.25	28559	79191	0.0%	-4.9%
82 Innisfil	438	1234	8795	24779	20.08	8793	24711	0.0%	0.3%
83 Bradford-West Gwillimbury	262	847	6380	20624	24.35	6379	20213	0.0%	2.0%
84 Tecumseth	429	1218	7941	22545	18.51	7939	22902	0.0%	-1.6%
85 Adjala-Tosorontio	103	306	2997	8911	29.10	3004	9361	-0.2%	-4.8%
86 Essa	316	922	5375	15683	17.01	5376	16363	0.0%	-4.2%
87 Clearview	231	661	4405	12605	19.07	4405	12407	0.0%	1.6%
88 Springwater	233	712	4879	14909	20.94	4880	14793	0.0%	0.8%
89 Lindsay	407	977	7175	17225	17.63	7177	17638	0.0%	-2.3%
90 OPS	18	54	1486	4458	82.56	1486	4311	0.0%	3.4%
91 Manvers	169	508	1876	5639	11.10	1876	5624	0.0%	0.3%
92 Mariposa	115	359	2509	7833	21.82	2509	7456	0.0%	5.1%
93 Eldon	69	171	1416	3509	20.52	1416	3707	0.0%	-5.3%
94 Carden	7	19	293	796	41.86	338	887	-13.3%	-10.3%
95 Dalton	0	0	0	0	N/A	169	442	-100.0%	-100.0%
96 L-D-L	18	43	754	1801	41.89	462	1114	63.2%	61.7%
97 Somerville	42	112	925	2466	22.02	925	2238	0.0%	10.2%
98 Bexley	11	32	461	1340	41.91	539	1306	-14.5%	2.6%
99 Fenelon	158	385	3576	8713	22.63	3576	8082	0.0%	7.8%
100 Verulam	66	159	1711	4121	25.92	1711	4373	0.0%	-5.8%
101 Bobcageon	61	112	1275	2341	20.90	1275	2753	0.0%	-15.0%
102 Emily	130	370	2812	8003	21.63	2812	7995	0.0%	0.1%
103 Peterborough	1693	4039	30379	72454	17.94	28610	70310	6.2%	3.0%
104 Cavan	51	157	2327	7164	45.63	2327	7042	0.0%	1.7%
105 North Monaghan	3	8	57	152	19.00	386	1210	-85.2%	-87.4%
106 South Monaghan	29	78	586	1576	20.21	586	1579	0.0%	-0.2%
107 Otonabee	29	79	1858	5062	64.07	1858	5447	0.0%	-7.1%
108 Asphodel	65	174	1468	3929	22.58	1468	4080	0.0%	-3.7%
109 Dummer	34	92	1092	2955	32.12	1092	3053	0.0%	-3.2%
110 Douro	129	345	2214	5920	17.16	2214	6115	0.0%	-3.2%
111 Smith	113	333	3634	10709	32.16	3634	10091	0.0%	6.1%
112 Ennismore	90	231	1615	4144	17.94	1615	4465	0.0%	-7.2%
113 Northumberland	361	930	5401	13913	14.96	N/A	N/A	N/A	N/A
Metro	44643	113431	908504	2305556	20.35	908996	2386213	-0.1%	-3.4%
Durham	7569	22172	154288	450354	20.38	154310	458616	0.0%	-1.8%
York	9058	28930	178203	567690	19.67	178174	592445	0.0%	-4.2%
Peel	13128	40088	266542	812512	20.30	266567	852526	0.0%	-4.7%
Halton	5865	16290	118403	328264	20.19	118405	339875	0.0%	-3.4%
Hamilton	8635	22375	179081	461991	20.74	179072	467799	0.0%	-1.2%
Niagara	8090	20655	156564	401716	19.35	156330	403741	0.1%	-0.5%
Waterloo	7495	20259	148892	402151	19.87	148895	405435	0.0%	-0.8%
Other (Excl. 113)	10349	27651	201312	540995	19.45	199362	547057	1.0%	-1.1%
Total	114832	311851	2311789	6271229	20.13	2310111	6453707	0.1%	-2.8%

3.2 Age and Gender

Table 2 compares the expanded TTS female and male population by age groups with data from the 1996 Canada Census. Respondents to the TTS frequently gave their age to the nearest 5 or 10 years. The age groupings have been selected to minimize the effect of this rounding. The comparison reveals significant under representation of 3 age groups in the TTS relative to the census.

1. The number of persons under 1 year of age is under represented by approximately 50% for both sexes. The amount of under representation is similar in magnitude for all geographic areas. There is no obvious explanation as to why this should have happened . There is no evidence of any over reporting of age 1 or 2. The 1991 TTS may have under represented zero age babies by the same amount but the effect was masked by the fact that all persons under the age of 2 were recorded as age 1. There was no significant under representation of zero age in the 1986 survey. It seems possible that the under representation is linked in some way to the use of the Direct Data Entry software and/or the training of interviewers. **The under representation of age zero should be taken into account when estimating total population or if the TTS data is used in the calculation of fertility rates.** There should be no effect on the accuracy of the travel information collected.

2. Above age 68 there is increasing under representation of population by age. The under representation is greater for women than for men of the same age. The highest discrepancy is 48% for women over the age of 88. The under representation occurs in all parts of the survey area. The exclusion of collective homes from the survey is likely the major cause. **The under representation of the elderly should be taken into account if the TTS data is used for demographic projections or for the analysis of the future needs of the elderly.** The impact of this under representation on trip totals is likely to be minor as elderly people in general, and in particular those in collective homes, make relatively few trips compared to the population as a whole.

   The under reporting of age zero together with age 68 and older accounts for approximately 80% of the total under reporting of population.

   In total the survey under reports the female population slightly more than the male. The difference is due to a higher proportion of women than men in the older, under reported, age groups. The difference is not expected to show any significant effect in the analysis of travel data.

3. The 18 to 27 age group is under represented by an average of 7% relative to the census with considerable variation between regions and gender. The under-representation is higher in the 18 to 22 sub-group. A likely cause of under representation in this age group is the use of listed residential telephones as the sample frame. A number of post secondary students do not have their own telephones or may not acquire them at the start of the school year in time to be included in the drawing of the sample. Variations in geographic distribution may be due to the difference in timing between the census and the conduct of the survey. The Canada Census is conducted at the end of May when many post secondary students are likely to be living at home with their parents or otherwise absent from their normal school location.

   Under reporting of the 18 to 27 age group is highest for Halton Region (18%) followed by the three Regions adjacent to Metro Toronto (Durham, York and Peel). This pattern is consistent with the difference in timing relative to the census and the limited number of post secondary education facilities in the regions immediately adjacent to Metro Toronto. Unfortunately there is not a corresponding over representation of the same age group in the regions with major post secondary education facilities. The under reporting that occurs in Metro Toronto and Hamilton may be as a result of the time at which the sample was drawn (end of July).

   Within the GTA the under representation of the 18 to 27 age group needs to be taken into consideration if the TTS data is used for the analysis of demographics and travel behaviour

specific to that age group including, specifically, the effect on estimates of public transit ridership. There is no apparent under reporting of the 18 to 27 age group outside the GTA. The Region of Waterloo shows a significant over reporting of men in the 18 to 22 age group which can be attributed to the existence of two universities (Waterloo and Wilfred Laurier) and the difference in timing.

Table 3 provides a comparison of population in the 18 to 27 age group at the municipal level for the cities with universities outside Metropolitan Toronto (Hamilton, St. Catharines, Waterloo, Guelph and Peterborough). With the exception of Hamilton, all show a higher population in the 18 to 27 age group than does the census. The sample for Hamilton was drawn with the rest of the GTA at the end of July. **The survey likely provides a better representation than does the census of the distribution of post secondary school population at the time of the survey.** The expansion factors, however, are based on the total population at the time of the census and therefore do not reflect changes in total population that occur during the school year. A number of areas in the Cities of St. Catharines, Waterloo, Guelph and Peterborough have expansion factors from 20% to 35% below the survey average of 20.13. A case could be made to modify these expansion factors to obtain a better representation of student travel patterns during the school year, however, the analysis of student enrollment (section 3.3) suggests that such adjustment might lead to over representation of students at the University of Waterloo.

Table 2 - Difference in Population Relative to the Census

Women	Age Group													Census
	0	1-7	8-17	18-22	23-27	28-37	38-47	48-57	58-67	68-77	78-87	88+	Total	(000's)
Metro Toronto	-44%	-1%	-1%	-8%	-3%	3%	0%	-6%	-2%	-11%	-27%	-45%	-3.7%	1238
Durham	-60%	4%	-2%	-20%	-5%	5%	2%	-3%	3%	-14%	-30%	-39%	-2.5%	232
York	-55%	-1%	-1%	-13%	-9%	0%	0%	-7%	0%	-15%	-24%	-44%	-4.5%	300
Peel	-68%	-2%	-5%	-9%	-12%	2%	-1%	-6%	-7%	-13%	-32%	-58%	-5.4%	431
Halton	-57%	6%	1%	-28%	-5%	3%	4%	-5%	-3%	-16%	-29%	-42%	-3.3%	173
Hamilton-Wentworth	-45%	9%	-4%	-2%	-5%	5%	-1%	-5%	8%	-13%	-23%	-47%	-1.7%	240
Niagara	-28%	6%	-2%	1%	5%	7%	0%	0%	3%	-12%	-32%	-55%	-1.2%	207
Waterloo	-51%	2%	2%	6%	-5%	2%	1%	-5%	10%	-8%	-29%	-48%	-0.8%	206
Other	-39%	5%	4%	9%	3%	3%	0%	-6%	2%	-17%	-32%	-54%	-1.2%	278
Total	-50%	2%	-1%	-7%	-4%	3%	0%	-5%	0%	-13%	-28%	-48%	-3.2%	3305
Census total (000's)	43	309	410	205	239	586	519	365	271	224	107	28	3305	
Abs. Diff. (000's)	-22	5	-5	-14	-10	18	2	-19	0	-28	-30	-13	-106	

Men	Age Group													Census
	0	1-7	8-17	18-22	23-27	28-37	38-47	48-57	58-67	68-77	78-87	88+	Total	(000's)
Metro Toronto	-49%	-2%	1%	-9%	-4%	0%	-1%	-3%	-4%	-5%	-16%	-26%	-3.0%	1148
Durham	-49%	6%	6%	-13%	-10%	-3%	5%	0%	-7%	-8%	-26%	-58%	-1.3%	226
York	-61%	5%	0%	-15%	-12%	-3%	0%	-5%	-6%	-7%	-26%	-37%	-4.0%	293
Peel	-57%	3%	0%	-18%	-11%	-2%	0%	-2%	-7%	-10%	-15%	-27%	-4.1%	422
Halton	-54%	5%	5%	-27%	-13%	0%	2%	-3%	-8%	-17%	-22%	10%	-3.7%	167
Hamilton-Wentworth	-51%	7%	3%	-7%	-8%	4%	0%	-5%	4%	-9%	-16%	1%	-0.8%	228
Niagara	-32%	10%	0%	0%	-7%	2%	-1%	3%	1%	-4%	-8%	-45%	0.3%	196
Waterloo	-40%	4%	0%	14%	-7%	-4%	0%	-2%	0%	-4%	-16%	-34%	-0.8%	199
Other	-45%	11%	4%	3%	1%	0%	4%	-2%	2%	-9%	-24%	-11%	1.1%	263
Total	-50%	3%	2%	-9%	-7%	-1%	1%	-2%	-3%	-7%	-18%	-25%	-2.3%	3142
Census total 000's)	45	325	433	208	228	563	487	353	253	174	63	9	3142	
Abs. Diff. (000's)	-23	11	7	-19	-15	-3	3	-8	-8	-12	-11	-2	-73	

Table 3 - Population aged 18-27

	Female			Male		
Municipality	Census	TTS	Diff.	Census	TTS	Diff.
Hamilton	23320	22870	-2%	22415	21761	-3%
St. Catharines	8815	10385	18%	8720	8674	-1%
Waterloo	6345	9189	45%	6625	10030	51%
Guelph	7785	9457	21%	7480	7311	-2%
Peterborough	4870	6349	30%	4505	5547	23%

3.3 School Enrollment

Table 4 provides a comparison between the number of students reported in the TTS and the actual school enrollment in the fall of 1996 as reported by the Registrar's office of each institution. Table 5 provides the same information for Community Colleges. The TTS numbers have been obtained by tabulating the expanded number of students over the age of 18 by the traffic zone of their usual place of school. The TTS database does not identify the school location by name. A large component of the part time enrollment at the Community Colleges is in adult continuing education courses. No information was provided as to where these courses are given. If they contain a significant off campus component then the comparison with the TTS data is not valid. Without that additional information no assessment can be made as to how well the data from the TTS reflects part time adult education.

The number of full time students in the TTS for the traffic zones containing the Universities of Toronto, York and Ryerson are all within 5% of the reported enrollment for those institutions. There is no obvious explanation for the over representation of part time enrollment at both York and Toronto. Ninety percent of the part time enrollment at Ryerson is in adult continuing education courses, therefore the comparison with TTS may not be valid for the reasons noted in the previous paragraph.

There is no significant under reporting of students at the location which represents the University of Waterloo despite the use of expansion factors based on the census. Sample selection for the City of Waterloo was delayed until October with the deliberate intention of obtaining a better representation of students in residence.

Possible explanations for the under representation of enrollment at McMaster include:

1. the enrollment numbers include locations other than the traffic zone selected for tabulation of the TTS data.
2. students that do not have phones and are therefore excluded from the sample frame
3. the sample being drawn too early (August) to include students in residences that are only used during the school year.
4. non response

Any judgment as to the importance of each of the above factors cannot be made without further investigation and additional information.

The reasons for under representation at the Universities of Wilfred Laurier, Guelph and Trent could be the same as above except that the timing of sample selection should not be a factor. **The use of expansion factors based on average response rates instead of census data would increase the expanded number of students in the TTS database for these three institutions and provide for better analysis of their travel behaviour characteristics.**

There is no obvious explanation for the over representation of full time students at Brock University relative to the enrollment figures provided by the University. Possible explanations could be the inclusion of other, non university, students in the TTS data or a difference in definition of full and part time student status. The number of part time students is under reported by an almost equal amount.

The TTS appears to provide accurate information on the number of full time students at Humber, Sheridan, Centennial, Niagara and Conestoga colleges. Mohawk college is under represented by the same amount as adjacent McMaster University. Both the Lindsay and Peterborough campuses of Fleming college appear over represented but the numbers are too small to expect a high degree of accuracy. Georgian College is located on the edge of the survey area . Students that live outside the survey are not included in the TTS data. **The substantial under representation of students at Seneca College warrants further investigation if the TTS data is to be used for analysis specific to that institution.**

The enrollment figures obtained for George Brown and Durham Colleges are annual figures and cannot be compared directly with the TTS data. Comparisons with the part time student enrollment at the non university Colleges are not meaningful for the reasons noted earlier.

Table 4 - University Enrollment (Fall 1996)

Traffic Zone	University Campus	Full-time Enrollment	Full-time TTS	Full-time Difference		Part-time Enrollment	Part-time TTS	Part-time Difference	
	Toronto	38,318	40,363	2,045	5%	15,306	16,330	1,024	7%
290	Laboratories		1,551				835		
366	Scarborough		4,976				1,023		
404	St. George		28,926				13,066		
1131	Erindale		4,910				1,406		
	York	28,431	27,403	-1,028	-4%	9,469	11,263	1,794	19%
131	Glendon		1,997				1,231		
281	Finch		25,406				10,032		
19	Ryerson	12,680	12,283	-397	-3%	18,000	10,445	N/A	N/A
1601	McMaster	13,589	10,374	-3,215	-24%	3,075	3,760	685	22%
2420	Waterloo	14,057	13,701	-356	-3%	4,132	3,167	-965	-23%
2705	Guelph	12,073	8,626	-3,447	-29%	1,838	1,233	-605	-33%
2163	Brock	6,426	8,191	1,765	27%	4,328	2,185	-2,143	-50%
2432	Wilfred Laurier	5,625	4,387	-1,238	-22%	2,177	1,656	-521	-24%
2920	Trent	3,893	2,533	-1,360	-35%	1,295	1,178	-117	-9%
	Total	135,092	127,861	-7,231	-5%	41,620 (Excl. Ryerson)	40,772	-848	-2%

Table 5 - Community College Enrollment (Fall 1996)

Traffic Zone	College Campus	Full-time Enrollment	Full-time TTS	Difference		Part-time Enrollment	Part-time TTS
	George Brown	15,000	8,534	N/A	N/A	45,000	4,627
36	St. James	(annual)	5,284			(annual)	2,996
159	Main		3,250				1,631
	Seneca College	13,808	8,575	-5233	-38%	23,632	7,680
315	North Yonge		1,064				1,050
318	Finch		6,652				5,695
921	King		859				935
	Humber	11,000	9,860	-1,140	-10%	55,000	7,796
216	Lakeshore	(est.)	1,369			(est.)	877
262	Main		8,491				6,919
	Sheridan	9,467	9,701	234	2%	581	8,436
1225	Brampton		3,397				3,310
1429	Oakville		6,304				5,126
	Centennial College	9,354	9,067	-287	-3%	28,000	6,335
351	Warden Woods		2,774			(est.)	1,993
442	Progress		6,293				4,342
	Mohawk	8,104	6,168	-1,936	-24%	417	5,231
1672			6,024				4,724
1761			144				507
	Fleming College						
2841	Lindsay	1,916	2,457	541	28%	77	350
2902	Peterborough	3,401	4,255	854	25%	234	980
2824	Georgian College	5,044	2,923	-2,121	-42%	9,500 (est.)	890
	Niagara	5,006	4,817	-189	-4%	334	2,553
2074	St. Catharines		259				96
2213	Welland		538				495
2258	Niagara		4,020				1,962
	Conestoga	4,175	4,714	539	13%	246	4,057
2403			1,015				735
2546			3,412				2,995
2580			287				327
594	Durham	4,500 (annual)	3,446	N/A	N/A	27,000 (annual)	2,915

3.4 Traffic Volumes

Validation of the TTS auto driver trip data was performed using expanded trip matrices extracted from the TTS database. The trip tables are based on the extended 1991 GTA traffic zone system and were assigned to the 1996 GTA road network, maintained at the Data Management group, using emme/2. The resulting link volumes were aggregated along inter-regional boundaries and compared with actual traffic counts collected as part of the 1995 Cordon Count program. Comparisons for smaller screen lines have not been included due to possible discrepancies between simulated and actual trip routings that could distort the comparison. There are other problems associated with the use of cordon counts as a base for comparison. Differences between the cordon count and TTS data which must be considered when evaluating the comparisons include:

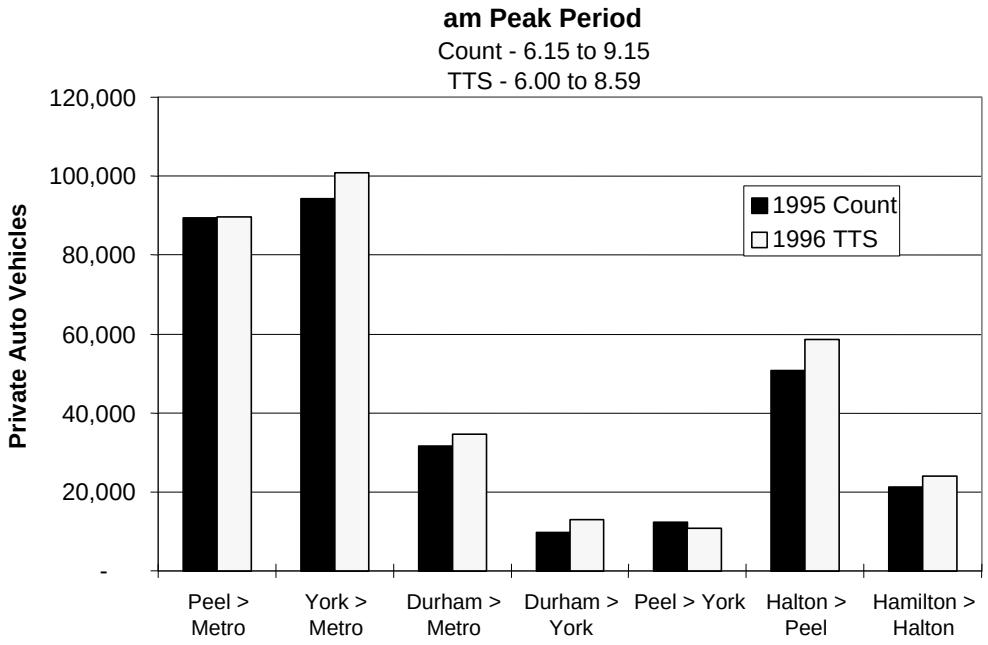
1. The cordon counts were taken in May and June of 1995, the TTS was done in the fall of 1996.
2. The TTS represents average week day conditions over a 3 month period for all locations whereas the counts are made are of individual one day counts taken on different days at different locations. Traffic volumes can vary substantially from one day to another so that there is no guarantee as to how accurately the count at any one station reflects the true average daily traffic for that station.
3. The TTS data is aggregated on the basis of reported trip time. Most respondents report trip times to the nearest 10 or 15 minutes. Significant peaks occur right on each hour meaning that the hourly volume can change significantly depending on which minute the hour is taken to begin and end on. The cordon counts are continuous with precise aggregation to 15 minute time periods for reporting purposes.
4. The TTS data is based on trip start times whereas the time at which a vehicle is counted in the cordon count program can occur at any point in the trip depending on the relative location of its origin and destination. A 15 minute offset has been used in order to average out and minimize this difference.
5. The cordon count data is for automobiles excluding taxis. Vehicles are classified by their visual appearance with the automobile category including vans and pick-up trucks that do not have commercial advertising on the side and which are not obviously being used for commercial purposes. The TTS data is not based on vehicle type although most commercially related travel is excluded.

The TTS data used in these comparisons is from version 2.0 of the 1996 Database. Differences between version 2.0 and version 2.1 are negligible in the context of these comparisons.

Chart 6 and table 7 show the comparison for the a.m. peak period. The differences are minor given the limitations of the comparison as previously noted. There is no evidence of any measurable under reporting of auto driver trips in the peak period.

Chart 8 and table 9 show the 15 hour daily traffic volumes across the Metro boundary. The volumes given by the TTS are 20% to 25% lower than those given by the cordon counts. This discrepancy is similar in magnitude to the differences observed in the validation of the 1986 and 1991 TTS data and is likely due to the under reporting of discretionary (non work or school) trips. **Due allowance must be made for the under reporting of discretionary travel when the TTS data is used for the analysis of off peak and total daily travel.**

Chart 6 - A.M. Peak Period Traffic Volumes



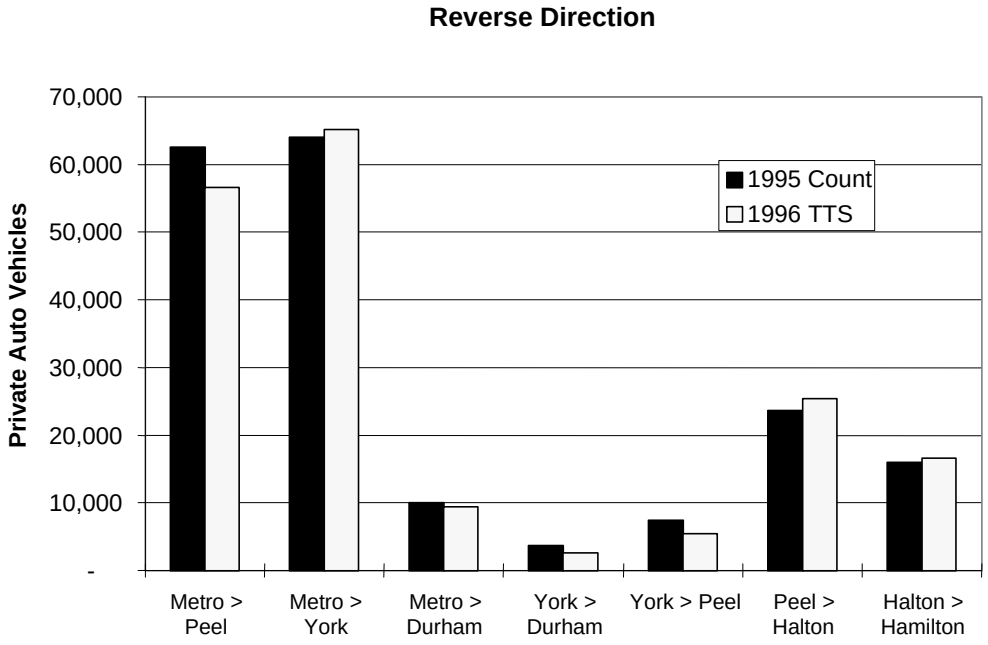


Table 7 - A.M. Peak Period Traffic Volumes

(Auto vehicles excluding taxis)

	Peak Direction					Reverse Direction		
	1995 Count	1996 TTS	Diff.			1995 Count	1996 TTS	Diff.
Peel > Metro	89,429	89,714	0%		Metro > Peel	62,571	56,571	-10%
York > Metro	94,286	100,857	7%		Metro > York	64,000	65,143	2%
Durham > Metro	31,714	34,571	9%		Metro > Durham	10,000	9,429	-6%
Durham > York	9,714	12,857	32%		York > Durham	3,714	2,571	-31%
Peel > York	12,286	10,857	-12%		York > Peel	7,429	5,429	-27%
Halton > Peel	50,857	58,571	15%		Peel > Halton	23,714	25,429	7%
Hamilton > Halton	21,143	24,000	14%		Halton > Hamilton	16,000	16,571	4%
Total	309,429	331,429	7%		Total	187,429	181,143	-3%

Chart 8 - 15 Hour Traffic Volumes (6 a.m. to 9 p.m.)

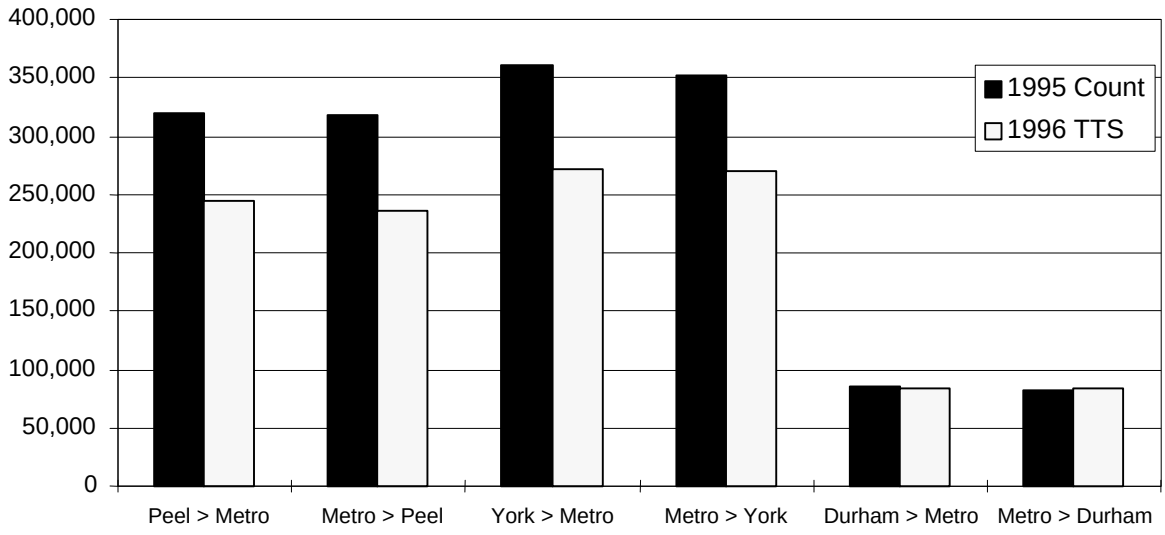


Table 9 - 15 Hour Traffic Volumes (6 a.m. to 9 p.m.)

	1995 Count	1996 TTS	Difference
Peel > Metro	320	245	-24%
Metro > Peel	318	236	-26%
York > Metro	361	272	-25%
Metro > York	353	271	-23%
Durham > Metro	85	84	-1%
Metro > Durham	81	84	4%
Total	1,519	1,192	-22%

3.5 Municipal Transit Ridership

Table 10 gives comparisons between the TTS data and passenger boarding counts collected by the TTC. The table has been sorted in order of the absolute daily difference within the three sub-categories of subway, streetcar and bus. The TTC boarding information is based on one day counts taken on a rotating basis throughout the TTC system. The actual date of each count is shown in the last column. Asterisks mark the counts that coincide with the period of the survey. There can be significant seasonal variation in the transit ridership on an individual route in addition to normal day to day variations. Comparisons are shown for both the a.m. peak period and total daily boardings. The a.m. peak includes all TTS trips with a start time prior to 9 a.m.. The time period used by the TTC for the conduct of the counts is nominally from the start of service to 9 a.m. but varies slightly from route to route depending on the transition point from peak to off-peak scheduling. These variations, as well as the accuracy and timing of the TTC counts, need to be taken into consideration when drawing conclusions from the comparisons with the TTS data at the individual route level.

The numbers given for TTS are obtained from the detailed routing information as reported by each respondent to the survey. Errors can result from routes being incorrectly identified, by the respondent or the interviewer, or incomplete information on the number of different route segments that make up a trip. TTC staff will be performing a more detailed validation of the TTS data using computer simulations to emulate the logical choice of route for each transit trip in the TTS database. The simulated routings will be compared with the reported routings for individual trips and the total simulated volumes compared with the TTC counts.

The TTC counts for subway ridership are based on platform counts. The total has been reduced by 20% to correct for double counting of passengers that transfer between the two subway lines. The 20% factor is based on old data, including the 1986 TTS, and may not be accurate. The TTS data does not count transfers between subway lines as two separate boardings. The TTS data appears to slightly over represent total daily subway ridership but not significantly given the constraints of the comparison. It is unlikely that the TTS would over report a trip total of this magnitude. Ridership on the Scarborough RT is under represented but it is possible that many survey respondents did not distinguish between the RT and the subway or ignored the transfer between the two. The reason for the substantial difference in peak period volumes is not readily apparent. The TTS data is based on trip start time, not actual boarding time. A half hour shift in the start times included in the comparison would account for about 40% of the difference. It is reasonable to conclude that subway ridership is not under reported in either the peak period or on a daily basis.

Daily streetcar ridership appears to be significantly under reported on all routes as was the case in the 1986 TTS. A likely explanation is that the streetcar routes predominantly serve the downtown area and that a high proportion of their use is for short discretionary trips in off-peak periods. There is strong evidence that TTS tends to under report this type of travel. The number of peak period streetcar trips closely matches the TTC counts both in total and on all the major routes.

Table 10 - TTC Boardings

Route		A.M. Peak Boardings				Daily Boardings				
Code	Name	Count	TTS	Difference		Count	TTS	Difference		Date
T595	Subway	144000	208467	64467	45%	634,950	682326	47376	7%	
T597	Scarborough RT.	9500	7676	-1824	-19%	35000	24667	-10333	-30%	
	Total Rail	**153500**	**216143**	**62643**	**41%**	**669950**	**706993**	**37043**	**6%**	
T506	Carelton SC	8148	8071	-77	-1%	54179	33004	-21175	-39%	95/4/10
T504	King SC	10361	10342	-19	0%	50978	35988	-14990	-29%	95/4/18
T501	Queen SC	8291	9159	868	10%	46155	35422	-10733	-23%	95/10/16
T505	Dundas SC	6643	6941	298	4%	43530	28587	-14943	-34%	95/4/07
T512	St Clair SC	6446	6735	289	4%	29546	24044	-5502	-19%	96/10/21 *
T511	Bathurst SC	2810	2801	-9	0%	16095	11389	-4706	-29%	96/11/22 *
T502	Downtowner SC	1198	502	-696	-58%	5560	1469	-4091	-74%	95/4/24
T510	Harbourfront LRT	1038	614	-424	-41%	5324	2755	-2569	-48%	96/9/30 *
T503	Kingston Tripper SC	1090	561	-529	-49%	2280	1406	-874	-38%	95/4/24
T508	LakeShore SC	371	146	-225	-61%	1175	491	-684	-58%	95/11/02
	Total Streetcar	**46396**	**45872**	**-524**	**-1%**	**254822**	**174555**	**-80267**	**-31%**	
T029	Dufferin	8194	9473	1279	16%	42610	31898	-10712	-25%	95/5/01
T039	Finch East	10342	10881	539	5%	40675	34396	-6279	-15%	96/11/04 *
T025	Don Mills	7675	8668	993	13%	38182	30807	-7375	-19%	96/5/30
T035	Jane	8865	8937	72	1%	36709	28255	-8454	-23%	95/11/20
T032	Eglinton West	9428	8835	-593	-6%	35595	29674	-5921	-17%	96/9/16 *
T036	Finch West	8738	10481	1743	20%	34750	32215	-2535	-7%	95/9/11
T085	Sheppard East	7049	8844	1795	25%	33342	30809	-2533	-8%	96/10/28 *
T054	Lawrence East	6564	8192	1628	25%	31387	27775	-3612	-12%	96/2/19
T077	Spadina	3618	4110	492	14%	25603	20154	-5449	-21%	95/11/06
T007	Bathurst	5386	5301	-85	-2%	25212	19618	-5594	-22%	95/11/10
T095	York Mills	5750	7947	2197	38%	24352	25051	699	3%	96/9/09 *
T063	Ossington	4717	4115	-602	-13%	23548	14256	-9292	-39%	95/11/27
T034	Eglinton East	6117	7926	1809	30%	20727	26493	5766	28%	95/2/06
T041	Keele	4821	5539	718	15%	20246	17343	-2903	-14%	96/2/23
T052	Lawrence West	4767	6370	1603	34%	20012	20142	130	1%	96/1/23
T024	Victoria Pk	4385	6393	2008	46%	19623	21147	1524	8%	96/6/07
T060	Steeles West	4854	6136	1282	26%	19592	19185	-407	-2%	96/1/25
T096	Wilson	5106	7557	2451	48%	19464	22576	3112	16%	96/1/29
T045	Kipling	4868	5196	328	7%	18075	15811	-2264	-13%	96/3/01
T053	Steeles East	4311	4896	585	14%	16268	15132	-1136	-7%	96/2/19
T102	Markham Rd	3965	4119	154	4%	15985	15591	-394	-2%	96/4/18
T084	Sheppard West	4107	4355	248	6%	15173	12778	-2395	-16%	96/10/16 *
T037	Islington	3351	3791	440	13%	14428	13043	-1385	-10%	96/1/08
T086	Scarboro	3767	2896	-871	-23%	14203	9693	-4510	-32%	96/11/12 *
T100	Flemingdon Pk	3540	2852	-688	-19%	14102	9379	-4723	-33%	97/1/13
T047	Lansdowne	3892	2939	-953	-24%	14070	9210	-4860	-35%	96/1/16
T006	Bay	3837	3401	-436	-11%	13990	9168	-4822	-34%	96/5/21
T116	Morningside	3493	3565	72	2%	13908	10972	-2936	-21%	96/1/10
T068	Warden	3676	4485	809	22%	13762	12918	-844	-6%	96/10/30 *
T165	Weston Rd	3308	1879	-1429	-43%	13610	5440	-8170	-60%	96/11/19 *
T106	York University	2555	3348	793	31%	13539	11330	-2209	-16%	96/10/17 *
T089	Weston	2981	2819	-162	-5%	13105	9226	-3879	-30%	96/11/27 *
T094	Wellesley	2782	2590	-192	-7%	12908	8937	-3971	-31%	96/11/26 *
T058	Malton	3066	1837	-1229	-40%	12624	5753	-6871	-54%	96/11/06 *

Table 10 - TTC Boardings

Route		A.M. Peak Boardings				Daily Boardings				
Code	Name	Count	TTS	Difference		Count	TTS	Difference		Date
T057	Midland	3447	3660	213	6%	11832	11008	-824	-7%	96/10/01 *
T043	Kennedy	2512	3165	653	26%	10840	10799	-41	0%	96/6/03
T129	McCowan North	2606	3169	563	22%	10602	10832	230	2%	96/4/25
T017	Birchmount	3198	3559	361	11%	9910	10099	189	2%	96/6/04
T046	Martin Grove	2350	2669	319	14%	8360	8290	-70	-1%	97/1/28
T073	Royal York	2034	2625	591	29%	8060	8459	399	5%	96/3/25
T110	Islington South	2553	2455	-98	-4%	7857	6655	-1202	-15%	96/4/22
T072	Pape	1755	2211	456	26%	7846	8514	668	9%	96/4/01
T012	Kingston Rd	2285	2454	169	7%	7770	6862	-908	-12%	96/4/09
T070	O'Connor	1525	1283	-242	-16%	7682	5034	-2648	-34%	96/12/02 *
T133	Neilson	1406	1366	-40	-3%	7553	5814	-1739	-23%	96/4/10
T022	Coxwell	1442	1782	340	24%	7512	6210	-1302	-17%	96/2/15
T016	McCowan	1885	2379	494	26%	7453	8530	1077	14%	96/2/12
T011	Bayview	1630	2533	903	55%	7390	7648	258	3%	96/5/10
T076	Royal York South	2022	1972	-50	-2%	7268	6233	-1035	-14%	96/12/05 *
T087	Cosburn	1953	1764	-189	-10%	6972	5505	-1467	-21%	96/10/15 *
T042	Cummer	1914	2443	529	28%	6883	7258	375	5%	96/12/05 *
T112	West Mall	2200	1830	-370	-17%	6814	5702	-1112	-16%	96/4/23
T079	Scarlett Road	1986	1305	-681	-34%	6406	3887	-2519	-39%	96/5/23
T168	Symington	1520	969	-551	-36%	6403	3494	-2909	-45%	95/11/27
T161	Rogers Road	1466	1191	-275	-19%	6391	3804	-2587	-40%	96/12/02 *
T090	Vaughan	1806	1913	107	6%	6378	5988	-390	-6%	96/4/01
T131	Nugget	1748	2460	712	41%	6337	6720	383	6%	95/11/21
T108	Downsview	1650	2016	366	22%	6207	6476	269	4%	96/10/07 *
T081	Thorncliff Pk	1761	1004	-757	-43%	6098	4175	-1923	-32%	96/12/03 *
T067	Pharmacy	1653	1900	247	15%	5883	5433	-450	-8%	96/5/23
T075	Sherbourne	1454	1312	-142	-10%	5738	4917	-821	-14%	96/5/13
T020	Cliffside	1144	1255	111	10%	5654	4188	-1466	-26%	96/2/26
T109	Ranee	1305	1348	43	3%	5495	4754	-741	-13%	96/11/05 *
T111	East Mall	1113	1217	104	9%	5256	3937	-1319	-25%	96/12/04 *
T040	Junction	974	701	-273	-28%	5208	2780	-2428	-47%	96/12/04 *
T128	Brimley North	1398	1504	106	8%	5140	4711	-429	-8%	96/10/08 *
T064	Main	1051	1059	8	1%	5131	4638	-493	-10%	96/12/04 *
T023	Dawes	1297	1164	-133	-10%	4948	4031	-917	-19%	96/2/26
T091	Woodbine	1479	1278	-201	-14%	4895	3846	-1049	-21%	96/4/04
T044	Kipling South	1440	1357	-83	-6%	4837	3882	-955	-20%	96/9/30 *
T004	Annette	1193	830	-363	-30%	4802	2988	-1814	-38%	96/11/20 *
T031	Greenwood	1101	1169	68	6%	4593	3616	-977	-21%	95/11/20
T071	Runnymede	1222	1540	318	26%	4421	5158	737	17%	96/5/06
T097	Yonge	959	1894	935	97%	4305	5638	1333	31%	96/5/22
T050	Burnamthorpe	1190	1281	91	8%	4148	3690	-458	-11%	96/10/29 *
T113	Danforth	1105	994	-111	-10%	4067	3499	-568	-14%	95/12/13
T062	Mortimer	798	1273	475	60%	3954	4321	367	9%	96/10/07 *
T123	Shorncliff	938	917	-21	-2%	3854	3054	-800	-21%	95/10/23
T051	Leslie	918	1115	197	21%	3785	3324	-461	-12%	96/5/22
T069	Warden South	919	1462	543	59%	3627	4974	1347	37%	96/4/23
T015	Evans	873	954	81	9%	3598	2764	-834	-23%	96/5/07
T010	Van Horne	1374	1117	-257	-19%	3579	2860	-719	-20%	97/1/29
T061	Northtown	998	1174	176	18%	3563	3451	-112	-3%	96/11/25 *
T088	South Leaside	1104	783	-321	-29%	3554	2373	-1181	-33%	96/5/29
T160	Bathurst North	728	462	-266	-37%	3538	2473	-1065	-30%	96/6/06
T107	Keele North	1311	1582	271	21%	3534	4626	1092	31%	96/10/08 *
T066	Prince Edward	968	997	29	3%	3500	3274	-226	-6%	96/4/25
T009	Bellamy	971	910	-61	-6%	3358	2714	-644	-19%	96/2/26
T117	Alness	1399	655	-744	-53%	3196	1764	-1432	-45%	96/10/15 *

Table 10 - TTC Boardings

Route		A.M. Peak Boardings				Daily Boardings				
Code	Name	Count	TTS	Difference		Count	TTS	Difference		Date
T122	Graydon hall	928	745	-183	-20%	3188	1954	-1234	-39%	96/4/04
T049	Bloor West	1064	832	-232	-22%	3157	2311	-846	-27%	96/4/15
T134	Tapscott	1013	937	-76	-8%	3156	2829	-327	-10%	96/5/06
T056	Leaside	972	912	-60	-6%	3103	2921	-182	-6%	96/11/18 *
T005	Avenue Road	895	1034	139	16%	3093	3447	354	11%	96/9/23 *
T124	Sunnybrook	658	473	-185	-28%	3082	1840	-1242	-40%	96/4/15
T126	Christie	688	724	36	5%	3052	2637	-415	-14%	95/11/02
T104	Faywood	772	678	-94	-12%	3021	2098	-923	-31%	96/3/25
T065	Parliament	561	590	29	5%	3019	2440	-579	-19%	96/2/26
T135	Gerrard	762	952	190	25%	2984	2862	-122	-4%	96/4/10
T030	Lambton	752	853	101	13%	2966	2723	-243	-8%	96/12/03 *
T139	Huntingwood	1037	566	-471	-45%	2868	1471	-1397	-49%	96/5/29
T021	Brimley	716	803	87	12%	2855	2630	-225	-8%	96/2/15
T002	Anglesey	725	844	119	16%	2654	2391	-263	-10%	96/5/07
T103	Mt Pleasant North	952	604	-348	-37%	2579	2013	-566	-22%	96/5/28
T098	Willowdale-Senlac	814	695	-119	-15%	2565	1820	-745	-29%	96/10/29 *
T125	Drewry	828	837	9	1%	2487	2058	-429	-17%	96/11/25 *
T059	Maple Leaf	1190	519	-671	-56%	2477	1504	-973	-39%	96/3/04
T171	Progress East	516	866	350	68%	2436	3040	604	25%	95/11/20
T092	Woodbine South	582	451	-131	-23%	2434	1686	-748	-31%	96/4/04
T191	Hwy 27 express *	1119	939	-180	-16%	2255	2244	-11	0%	96/4/01
T127	Davenport	523	759	236	45%	1962	2210	248	13%	96/6/03
T132	Milner	815	826	11	1%	1954	2165	211	11%	95/12/19
T080	Queensway	511	532	21	4%	1952	1687	-265	-14%	96/11/20 *
T130	Middlefield	634	690	56	9%	1951	1772	-179	-9%	96/4/15
T083	Jones	647	523	-124	-19%	1902	1512	-390	-21%	96/10/23 *
T105	Wilson heights	618	860	242	39%	1868	2575	707	38%	96/10/15 *
T014	Glencairn	839	584	-255	-30%	1849	1517	-332	-18%	96/11/18 *
T082	Rosedale	436	736	300	69%	1732	2138	406	23%	96/5/13
T078	St Andrews	559	805	246	44%	1668	1948	280	17%	96/3/25
T121	Front-Esplanade	526	640	114	22%	1280	1616	336	26%	96/10/21 *
T074	Mt Pleasant	268	492	224	84%	1172	1391	219	19%	96/12/01 *
T028	Divisville	792	1041	249	31%	1155	2948	1793	155%	96/2/12
T008	Broadview	197	663	466	237%	940	2263	1323	141%	96/10/15 *
T115	Silver hills	297	103	-194	-65%	739	187	-552	-75%	96/10/22 *
T055	Warren Park	322	183	-139	-43%	595	555	-40	-7%	96/2/12
T033	Forest Hill	306	363	57	19%	539	755	216	40%	96/10/21 *
T120	Calvington	311	121	-190	-61%	518	492	-26	-5%	96/9/30 *
T141	Mt Pleasant prem. Exp.	239	247	8	3%	412	348	-64	-16%	#N/A
T162	Lawrence-Donway	93	83	-10	-11%	397	161	-236	-59%	96/10/03 *
T143	Queen prem. Exp.	162	120	-42	-26%	284	176	-108	-38%	96/12/02 *
T136	Wynford prem. Exp.	174	135	-39	-22%	269	196	-73	-27%	#N/A
T144	Underhill prem. Exp.	141	134	-7	-5%	232	220	-12	-5%	96/4/15
T142	Avenue prem. Exp.	169	141	-28	-17%	212	323	111	52%	96/4/15
	Total Bus	**286029**	**306689**	**20660**	**7%**	**1150377**	**991923**	**-158454**	**-14%**	
	Blue night services	N/A	0				0			
T498	Wheel Trans	N/A	291			2642	2389			
	Other/Unknown	N/A	992			104	1581			
	Total TTC	**485925**	**569987**	**84062**	**17%**	**2077895**	**1877441**	**-200454**	**-10%**	

There is considerable variation in the accuracy with which the TTS data matches the TTC counts on individual bus routes. The biggest discrepancy is for the Dufferin Street bus but the count information was collected 18 months before the TTS and at a different time of year. It is possible that measurable declines in ridership have occurred on a number of routes so that the actual number of boardings at the time of the survey is less than that given by the TTC counts. It is also possible that there is some under reporting of the number of bus boardings in the TTS due to incomplete routing information. During the conduct of the survey staff from the TTC did a visual review of the information recorded for every transit trip. That review ensured that every route segment belonged to a valid transit route and call backs and corrections were made to obvious inconsistencies. The review process, however, could not ensure that every route segment was actually reported nor necessarily identify the correct route where several feasible alternatives actually exist. The detailed validation work by the TTC should provide better insight into route by route variations and the reliability of the TTS data for analysis at the individual route level. The total number of daily TTC bus boardings may be slightly under reported. There is no evidence of under reporting in the peak period.

The total number of Wheeltrans users reported by TTS is close to the TTC count but that count only includes the mini-bus component of Wheeltrans ridership. Wheeltrans riders that travel by taxi are not included. It is not known how the taxi component is most likely to have been reported in TTS.

Table 11 presents a similar comparison to table 10 for the transit routes operated by Mississauga transit. The count information differs from the TTC data in that it is estimated from fare box revenue rather than physical boarding counts. The Mississauga data is more comparable to TTS than the TTC data in that it represents the average weekday ridership for the months of October and November 1996 but may not be as reliable due to the method of collection. The counts rely on bus drivers correctly registering each transit pass use and transfer from another route. The accuracy of the peak period counts depends on the bus driver resetting the fare box at the end of the last run that falls within the time period. If the driver does not reset the fare box, or is late doing so, the peak period estimates will be incorrect. The daily total should not be affected.

Total daily boardings on Mississauga transit as reported by TTS are within 10% of the estimate provided by Mississauga transit. All counts of individual routes are within 2000 and only six routes differ by more than 1000. The count information provided for the peak period is suspect. Some of the counts are less than 10% of the daily totals which is hard to rationalize given the normal dominance of peak period travel on public transit. It seems highly likely that the TTS data is more reliable than the peak period estimates based on fare box revenue.

Tables 12 through 15 contain passenger boarding count comparisons for several other municipal transit operators in the GTA for which boarding counts were available at the time the validation was performed. Boarding counts were provided by Brampton, Markham, Vaughan and Whitby transit operators. The counts are actual boarding counts similar to those performed by the TTC but only daily totals were available. The data are presented for all routes for which counts were available but very few meet the criterion of 2000 boardings needed for a reasonable degree of statistical accuracy. In general the TTS gives total that are slightly higher than the counts. It should noted that many of the counts were done at different times of year and that some are for 1995, not 1996. Transit ridership is generally highest in early fall which coincides with the timing of the TTS.

Table 11 - Mississauga Transit Ridership

Route		A.M. Peak Boardings				Daily Boardings			
Code	Name	Count	TTS	Difference		Count	TTS	Difference	
MS01	Dundas	1257	2328	1071	85%	8917	8696	-221	-2%
MS03	Bloor	1064	1883	819	77%	5864	5665	-199	-3%
MS04	Applewood	220	401	181	82%	1158	1299	141	12%
MS05	Dixie	259	1350	1091	421%	2961	4257	1296	44%
MS06	Credit Woodlands	269	374	105	39%	1662	1177	-485	-29%
MS07	Airport	354	702	348	98%	2072	2228	156	8%
MS08	Cawthra	852	938	86	10%	3406	3120	-286	-8%
MS09	Streetsville	418	610	192	46%	2359	2412	53	2%
MS10	Meadowvale	315	392	77	24%	2155	1881	-274	-13%
MS11	Malton	250	424	174	70%	754	1322	568	75%
MS12	Rexdale	47	18	-29	-62%	149	128	-21	-14%
MS13	Clakson	440	753	313	71%	2326	2242	-84	-4%
MS16	Malton East	122	118	-4	-3%	417	372	-45	-11%
MS17	Dixie Ind. South	232	64	-168	-72%	447	203	-244	-55%
MS18	Malton Ind. South	197	200	3	2%	897	460	-437	-49%
MS19	Hurontario	2052	3126	1074	52%	13951	11978	-1973	-14%
MS20	Rathburn	371	912	541	146%	2264	3510	1246	55%
MS22	Humber College	251	356	105	42%	1303	1222	-81	-6%
MS23	LakeShore	600	786	186	31%	2954	2287	-667	-23%
MS25	Britannia Rd	253	218	-35	-14%	470	521	51	11%
MS26	Burnamthorpe	1150	2574	1424	124%	10546	10231	-315	-3%
MS27	Matheson	192	295	103	54%	434	592	158	36%
MS28	Confederation	393	604	211	54%	1948	1752	-196	-10%
MS29	Sheridan Park	69	181	112	162%	644	474	-170	-26%
MS30	Malton West	0		0		286	38	-248	-87%
MS34	Eglinton West	189	308	119	63%	1868	1764	-104	-6%
MS38	Creditview	285	267	-18	-6%	1080	1005	-75	-7%
MS40	Westwood	107	168	61	57%	752	429	-323	-43%
MS41	Port Credit	14	55	41	293%	14	172	158	1129%
MS42	Derry	179	680	501	280%	1140	1705	565	50%
MS43	Lisgar	111	41	-70	-63%	318	175	-143	-45%
MS44	Falconer	252	369	117	46%	1682	1457	-225	-13%
MS47	Collegeway	66	101	35	53%	412	164	-248	-60%
MS48	Erin Mills Pkwy	641	896	255	40%	4147	3963	-184	-4%
MS51	Tomken	517	1062	545	105%	1607	2683	1076	67%
MS52	Meyerside Ind.	148	148	0	0%	687	360	-327	-48%
MS53	Kennedy	122	136	14	11%	467	276	-191	-41%
MS65	Sandlewood	43	44	1	2%	485	215	-270	-56%
MS67	Heartland	147	244	97	66%	796	552	-244	-31%
MS68	Bristol	91	80	-11	-12%	827	454	-373	-45%
MS70	Heartland Exp.	165	122	-43	-26%	222	224	2	1%
MS81	Dundas Exp.	944	1010	66	7%	3645	2485	-1160	-32%
MS83	Bloor Exp.	455	374	-81	-18%	1361	759	-602	-44%
MS85	Dixie Exp.	251	284	33	13%	749	528	-221	-30%
MS86	Burnamthorpe Exp.	674	844	170	25%	3004	1958	-1046	-35%
MS89	Meadowvale Exp.	586	331	-255	-44%	1353	947	-406	-30%
MS97	School Specials	235	20	-215	-91%	886	164	-722	-81%
	Other or unknown	74	153	79	107%	2546	526	-2020	-79%
Total Mississauga Transit		17923	27344	9421	53%	100392	91032	-9360	-9%

Table 12 - Brampton Transit Boardings

Route Code	Name	Daily Boardings Count	TTS	Difference	
BR07	Kennedy	2493	2106	-387	-16%
BR02	Main	2292	2547	255	11%
BR01	Queen	1704	3927	2223	130%
BR14	Torbram	1529	948	-581	-38%
BR18	Dixie	1474	1322	-152	-10%
BR11	Steeles	1402	1853	451	32%
BR77	Hwy 7	1328	2762	1434	108%
BR08	Centre	1189	994	-195	-16%
BR12	Grenoble	804	771	-33	-4%
BR15	Bramalea	710	1121	411	58%
BR09	Vodden	548	570	22	4%
BR17	Howden	484	505	21	4%
BR04	Chinguacousy	467	381	-86	-18%
BR10	Industrial	265	346	81	31%
BR03	McLaughlin	259	635	376	145%
BR16	Southgate	168	193	25	15%
BR13	Avondale	166	169	3	2%
BR20	E. Industrial	164	136	-28	-17%
	Other or unknown	1263	819	-444	-35%
Total Brampton Transit		18709	22105	3396	18%

Table 13 - Markham Transit Boardings

Route Code	Name	Daily Boardings Count	TTS	Difference	
MA01	North Trunk	3406	3475	69	2%
MA02	South Trunk	2029	2776	747	37%
MA04	Unionville	611	634	23	4%
MA03	Thornhill Local	349	610	261	75%
MA08	Unionville Exp.	140	256	116	83%
MA05	Buttonville North	91	267	176	193%
MA07	16th Avenue	N/A	250	N/A	N/A
MA99	Unknown	418	81	-337	-81%
Total Markham Transit		7044	8349	1305	19%

Table 14 - Vaughan Transit Boardings

Route Code	Name	Daily Boardings Count	TTS	Difference	
VA01	Woodbridge	108	117	9	8%
VA02	Pine Valley	134	258	124	93%
VA03	Islington Ave.	73	122	49	67%
VA04	Major Mackenzie	233	188	-45	-19%
VA05	Clark	2120	1950	-170	-8%
VA06	Ansley Grove	58	197	139	240%
VA07	Martin Grove	263	807	544	207%
VA99	Vaughan route unknown		40	40	N/A
Total Vaughan Transit		2989	3679	690	23%

Table 15 - Whitby Transit Boardings

Route Code	Name	Daily Boardings Count	TTS	Difference	
WH01	Otter Creek/W Lynde	243	264	21	9%
WH02	Brock/Timber/Hospital	440	428	-12	-3%
WH03	Garden	245	552	307	125%
WH04	Anderson	389	447	58	15%
WH05	Thickson/Garrard	220	570	350	159%
WH06	White Oaks/Oshawa Centre	835	852	17	2%
WH99	Whitby route unknown	16	37	21	131%
Total Whitby Transit		2388	3150	762	32%

Table 16 shows comparisons between the TTS and annual ridership estimates for the municipal operators for which boarding counts were not available at the time of the validation. The TTS numbers are based on version 2.0 of the database. The annual ridership data were obtained from the Transit Office at the Ministry of Transportation and are for the year 1995. In most cases the annual ridership has been estimated from fare box revenue. The TTS trip data excludes transfers between routes on the same transit property and should therefore be comparable with ridership estimates based on fare box revenue. The relationship between daily and annual ridership depends on the size of the transit property and the frequency of weekend transit use relative to week days. Weekend ridership is minimal for the smaller properties. A TTS to annual ratio of less than 270 is likely to mean that the TTS trip data is over reported. A ratio greater than 320 is likely to indicate under reporting. Based on those criteria transit travel could be slightly under represented in Hamilton. The ratios in Oakville, St. Catharines and Peterborough are less than 270 but that could be the result of ridership at the time of the survey being higher than the year round average. In all of the other municipalities the ratio of annual ridership to daily trips, as reported in the TTS, is either within the expected range or the total numbers are too small for a meaningful comparison to be made.

Table 16 - Comparison with Annual Transit Ridership

	TTS Daily		Annual	Annual Pass.
	Boardings	Trips	pass. (000's)	TTS Daily Trips
Hamilton	73,813	56,012	20,007	357
Oshawa	13,506	10,709	3,115	291
Oakville	9,435	7,524	1,885	250
Burlington	6,303	5,163	1,364	264
Pickering	5,361	4,950	1,058	214
Ajax	4,004	4,176	1,306	313
Richmond Hill	4,326	3,943	742	188
Newmarket	2,359	2,143	815	380
Aurora	509	509	72	141
Milton	157	157	101	642
St. Catharines	12,184	12,113	3,059	253
Guelph	11,271	11,271	3,394	301
Peterborough	7,973	7,973	1,943	244
Barrie	4,109	4,091	1,194	292
Welland	2,069	2,035	362	178
Lindsay	410	410	78	190
Orangeville	72	72	37	513

3.6 GO Transit Ridership

Tables 17 and 18 contain comparisons between the TTS data and boarding count information supplied by GO transit for GO Bus and GO Rail. The most significant differences are an under representation of the Whitby train meet service and a corresponding over representation of the Highway 2 bus service between Oshawa and Yorkdale. The Whitby GO station is served by both routes and it is possible that some survey responses were ambiguous as to which route was actually used. The 8% difference in total ridership can be attributed to the absence of count information for the Bayview bus service. There is an almost exact total GO Rail ridership with slight under representation of Lakeshore East relative to the other routes.

Table 17 - GO Bus Daily Boardings

Route		Daily Boardings			
Code	Name	Count	TTS	Difference	
GB01	Oakville Train Meet	1379	1104	-275	-20%
GB03	Georgetown Train Meet	31	45	14	45%
GB06	Richmond Hiil Train Meet	144	130	-14	-10%
GB09	Whitby Train Meet	1589	572	-1017	-64%
GB16	Ham.-Tor. Exp. (QEW)	2273	2384	111	5%
GB19	Oakville-York Mills	332	1087	755	227%
GB21	Milton - Union	1160	637	-523	-45%
GB27	Milton-York Mills	659	494	-165	-25%
GB31	Georgetown-Union	642	324	-318	-50%
GB33	Georgetown-York Mills	830	807	-23	-3%
GB34	Brampton-York Mills	1765	2154	389	22%
GB52	Yonge "C"	7989	7388	-601	-8%
GB61	Richmond Hill-Union	80	590	510	638%
GB62	Newmarket "B"	2872	2511	-361	-13%
GB66	Newmarket-Yorkdale	705	613	-92	-13%
GB68	Bradford	382	270	-112	-29%
GB69	Sutton	326	218	-108	-33%
GB94	Oshawa-Yorkdale	3998	5284	1286	32%
GB58	Bayview	N/A	2619		
Total GO Bus		27156	29307	2151	8%

Table 18 - GO Rail Daily Boardings

Route		Daily Boardings			
Code	Name	Count	TTS	Difference	
GT01	Lakeshore West	34792	33601	-1191	-3%
GT02	Milton	12491	11964	-527	-4%
GT09	Lakeshore East	29375	27195	-2180	-7%
GT03	Georgetown	8652	8651	-1	0%
GT05	Bradford	1764	2258	494	28%
GT06	Richmond Hill	4853	4542	-311	-6%
GT07	Stouffville	2215	2673	458	21%
GT99	Unknown		4014		
Total GO Train		94142	94898	756	1%

Tables 19 and 20 contain comparisons with the results of the 1995 GO Rail survey. The rail survey is done in the outbound direction only. The results have been factored to the same trip total given by TTS in order to compare distributions.

Table 19 reveals some significant differences in age and gender distribution of the TTS data relative to the rail survey. The reported proportion of GO Rail trips made by young males is substantially higher in the TTS than in the rail survey. There is much greater scope for response bias in the GO rail survey than in the TTS since the response rate to the latter is about 30%. It is therefore highly likely that the TTS provides more reliable data than the rail survey with respect to the socio-demographic characteristics of GO Rail riders.

The number of boardings shown in Table 18 is slightly higher than the number of trips shown in Table 20 due to transfers between lines. Table 20 compares the distribution of residences in the TTS with the distribution of destinations in the Rail survey. The difference in definition may well account for the apparent over representation within Metro by the TTS data relative to the Rail survey.

Table 19 - Age and Gender Comparison with 1995 GO Rail Survey

	Female					Male			
Age	95GO	TTS	Difference			95GO	TTS	Difference	
0-17	112	157	45	40%		214	624	410	192%
18-27	6678	8391	1713	26%		3602	6832	3231	90%
28-37	20393	19612	-781	-4%		10594	13461	2867	27%
38-47	15530	14128	-1402	-9%		12273	12528	254	2%
48-57	6574	5784	-791	-12%		8240	7050	-1190	-14%
58-67	1466	1030	-436	-30%		2459	2072	-387	-16%
68 +	188	596	408	216%		329	412	84	26%
Refused	3155	131	-3024	-96%		1036	34	-1002	-97%
Total	54097	49830	-4267	-8%		38746	43013	4267	11%
% of total	58.5%	53.9%				41.9%	46.5%		

Table 20 - Comparison with 1995 GO Rail Survey by Municipality of Residence

Municipality	95GO	TTS	Difference	
1 PD1	19	399	381	2050%
2 PD2	19	297	279	1500%
3 PD3	409	455	46	11%
4 PD4	0	279	279	N/A
5 PD5	269	186	-84	-31%
6 PD6	288	613	325	113%
7 PD7	1086	1940	854	79%
8 PD8	1077	1012	-65	-6%
9 PD9	603	901	297	49%
10 PD10	130	204	74	57%
11 PD11	139	381	241	173%
12 PD12	696	678	-19	-3%
13 PD13	1829	2228	399	22%
14 PD14	1485	1513	28	2%
15 PD15	3092	3138	46	2%
16 PD16	1467	1699	232	16%
17 Brock	37	0	-37	-100%
18 Uxbridge	223	46	-176	-79%
19 Scugog	167	306	139	83%
20 Pickering	6499	5468	-1031	-16%
21 Ajax	4568	5181	613	13%
22 Whitby	3333	3983	650	19%
23 Oshawa	2581	3305	724	28%
24 Clarington	1077	966	-111	-10%
25 Georgina	74	56	-19	-25%
26 East Gwillimbury	65	139	74	114%
27 Newmarket	752	1086	334	44%
28 Aurora	613	678	65	11%
29 Richmond Hill	2572	1996	-576	-22%
30 Whit.-Stouff.	297	344	46	16%
31 Markham	2247	2367	121	5%
32 King	269	149	-121	-45%
33 Vaughan	650	715	65	10%
34 Caledon	399	251	-149	-37%
35 Brampton	5905	5376	-529	-9%
36 Mississauga	24343	23248	-1096	-5%
37 Halton Hills	873	826	-46	-5%
38 Milton	817	743	-74	-9%
39 Oakville	11958	10928	-1031	-9%
40 Burlington	5617	4596	-1021	-18%
41 Flamborough	251	390	139	56%
42 Dundas	121	111	-9	-8%
43 Ancaster	186	186	0	0%
44 Glanbrook	9	37	28	300%
45 Stoney Creek	288	316	28	10%
46 Hamilton	1170	1625	455	39%
External to the GTA	2256	1541	-715	-32%
Total	92843	92843		
Metro	12608	15923	3314	26%
Durham	18485	19256	771	4%
York	7539	7530	-9	0%
Peel	30647	28874	-1773	-6%
Halton	19265	17092	-2173	-11%
Hamilton-Wentworth	2024	2665	641	32%