WORKING
DRAFT

GTA P.M. PEAK MODEL

Version 2.0

And

HALTON REGION SUB-MODEL

Documentation
&
Users' Guide

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Contents

1.0 P.M. Peak Period Model for the GTA

Table 1 provides a summary of the main features of the GTA P.M. peak period model. Figure 1 shows the flow of information through the Trip Generation, Mode Split and Trip Distribution components of the model. The modelling procedures are similar to those used in the simplified GTA model for the a.m. peak period but the combinations of trip purposes and mode have been changed to reflect the greater diversity of trip making activity that occurs in the p.m. peak period The model has been calibrated using the 1996 TTS data. The trip generation rates have been modified to take into account the known under reporting of non-work and school travel in the TTS.

The p.m. model differs from the a.m. model in that all of the data preparation, model execution and basic reporting are done within the emme2 framework without the use of external spreadsheets.

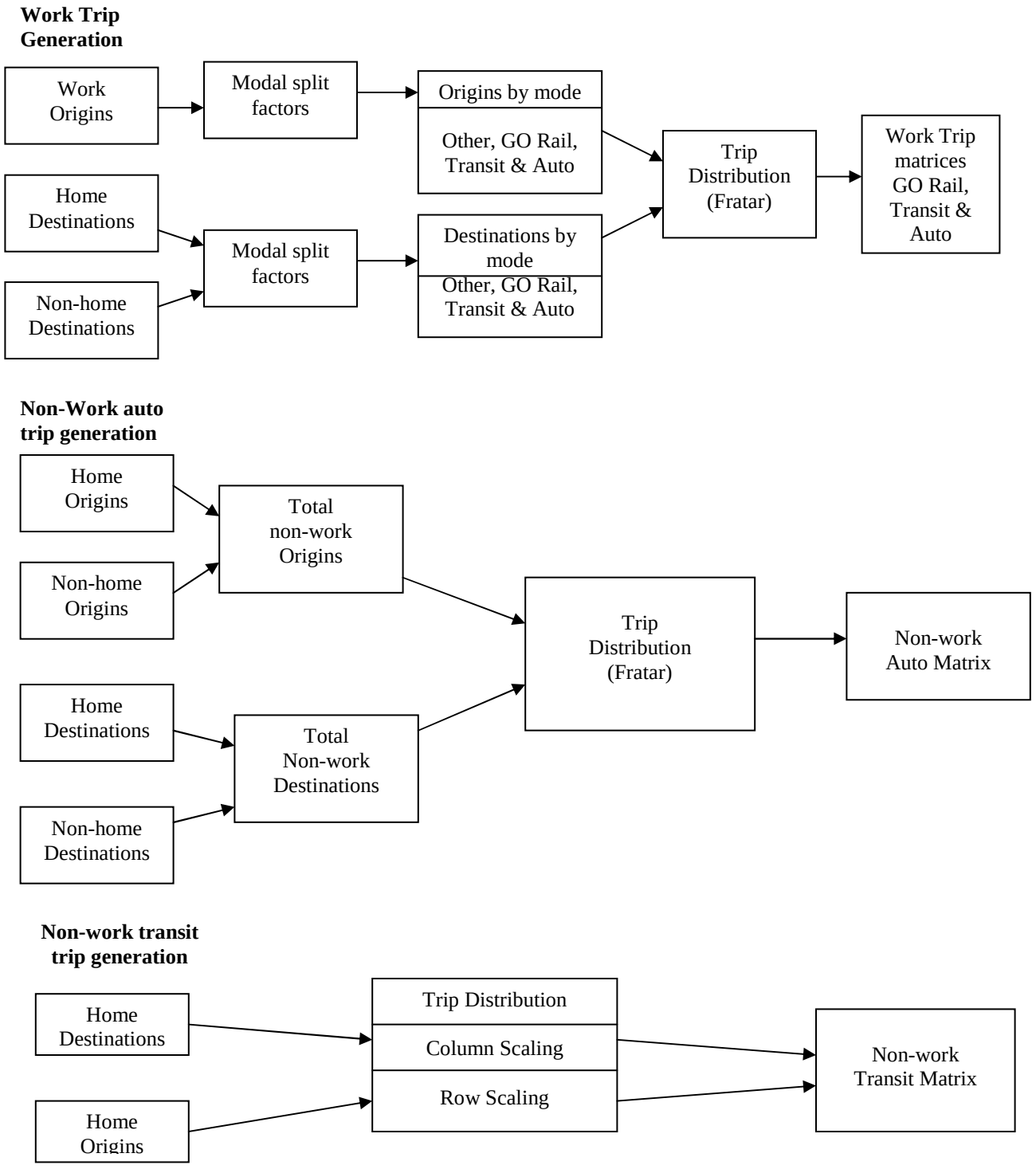
Table 1 - Features of the P.M. Peak Period Model

Time period	p.m. peak 3 hrs (3:01 - 6:00)
Geographic Scope	GTA, including Hamilton-Wentworth, plus 10 adjacent Counties and Regional Municipalities
Zone system	GTA96 plus 26 external zones (1703 total)
Trip purpose categories	1. From Work (all modes) 2. Non-work origin (Auto & transit)
Modes	1. Auto (Driver & Passenger) 2. Transit (Excluding GO Rail access) 3. GO Rail 4. Other, primarily walk & cycle (Trips not distributed or assigned)
Special Features	1. Bucket rounding used at all stages for the calculation of trip end control totals and distributed cell values 2. Modified auto trip distribution reflecting projected changes in travel time (Optional). 3. Simulation of HOV lanes including the formation of new car-pools (Optional). 4. Inclusion of an additional auto matrix that may be used to represent GO Rail access, truck movements or external and through trips from outside the simulated area.
Network used in calibration & validation	1996 Version of 2001 GTA integrated auto and transit (Including HOV lanes)

The definition of the GTA includes the Regional Municipality of Hamilton-Wentworth in the context of the model and this documentation. Regional sub-components of the model have been developed for the Regional Municipalities of Durham and Halton using more detailed zone systems. The Regional sub-models are linked to the main GTA model using similar procedures to those used in the Durham a.m. peak period Regional sub-model.

School trips are not treated as a separate trip purpose because the trip generation and distribution procedures are the same as for other non-work related trips. Further stratification of trip purpose is unlikely to yield significantly different results unless the population forecasts can be stratified by age to reflect significant differences in ageing trends in different areas.

Figure 1 - Flow Diagram



The model produces traffic assignments for auto drivers and local transit. In the trip generation and mode split components the auto mode includes both auto passengers and auto drivers. A subsequent auto occupancy calculation is used to generate the auto driver matrix that is assigned. The mode-split component includes an "other" mode category (Primarily walk and cycle) but the trips are not distributed or assigned. The auto driver matrix may be stratified by auto occupancy permitting the use of multiclass assignments to project HOV lane use.

Bucket rounding is used, wherever applicable, to produce control totals and individual matrix cell values that are integers. The bucket rounding function (bint) is described in full on page 3-67 of the emme/2 User's Manual (Release 8). The advantages of using rounded integer values are:

a) Rounding errors are eliminated as a source of differences when data are exported from emme/2 for external analysis.
b) The size of the data files used to store, or transfer, matrix data is reduced dramatically due to the smaller number of non zero values and obviating the need for decimal places.
c) The standard output tables produced by emme/2 are more readable and easier to analyse.

The model may be run in two stages. In stage 1 levels of service on the road and transit networks are assumed to remain constant at 1996 levels - an appropriate assumption for the purpose of identifying deficiencies and pressure points in the existing network or the travel "demand" associated with future land use alternatives. In the 2nd stage of the model, the distribution of auto trips can be modified to reflect planned improvements in the road network and projected changes in levels of service. Changes in the local transit or GO Rail service must be reflected in the input assumptions to the mode split component. Post distribution diversion procedures can be applied to the output matrices to estimate the ridership potential of any major new transit facility such as a busway.

1.1 Trip Generation

Trip generation rates are applied to estimates of population and employment in order to obtain the trip end totals used as input to the subsequent stages of the model. Table 2 shows the categories of trip used in the trip generation component of the model.. A user specified global weighting factor is applied to balance the total number of work trip origins and destinations to the same total. The default value of the origin weight has been set to 0.5. The destination weight is automatically calculated as 1 minus the origin weight.

Table 2 - Trip Generation Categories

		TTS Trip Total
Employment Based Trip Rates		
	Work trip origins - all modes	1,290,169
Population Based Trip Rates		
	Work to home destinations - all modes	1,048,965
	Non work to home destinations -auto mode	606,228
	Non work to home destinations - transit mode	138,339
	Home origins - auto mode	460,011
	Home origins - transit mode	43,101
Combined Population & Employment Trip Rates *		
	Work to non-home destinations - all modes	239,635
	Non-home non-work origins - auto mode	217,817
	Non-home destinations with non--home non-work origins - auto mode	217,899

* The combined trip rates are applied to the employment total plus half the population.

The following trip categories are not included in the trip generation component of the model:

1. GO Rail trips with a non work origin (8.3% of total p.m. peak GO Rail trips - TTS data)
2. Non home or work based transit trips (4.6% of total p.m. peak transit trips - TTS data)

The model uses global adjustment factors, prior to trip assignment, to correct for the under representation of these two modes.

The use of separate auto and transit trip generation rates in the non work trip categories recognises the strong correlation between mode choice and trip purpose in those categories. 47% of the transit trips are school related compared to just 8% of auto trips (TTS data).

Base case trip generation rates were obtained from the TTS data at an aggregated level. The zone ensemble "gg", in the emme2bank, contains the zone aggregations that are used. These aggregations are sub-divisions of Planning Districts with the first digit of a 2-digit number, or 2 digits of a 3-digit number, being the planning district number. The total number of aggregations is 77. The aggregations are the same as were used for the a.m. peak model except for some amalgamations in Markham, Vaughan and Brampton where the previous aggregations contained insufficient data.

gg313 has been expanded to include gg315
gg335 has been expanded to include gg333
gg352 has been expanded to include gg351
gg354 has been expanded to include gg353, gg355 and gg356

The aggregations are shown in Figure 2. The trip generation rates used in future forecasts can be based on the same aggregations, a different set of aggregations or individual values for each traffic zone.

Table 3 shows the trip generation rates used in the calibration of the model. These rates were calculated from the TTS data and adjusted to account for the known under reporting of non work or school related trips. The trip rates for areas outside the GTA are for trips to or from the GTA only. There is assumed to be no non-work related local transit trips to or from areas outside the GTA. The number of external observed trips in the TTS database is too small to be meaningful.

The trip rates used in the running of the model can be adjusted by applying a global factor or new rates can be defined using the same zone aggregations (gg), any other zone grouping defined in the emme2bank, individual zones or any combination of the above.

Figure 2 - Aggregations Used in Trip Generation

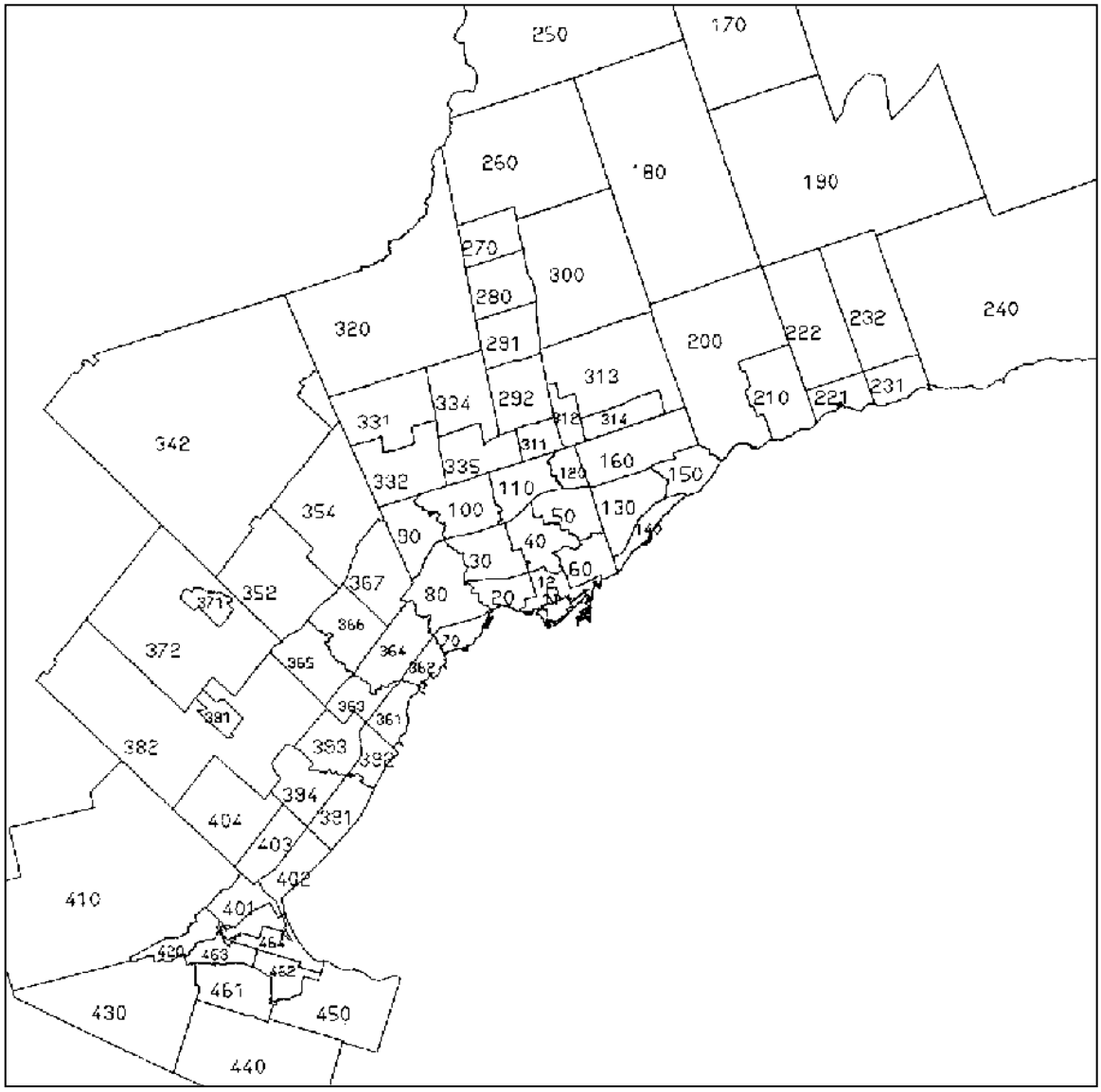


Table 3 - Trip Generation Rates (TTS)

	Origins Per 1000 Emp.	Origins per 1000 population		Destinations per 1000 Population			Per 1000 (Emp. + Pop./2)		
							Destinations		Origins
From	Work	Home		Work	not work		Work	not home or work	
To	All	All		Home			not home	not home	
Mode	All	Auto	Transit	All	Auto	Transit	All	Auto	
gg									
11	561	35	28	209	37	63	70	52	26
12	631	30	11	284	33	49	51	32	10
20	424	55	22	206	65	58	49	67	36
30	523	60	21	192	79	58	47	65	35
40	529	85	17	218	116	48	60	74	43
50	552	84	12	189	132	54	39	63	32
60	416	58	19	207	77	64	46	64	46
70	517	91	11	205	111	36	38	57	24
80	546	100	10	185	143	43	64	114	62
90	550	84	8	209	98	44	42	100	32
100	582	66	11	190	90	55	46	72	32
110	543	84	13	192	128	54	62	91	54
120	563	79	10	194	129	56	53	81	42
130	521	76	13	182	107	50	58	105	55
140	373	92	11	191	139	46	39	93	46
150	450	85	9	203	120	52	38	76	45
160	535	73	10	199	112	49	41	72	39
170	500	85	0	178	145	0	30	55	17
180	450	119	0	191	178	0	31	147	46
190	480	117	0	188	147	0	42	124	69
200	520	108	1	226	141	15	51	132	71
210	457	107	1	217	143	11	42	121	52
221	514	123	2	210	142	9	59	174	64
222	488	121	2	213	162	6	45	115	47
231	413	113	4	178	136	12	35	166	58
232	456	149	2	196	160	16	40	161	64
240	457	132	1	185	122	2	27	112	47
250	451	72	0	182	121	1	41	72	40
260	423	107	0	206	145	0	35	64	32
270	497	118	1	221	140	12	64	168	77
280	557	116	0	219	147	5	40	121	55
291	464	126	0	235	144	0	31	92	56
292	538	95	3	221	154	21	53	96	45
300	525	133	0	213	150	0	45	87	65
311	506	112	6	221	150	29	46	117	40
312	639	107	2	188	178	19	51	48	30
313	469	104	2	220	158	10	50	145	68
314	561	74	5	210	132	23	43	75	34
320	504	98	0	196	123	0	38	99	40
331	537	49	5	182	100	0	5	90	61
332	572	74	1	246	128	10	34	73	30
334	545	82	0	248	107	12	48	69	33
335	569	97	3	201	157	18	40	85	36
341	558	98	0	240	156	0	55	103	41
342	498	99	0	239	128	1	32	67	16
352	484	101	2	223	128	10	41	106	53
354	501	106	2	238	129	8	51	106	41

Table 3(Cont.) - Trip Generation Rates (TTS)

	Origins Per 1000 Emp.	Origins per 1000 population		Destinations per 1000 Population			Per 1000 (Emp. + Pop./2)		
							Destinations		Origins
From	Work	Home		Work	not work		Work	not home or work	
To	All	All		Home			not home	not home	
Mode	All	Auto	Transit	All	Auto	Transit	All	Auto	
361	482	113	4	222	153	6	35	92	45
362	499	101	1	229	121	10	57	135	79
363	535	101	3	228	134	11	50	125	55
364	507	95	7	220	118	19	53	116	52
365	557	101	4	243	126	10	53	104	32
366	596	98	5	229	126	9	40	62	30
367	552	92	4	198	102	11	37	74	28
371	513	125	0	250	167	0	48	149	49
372	598	135	0	261	129	0	29	125	34
381	462	134	0	240	141	2	43	105	27
382	511	106	0	194	164	2	34	133	42
391	563	115	1	199	181	6	54	108	51
392	504	123	1	222	162	6	57	135	51
393	569	97	1	243	134	6	52	137	75
394	505	146	1	223	159	6	36	153	63
401	500	119	1	199	166	5	34	117	87
402	494	127	1	231	167	5	54	173	97
403	539	139	1	231	158	5	42	114	39
404	610	185	1	157	213	5	22	75	47
410	463	123	0	187	176	1	22	103	40
420	465	134	1	188	191	16	45	145	73
430	475	125	0	197	153	2	44	137	40
440	397	108	0	199	130	0	33	106	37
450	514	114	2	208	127	6	36	101	49
461	431	129	5	169	150	22	46	170	84
462	449	115	6	169	135	23	34	136	68
463	528	93	15	170	101	28	41	109	51
464	486	96	7	155	103	33	19	54	17
500	**17**	**4**	**0**	**18**	**10**	**0**	**3**	**7**	**2**
510	**14**	**6**	**0**	**13**	**5**	**0**	**2**	**5**	**3**
520	18	16	0	43	28	0	4	12	4
530	**29**	**13**	**0**	**57**	**14**	**0**	**6**	**6**	**3**
540	**51**	**10**	**0**	**68**	**21**	**0**	**7**	**18**	**4**
550	**28**	**7**	**0**	**36**	**11**	**0**	**4**	**3**	**3**
560	16	3	0	11	3	0	2	2	1
570	**28**	**6**	**0**	**20**	**8**	**0**	**3**	**6**	**3**
580	**14**	**9**	**0**	**30**	**11**	**0**	**4**	**6**	**4**
590	21	6	0	21	8	0	3	4	2
Toronto	546	72	15	198	101	53	53	73	38
Durham	466	121	2	202	145	10	41	138	57
York	552	98	2	216	144	13	46	98	45
Peel	529	100	4	227	126	11	46	99	42
Halton	522	125	1	229	159	5	48	135	63
Ham.-Wen.	484	116	6	177	138	18	37	123	57
Total GTA	533	92	9	206	121	31	48	93	44

External rates are for trips to or from the GTA

Values shown in bold type have been adjusted to reflect partial coverage or absence of TTS data.

1.2 Mode Split

Figure 3 shows the zone aggregations used in the calibration of the mode split component of the model. The areas not shown have the same aggregations as used for trip generation (Figure 2). Table 4 shows the base case modal split factors calculated from TTS data. The columns labelled GO 2000 contain GO Rail mode splits that have been adjusted to reflect the observed increases in ridership that occurred between the 1996 TTS and May of 2000. The numbering convention is the same as for the aggregations used in trip generation (i.e. the first 1 or 2 digits are the planning district number). The total number of aggregations is 127. The letters shown in the 2nd column of Table 4 denote non-contiguous areas that have been aggregated further due to a lack of data.

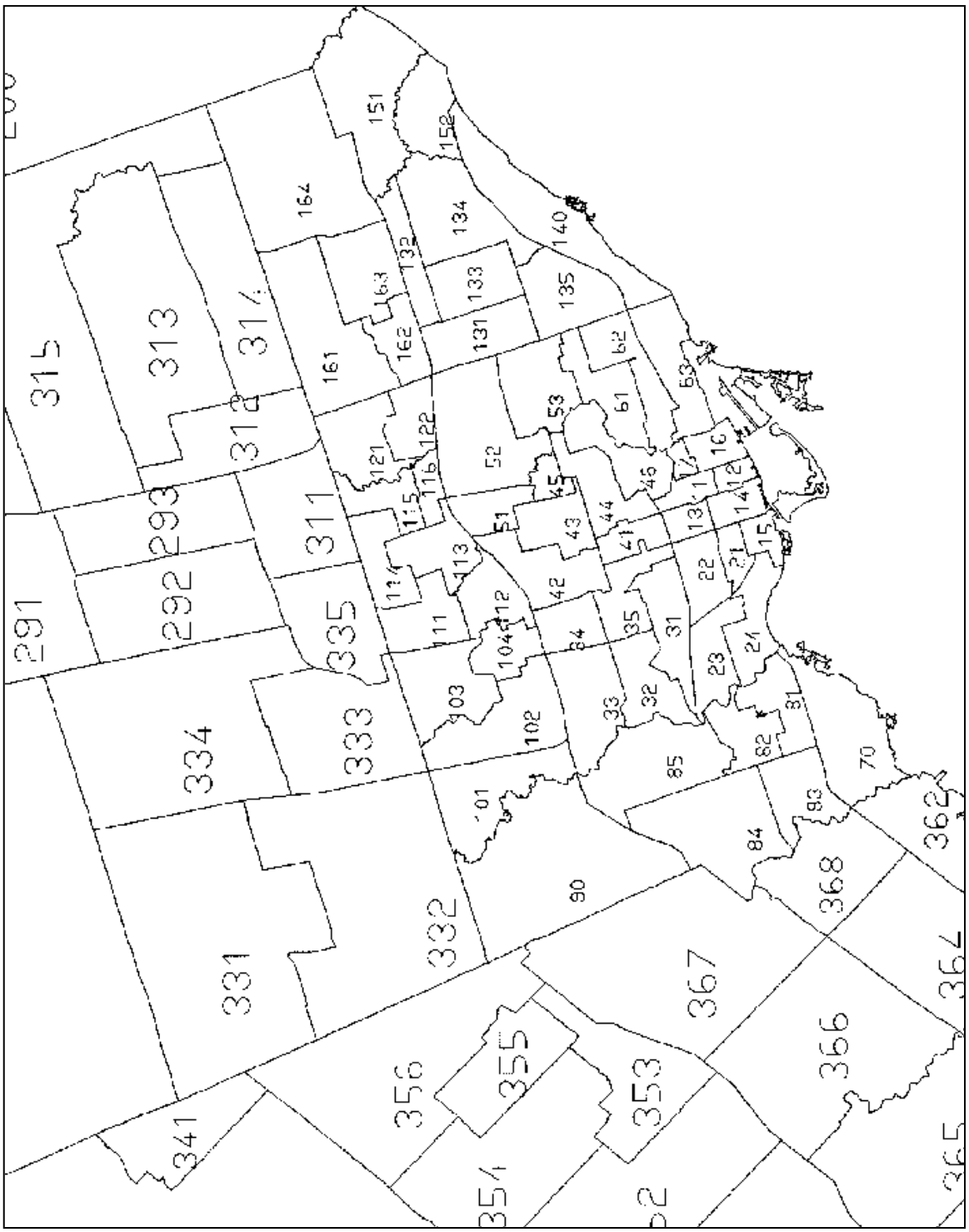
The factors are applied sequentially to determine the subsequent mode shares after the previous mode has been subtracted from the total. The sequence of application is

i) Other (Walk and Cycle)
ii) GO Rail
iii) Local Transit

The remaining trips are assumed to be made by automobile (Driver or passenger).

Mode split factors have to be supplied for both the origins and destinations of trips starting from work. The origins and destinations for each mode are factored to a common total, using a specified weighting factor, prior to calculation of the split for the next mode. The mode split factors applied in the running of the model may be based on the same aggregations as used in the calibration, a different set of aggregations or on individual zone values.

Figure 3 - Zone Aggrgations Used for Modal Split



Areas not shown use the same aggregations as for trip Generation (See Figure 2)

Table 4 - Work Trip Mode Split Factors (%)

		Origins				Destinations			
Gm		Other	GO Rail	GO 2000	Transit	Other	GO Rail	GO 2000	Transit
11		11.1	7.1	9.8	54.9	28.6	0.2	0.3	47.0
12		7.7	23.3	32.0	57.2	31.7	0.3	0.3	32.2
13		15.8	3.0	4.2	48.6	23.6	0.0	0.0	44.4
14		9.4	11.8	16.1	48.9	29.1	0.2	0.3	29.5
15		5.5	2.2	3.0	18.0	19.3	0.0	0.0	28.2
16		9.1	4.1	5.6	32.2	34.9	0.3	0.4	40.4
17		14.0	3.7	5.1	32.9	26.2	0.7	0.9	52.9
21		13.5	1.6	2.3	26.8	14.5	0.3	0.3	35.2
22		9.1	0.3	0.4	27.9	10.5	0.0	0.0	43.0
23		13.6	0.4	0.6	20.4	7.2	0.0	0.0	41.2
24		10.3	1.2	1.6	29.9	9.1	0.0	0.0	39.0
31		6.4	0.0	0.0	23.8	4.7	0.3	0.4	40.8
32		4.5	0.0	0.0	16.5	2.9	0.0	0.0	32.4
33		4.3	0.7	1.0	18.2	3.7	1.3	1.6	23.2
34		2.0	0.2	0.2	26.2	5.0	0.4	0.4	21.4
35		8.7	0.3	0.4	27.8	4.8	0.0	0.0	39.6
41		12.2	0.0	0.0	31.8	8.2	0.0	0.0	26.2
42		4.5	1.4	1.9	22.8	4.2	0.0	0.0	29.4
43		5.9	1.6	2.2	32.7	6.9	0.2	0.3	38.9
44		6.9	3.2	4.4	36.6	10.3	0.1	0.1	41.7
45		4.8	0.0	0.0	23.6	0.0	0.0	0.0	14.6
46		4.0	0.0	0.0	25.1	5.1	0.0	0.0	33.0
51		4.1	0.0	0.0	26.8	0.0	0.0	0.0	25.4
52		1.4	0.0	0.0	13.4	1.9	0.3	0.4	19.9
53		3.1	0.4	0.6	15.2	3.8	0.0	0.0	25.6
61		6.5	0.5	0.7	18.1	4.4	0.2	0.2	36.8
62		11.1	1.3	1.7	26.6	7.1	0.1	0.1	46.6
63		12.5	1.7	2.3	25.1	7.8	0.5	0.6	35.2
70		4.3	1.1	1.4	10.0	4.6	4.6	5.7	17.6
81		2.9	0.4	0.6	10.7	4.1	0.0	0.0	21.7
82		2.5	0.3	0.4	20.1	2.1	0.3	0.4	23.9
83		1.7	0.0	0.0	11.7	0.5	2.0	2.5	9.2
84		0.8	0.0	0.0	6.3	0.9	0.8	0.9	18.1
85		4.3	0.8	1.1	13.8	2.4	1.0	1.2	20.2
90		1.5	0.1	0.1	8.1	1.8	1.7	2.1	17.7
101		1.1	0.0	0.0	12.9	2.4	1.2	1.4	15.0
102		3.2	0.0	0.0	11.6	2.3	0.1	0.2	25.0
103		1.6	0.0	0.0	17.1	2.3	0.0	0.0	22.7
104		0.8	0.0	0.0	12.5	6.1	0.0	0.0	25.7
111		3.4	0.0	0.0	17.4	3.1	0.0	0.0	25.0
112		4.6	0.0	0.0	13.4	2.5	0.0	0.0	24.9
113		2.4	0.7	0.9	25.3	3.3	0.4	0.5	34.0
114		3.4	0.0	0.0	14.8	3.2	0.0	0.0	27.9
115	B	4.1	0.0	0.0	10.5	2.6	2.0	2.4	20.2
116	B	4.1	0.0	0.0	10.5	2.6	2.0	2.4	20.2
121		2.1	0.5	0.7	10.7	1.5	2.3	2.9	24.5
122		2.4	0.5	0.7	11.1	2.4	0.8	1.0	27.7

Table 4 (Cont.) - Work Trip Mode Split Factors (%)

		Origins				Destinations			
gm		Other	GO Rail	GO 2000	Transit	Other	GO Rail	GO 2000	Transit
131		2.0	0.0	0.0	14.9	2.0	1.1	1.3	23.6
132		1.4	0.8	1.1	16.2	2.3	1.6	1.9	22.1
133		2.7	0.3	0.4	15.4	1.6	0.9	1.1	26.6
134		4.0	0.4	0.6	14.8	1.3	4.1	5.1	25.4
135		3.7	0.5	0.7	19.7	3.6	1.0	1.3	40.8
140		5.4	1.2	1.6	7.5	2.4	5.2	6.4	22.1
151		4.7	0.5	0.7	8.4	2.0	7.4	9.1	15.5
152		2.5	1.7	2.3	8.7	1.4	7.2	8.8	22.9
161		2.1	0.0	0.0	11.5	1.3	1.5	1.9	25.3
162		1.5	0.0	0.0	20.5	2.5	1.0	1.3	19.7
163		1.1	0.2	0.3	15.8	1.9	2.7	3.4	20.9
164		1.4	0.0	0.0	8.4	1.0	1.4	1.7	26.2
170	A	3.0	0.1	0.1	0.6	1.7	1.2	1.5	0.7
180	A	3.0	0.1	0.1	0.6	1.7	1.2	1.5	0.7
190	A	3.0	0.1	0.1	0.6	1.7	1.2	1.5	0.7
200		1.9	0.2	0.2	1.2	1.3	10.9	13.4	2.7
210		3.1	0.2	0.3	2.5	1.7	14.1	17.4	3.0
221		1.2	0.7	1.0	1.3	1.4	11.0	13.5	0.0
222		2.0	0.5	0.7	0.4	0.9	7.7	9.5	1.0
231		3.7	0.1	0.2	2.9	3.9	3.4	4.1	3.9
232		4.6	0.4	0.6	1.4	2.6	3.9	4.8	2.0
240	A	3.0	0.1	0.1	0.6	1.7	1.2	1.5	0.7
250	A	3.0	0.1	0.1	0.6	1.7	1.2	1.5	0.7
260	A	3.0	0.1	0.1	0.6	1.7	1.2	1.5	0.7
270		2.6	0.0	0.0	1.2	2.2	2.9	3.5	3.4
280		2.5	0.0	0.0	1.3	1.5	3.6	4.5	4.0
291		2.2	0.0	0.0	1.9	1.0	2.0	2.5	4.1
292		3.7	0.0	0.0	4.6	2.3	4.0	4.9	10.3
293	C	1.3	0.2	0.2	3.4	1.3	3.1	3.8	5.3
300	C	1.3	0.2	0.2	3.4	1.3	3.1	3.8	5.3
311		1.3	0.0	0.0	4.7	0.6	1.8	2.3	11.3
312		0.6	0.0	0.0	5.6	1.2	0.7	0.9	2.2
313		1.7	0.0	0.0	2.7	1.1	3.7	4.5	4.6
314		0.5	0.0	0.0	5.3	0.3	1.2	1.5	14.5
315		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
320		0.9	0.0	0.0	0.0	0.0	1.9	2.3	0.4
331		0.0	0.0	0.0	5.7	0.0	0.0	0.0	2.7
332		0.6	0.0	0.0	4.4	0.5	0.6	0.7	5.1
333		0.2	0.0	0.0	7.3	1.3	0.0	0.0	6.3
334		1.9	0.0	0.0	1.4	1.2	2.4	2.9	4.1
335		1.7	0.0	0.0	11.4	0.5	0.5	0.6	14.1
341	A	3.0	0.1	0.1	0.6	1.7	1.2	3.0	0.7
342	A	3.0	0.1	0.1	0.6	1.7	1.2	9.0	0.7
351	D	2.2	0.0	0.0	3.2	1.6	3.4	3.4	3.8
352	D	2.2	0.0	0.0	3.2	1.6	3.4	4.2	3.8
353	D	2.2	0.0	0.0	3.2	1.6	3.4	4.2	3.8
354	D	2.2	0.0	0.0	3.2	1.6	3.4	4.2	3.8

Table 4 (Cont.) - Work Trip Mode Split Factors (%)

		Origins				Destinations			
gm		Other	GO Rail	GO 2000	Transit	Other	GO Rail	GO 2000	Transit
355	D	2.2	0.0	0.0	3.2	1.6	3.4	4.2	3.8
356	D	2.2	0.0	0.0	3.2	1.6	3.4	4.2	3.8
361		2.3	1.0	1.4	3.6	1.3	14.6	17.9	5.4
362		3.7	0.4	0.6	3.9	2.6	6.7	8.2	4.9
363		3.4	0.0	0.0	4.0	2.0	9.5	11.6	5.1
364		1.6	0.3	0.4	5.7	1.2	6.2	7.7	12.0
365		1.8	0.1	0.1	3.0	1.2	6.9	8.4	3.4
366		0.6	0.1	0.1	4.4	0.5	5.4	6.6	7.3
367		0.5	0.1	0.1	5.1	3.4	0.9	1.1	8.5
368		2.6	0.2	0.2	7.6	1.3	2.5	3.1	12.6
371		3.5	0.0	0.0	0.0	2.5	4.1	5.0	0.3
372		3.0	0.0	0.0	0.0	1.6	1.7	2.1	0.7
381		3.5	0.0	0.0	0.0	2.7	4.7	5.8	1.0
382		3.0	0.0	0.0	0.0	1.6	1.7	2.1	0.7
391		2.1	1.0	1.3	0.9	2.9	8.8	10.8	2.1
392		2.7	2.9	3.9	1.6	2.4	16.5	20.2	2.0
393		3.1	0.2	0.3	1.0	2.3	16.4	20.2	1.7
394		1.3	1.9	2.6	1.9	1.5	17.1	21.0	1.3
401		5.1	0.0	0.0	4.6	4.8	1.4	1.7	0.0
402		1.9	0.2	0.2	2.1	2.3	6.9	8.5	2.2
403		1.3	0.0	0.0	1.3	0.7	3.4	4.2	1.3
404		3.0	0.0	0.0	0.0	1.6	1.7	2.1	0.7
410		3.0	0.0	0.0	0.0	1.7	1.2	1.5	0.7
420		9.2	0.1	0.0	0.6	6.2	1.1	1.4	0.7
430	A	3.0	0.1	0.1	0.6	1.7	1.2	1.5	0.7
440	A	3.0	0.1	0.1	0.6	1.7	1.2	1.5	0.7
450		1.8	0.0	0.0	2.2	0.9	1.2	1.5	1.6
461		3.9	0.0	0.0	4.6	2.3	0.8	1.0	5.8
462		4.6	0.0	0.0	6.6	3.3	0.4	0.4	7.6
463		9.6	0.2	0.3	9.9	13.8	0.8	0.9	11.4
464		1.6	0.0	0.0	3.4	9.0	0.7	0.7	8.0
500		0.6	0.0	0.0	0.0	0.0	2.0	2.0	0.0
510		0.0	0.0	0.0	0.0	0.0	1.9	1.9	0.0
520		0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
530		0.1	0.0	0.0	0.0	0.0	1.6	1.6	0.0
540		0.0	0.0	0.0	0.0	0.0	1.3	1.3	0.0
550		0.1	0.0	0.0	0.0	0.0	2.8	2.8	0.0
560		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
590		0.0	0.0	0.0	0.0	0.0	0.9		0.0
A		3.0	0.1		0.6	1.7	1.2		0.7
B		4.1	0.0		10.5	2.6	2.0		20.2
C		1.3	0.2		3.4	1.3	3.1		5.3
D		2.2	0.0		3.2	1.6	3.4		3.8
Toronto		5.6	5.2		27.4	6.6	1.1		29.4
Durham		2.8	0.3		1.6	1.8	6.6		2.0
York		1.3	0.0		4.7	1.3	2.2		6.9
Peel		1.6	0.1		4.3	1.6	4.9		6.3
Halton		2.5	0.6		1.3	2.1	7.5		1.5
Ham.-Wen.		5.4	0.1		5.7	4.8	0.9		5.5
Total GTA		4.1	2.8		16.0	4.2	2.9		16.4
External		0.0	0.0		0.0	0.0	1.3		0.0

1.3 Trip Distribution

Trips that start from work are distributed by two-dimensional balancing of a "base" matrix to the desired origin and destination zone totals for each of the three modes (auto, GO Rail and local transit). Non-work auto trips are distributed in the same manner. The two non-work transit trip purposes are distributed by factoring each row or column of the applicable "base" matrix to the desired row. The rows are factored to the desired origin trip total for the from home transit trip matrix and the columns to the desired destinations for the to home matrix. The input "base" matrices are not trip matrices. They define an initial probability distribution that is comparable in its role to the impedance component of a gravity model function. The matrices are derived from the 1996 TTS data and have the following characteristics:

a) When applied to the TTS trip end totals they produce an almost identical trip distribution pattern at an aggregate level (e.g.: PD to PD)
b) The observed TTS trip length distribution is closely maintained.
c) The matrices for the auto mode have non-zero values in every row and column. The GO Rail and transit matrices may have zero row and column totals in those areas that currently have no observed ridership (TTS) even at a very aggregate level (e.g. Planning District).

Table 5 compares the TTS, the "base" matrices and resulting simulations with respect to the number of non-zero cells in the trip distribution for each combination of mode and trip purpose. The total number of cells in each matrix is approximately 2.9 million (1703 x 1703). Most of the non-zero cell values in the TTS trip matrices are single observations representing an expanded total of approximately 20 trips (5% sample). The base matrices only have zero values in those areas where there are no observed trips at a more aggregate level (mostly planning district to planning district). The underlying assumption in accepting these zero values is that if there are no trips at all today, the number of trips is not likely to become significant in the foreseeable future. Bucket rounding greatly reduces the number of non-zero cells in the simulated matrix. Row and/or column totals may be zero for those zones that have a forecast population or employment of zero.
(Note: The procedures and aggregations used to produce the base matrices will be documented as an appendix)

Table 5 - Trip Distribution Matrices

	No. of Trips (1996 TTS)	Number of non zero cells		
		TTS	Base Matrix (Possible O-D pairs)	1996 Simulation (Test run)
From work auto	1,013,623	40,355	1,047,990	408,068
From work GO Rail	34,774	1,446	102,651	16,182
From work local transit	190,725	8,007	439,535	101,095
Non work auto	1,286,967	30,183	1,252,376	306,752
Non work>home transit	138,339	4,803	196,408	63,658
From home transit	43,101	1,630	93,744	29,633

Stage 2 of the model adjusts the work to home auto distribution to reflect expected changes in level of service. The method of adjustment is described in section 1.5.

1.4 Auto Assignment

Prior to assignment the matrices for the different trip purposes are aggregated. An auto occupancy matrix is used to calculate the number of auto vehicles (auto drivers) and a peak hour factor is applied. The base case auto occupancy factors are shown in Table 6. The factors are the number of auto drivers plus passengers divided by the number of auto drivers in the TTS data. The occupancy factors have been calculated using the same zone aggregations as for trip generation. The boxed in sections denote areas that have been further aggregated to obtain sufficient observations for statistical reliability. Shading is used to denote non-adjacent cells that have been aggregated together. The general criterion for aggregation is to have a minimum expanded total of 5,000 trips within each aggregation. The TTS does not include trip data for persons under the age of 11. Since these people are, of necessity not auto drivers; the occupancy factors are therefore significantly lower than those one would expect to observe on street are.

Unlike the a.m. model a global peak hour factor is used. In the a.m. model the factor is stratified by trip length due to the significant variation observed in the TTS data. The peak hour factor used in the calibration of the p.m. model is 0.37 based on TTS data. The same, or a different factor, may be used for future model runs. A factor of 0.33 represents uniform distribution of trip start times across the three-hour peak period.

The total auto vehicle matrix also includes the auto vehicle trips specified in a supplementary one-hour auto driver matrix. At the present time this matrix consists of observed (TTS) auto driver access/egress trips to and from GO Rail and subway stations. The matrix extracted from the TTS data was for the peak 3 hours. A factor of 0.52, based on the observed distribution of trip start times, was applied to obtain the peak hour matrix. The model has provision for factoring the supplementary matrix selectively by the origin zones representing egress stations to reflect projected growth in GO Rail ridership.

The supplementary matrix could also be used to represent other trips not included in the basic model. Two potential uses are:

a) The addition of vehicle trips to, from and between the three external cordon stations (401 East of Port Hope, 401 West of Cambridge and the Peace Bridge in Fort Erie)
b) The addition of an auto equivalency matrix representing projected truck movements.

The model includes options to stratify the total auto driver matrix into separate matrices representing 1, 2 and 3 plus auto occupancy and to estimate the number of new high occupancy vehicles that might be formed as a result of exclusive high occupancy vehicle lanes. These procedures are described in section 1.6.

The model calibration and validation have been performed using tangential volume delay functions. The tangential volume delay functions have take the same form as the widely used BPR functions up to the nominal link capacity specified in the link attribute data. Above capacity a straight line that is a tangent to the BPR curve at that point is used. The emme2 equilibrium assignment procedure converges much faster using the tangential volume delay functions than it does with the BPR functions particularly in situations where a large part of the network is assigned over capacity. The performance of the tangential volume delay functions is very similar to that of conical volume delay functions in this regard. The emme2bank includes volume delay functions to represent the time equivalent of tolls on Highway 407. The implied value of travel time (currently $24 per hour) is based on experience in applying the a.m. peak model.

Table 6 - Base Case Auto Occupancy Factors

gg	11	12	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190
11	**1.22**	1.22	1.24	1.23	1.18	1.23	1.23	1.13	1.13	1.13	1.25	1.25	1.25	1.17	1.17	1.24	1.24	1.23	1.23	1.23
12	1.22	**1.22**	1.20	1.20	1.20	1.20	1.20	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.23	1.23	1.23
20	1.22	1.28	**1.21**	1.28	1.14	1.14	1.14	1.24	1.24	1.24	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.15	1.15	1.15
30	1.22	1.28	1.28	**1.28**	1.17	1.14	1.14	1.22	1.22	1.22	1.26	1.18	1.18	1.20	1.20	1.20	1.20	1.15	1.15	1.15
40	1.22	1.28	1.18	1.25	**1.18**	1.17	1.17	1.16	1.16	1.16	1.16	1.18	1.18	1.16	1.16	1.16	1.16	1.15	1.15	1.15
50	1.22	1.28	1.18	1.18	1.17	**1.22**	1.17	1.16	1.16	1.16	1.16	1.24	1.24	1.25	1.20	1.20	1.20	1.15	1.15	1.15
60	1.22	1.28	1.18	1.18	1.18	1.18	**1.27**	1.16	1.16	1.16	1.16	1.23	1.23	1.23	1.23	1.23	1.23	1.15	1.15	1.15
70	1.22	1.22	1.18	1.18	1.16	1.16	1.16	**1.18**	1.22	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.13	1.13	1.13
80	1.22	1.22	1.18	1.18	1.16	1.16	1.16	1.22	**1.23**	1.22	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.13	1.13	1.13
90	1.22	1.22	1.16	1.22	1.16	1.16	1.16	1.09	1.22	**1.30**	1.24	1.09	1.09	1.09	1.09	1.09	1.09	1.13	1.13	1.13
100	1.22	1.22	1.16	1.27	1.14	1.14	1.16	1.09	1.09	1.24	**1.30**	1.16	1.12	1.12	1.12	1.12	1.12	1.13	1.13	1.13
110	1.22	1.22	1.16	1.22	1.14	1.14	1.16	1.09	1.09	1.09	1.16	**1.24**	1.21	1.19	1.19	1.19	1.19	1.13	1.13	1.13
120	1.22	1.22	1.16	1.22	1.07	1.20	1.20	1.09	1.09	1.09	1.24	1.21	**1.28**	1.20	1.20	1.20	1.20	1.13	1.13	1.13
130	1.22	1.22	1.16	1.22	1.07	1.20	1.20	1.09	1.09	1.09	1.24	1.24	1.24	**1.27**	1.21	1.25	1.27	1.13	1.13	1.13
140	1.22	1.22	1.16	1.22	1.07	1.20	1.20	1.09	1.09	1.09	1.24	1.24	1.24	1.21	**1.19**	1.28	1.28	1.13	1.13	1.13
150	1.22	1.22	1.16	1.22	1.13	1.13	1.13	1.09	1.09	1.09	1.24	1.24	1.24	1.28	1.28	**1.22**	1.23	1.16	1.16	1.16
160	1.22	1.22	1.16	1.22	1.13	1.13	1.13	1.09	1.09	1.09	1.24	1.24	1.24	1.26	1.28	1.23	**1.31**	1.16	1.16	1.16
170	1.14	1.14	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	**1.18**	1.18	1.18
180	1.14	1.14	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.18	**1.18**	1.18
190	1.14	1.14	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.18	1.18	**1.18**
200	1.14	1.14	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.12	1.12	1.12
210	1.14	1.14	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.12	1.12	1.12
221	1.14	1.14	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.12	1.12	1.12
222	1.14	1.14	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.12	1.12	1.12
231	1.14	1.14	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.12	1.12	1.12
232	1.14	1.14	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.12	1.12	1.12
240	1.14	1.14	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.12	1.12	1.12
250	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.11	1.11	1.11
260	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.11	1.11	1.11
270	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.11	1.11	1.11
280	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.11	1.11	1.11
291	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.11	1.11	1.11
292	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.11	1.11	1.11
300	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.11	1.11	1.11
311	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.17	1.17	1.17	1.22	1.22	1.22	1.21	1.11	1.11	1.11
312	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.17	1.17	1.17	1.22	1.22	1.22	1.21	1.11	1.11	1.11
313	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.17	1.17	1.17	1.22	1.22	1.22	1.21	1.11	1.11	1.11
314	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.17	1.17	1.17	1.22	1.22	1.22	1.21	1.11	1.11	1.11
320	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.20	1.15	1.15	1.15	1.15	1.15	1.15	1.11	1.11	1.11
331	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.20	1.15	1.15	1.15	1.15	1.15	1.15	1.11	1.11	1.11
332	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.20	1.15	1.15	1.15	1.15	1.15	1.15	1.11	1.11	1.11
334	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.20	1.15	1.15	1.15	1.15	1.15	1.15	1.11	1.11	1.11
335	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.16	1.16	1.16	1.20	1.15	1.15	1.15	1.15	1.15	1.15	1.11	1.11	1.11
341	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
342	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
352	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
354	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
361	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
362	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
363	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
364	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.15	1.16	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
365	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
366	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
367	1.14	1.14	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
370	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
380	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
390	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
400	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
410	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
420	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
430	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
440	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
450	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
461	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
462	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
463	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
464	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.11	1.11	1.11
500	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.22	1.22	1.22
510	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.22	1.22	1.22
520	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.22	1.22	1.22
530	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.22	1.22	1.22
540	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.22	1.22	1.22
550	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.22	1.22	1.22
560	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.22	1.22	1.22
570	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.22	1.22	1.22
580	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.22	1.22	1.22
590	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.22	1.22	1.22
Mean	1.22	1.20	1.21	1.23	1.16	1.18	1.22	1.16	1.19	1.25	1.23	1.20	1.24	1.24	1.18	1.21	1.24	1.12	1.19	1.18

Table 6 (Cont.) - Base Case Auto Occupancy Factors

gg	200	210	221	222	231	232	240	250	260	270	280	291	292	300	311	312	313	314	320	331
11	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
12	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
20	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.17	1.17	1.17	1.17	1.20	1.20
30	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.17	1.17	1.17	1.17	1.20	1.20
40	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.17	1.17	1.17	1.17	1.20	1.20
50	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.17	1.17	1.17	1.17	1.20	1.20
60	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.17	1.17	1.17	1.17	1.20	1.20
70	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
80	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
90	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
100	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.18	1.18	1.18	1.18	1.15	1.15
110	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.18	1.18	1.18	1.18	1.26	1.26
120	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.18	1.18	1.18	1.18	1.26	1.26
130	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
140	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
150	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
160	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
170	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
180	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
190	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
200	**1.25**	1.22	1.13	1.13	1.13	1.13	1.12	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
210	1.22	**1.25**	1.13	1.13	1.13	1.13	1.12	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
221	1.14	1.14	**1.19**	1.21	1.19	1.19	1.12	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
222	1.14	1.14	1.21	**1.19**	1.19	1.19	1.12	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
231	1.14	1.14	1.19	1.19	**1.20**	1.19	1.12	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
232	1.14	1.14	1.19	1.19	1.25	**1.23**	1.12	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
240	1.12	1.12	1.12	1.12	1.17	1.17	**1.19**	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
250	1.11	1.11	1.11	1.11	1.11	1.11	1.11	**1.18**	1.18	1.25	1.16	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
260	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.18	**1.18**	1.25	1.16	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
270	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.25	1.25	**1.24**	1.16	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
280	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.16	1.16	1.16	**1.16**	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
291	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	**1.20**	1.20	1.23	1.23	1.23	1.23	1.23	1.17	1.17
292	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.20	**1.20**	1.23	1.23	1.23	1.23	1.23	1.17	1.17
300	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.21	1.21	**1.16**	1.24	1.24	1.24	1.24	1.15	1.15
311	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.21	1.21	1.24	**1.24**	1.24	1.24	1.24	1.15	1.15
312	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.21	1.21	1.24	1.24	**1.36**	1.24	1.24	1.15	1.15
313	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.21	1.21	1.24	1.24	1.24	**1.27**	1.24	1.15	1.15
314	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.21	1.21	1.24	1.24	1.24	1.24	**1.36**	1.15	1.15
320	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.17	1.17	1.15	1.15	1.15	1.15	1.15	**1.16**	1.15
331	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.17	1.17	1.15	1.15	1.15	1.15	1.15	1.15	**1.23**
332	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.17	1.17	1.15	1.15	1.15	1.15	1.15	1.15	1.15
334	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.17	1.17	1.15	1.15	1.15	1.15	1.15	1.15	1.15
335	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.17	1.17	1.15	1.15	1.15	1.15	1.15	1.15	1.15
341	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
342	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
352	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
354	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
361	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
362	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
363	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
364	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
365	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
366	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
367	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
370	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
380	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
390	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
400	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
410	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
420	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
430	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
440	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
450	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
461	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
462	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
463	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
464	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
500	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
510	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
520	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
530	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
540	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
550	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
560	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
570	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
580	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
590	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Mean	1.19	1.20	1.18	1.18	1.21	1.18	1.14	1.16	1.19	1.19	1.12	1.14	1.18	1.14	1.20	1.17	1.21	1.29	1.11	1.24

Table 6 (Cont.) - Base Case Auto Occupancy Factors

gg	332	334	335	341	342	352	354	361	362	363	364	365	366	367	370	380	390	400	410	420
11	1.17	1.17	1.17	1.20	1.20	1.20	1.20	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.16	1.16	1.16	1.16	1.16	1.16
12	1.17	1.17	1.17	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.16	1.16	1.16	1.16	1.16	1.16
20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.16	1.16	1.16	1.16	1.16	1.16
30	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.09	1.09	1.09	1.09	1.09	1.09
40	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.09	1.09	1.09	1.09	1.09	1.09
50	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.09	1.09	1.09	1.09	1.09	1.09
60	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.09	1.09	1.09	1.09	1.09	1.09
70	1.08	1.08	1.08	1.13	1.13	1.13	1.13	1.12	1.21	1.12	1.21	1.12	1.12	1.12	1.09	1.09	1.09	1.09	1.09	1.09
80	1.08	1.08	1.08	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.17	1.12	1.12	1.21	1.09	1.09	1.09	1.09	1.09	1.09
90	1.08	1.08	1.08	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.12	1.21	1.09	1.09	1.09	1.09	1.09	1.09
100	1.15	1.15	1.15	1.17	1.17	1.17	1.17	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.09	1.09	1.09	1.09	1.09	1.09
110	1.26	1.26	1.26	1.17	1.17	1.17	1.17	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.09	1.09	1.09	1.09	1.09	1.09
120	1.26	1.26	1.26	1.17	1.17	1.17	1.17	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.09	1.09	1.09	1.09	1.09	1.09
130	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.09	1.09	1.09	1.09	1.09	1.09
140	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.09	1.09	1.09	1.09	1.09	1.09
150	1.18	1.18	1.18	1.17	1.17	1.17	1.17	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.09	1.09	1.09	1.09	1.09	1.09
160	1.18	1.18	1.18	1.17	1.17	1.17	1.17	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.09	1.09	1.09	1.09	1.09	1.09
170	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
180	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
190	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
200	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
210	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
221	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
222	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
231	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
232	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
240	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
250	1.14	1.14	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
260	1.14	1.14	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
270	1.14	1.14	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
280	1.14	1.14	1.14	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
291	1.17	1.17	1.17	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
292	1.17	1.17	1.17	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
300	1.15	1.15	1.15	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
311	1.15	1.15	1.15	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
312	1.15	1.15	1.15	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
313	1.15	1.15	1.15	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
314	1.15	1.15	1.15	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
320	1.15	1.15	1.15	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
331	1.15	1.15	1.15	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
332	**1.23**	1.15	1.15	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
334	1.15	**1.23**	1.15	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
335	1.15	1.15	**1.23**	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
341	1.10	1.10	1.10	**1.19**	1.19	1.23	1.23	1.15	1.15	1.15	1.15	1.15	1.15	1.20	1.14	1.14	1.14	1.14	1.14	1.14
342	1.10	1.10	1.10	1.19	**1.19**	1.23	1.23	1.15	1.15	1.15	1.15	1.15	1.15	1.20	1.14	1.14	1.14	1.14	1.14	1.14
352	1.10	1.10	1.10	1.23	1.23	**1.26**	1.22	1.15	1.15	1.15	1.15	1.15	1.15	1.20	1.14	1.14	1.14	1.14	1.14	1.14
354	1.10	1.10	1.10	1.23	1.23	1.20	**1.24**	1.15	1.15	1.15	1.15	1.15	1.15	1.20	1.14	1.14	1.14	1.14	1.14	1.14
361	1.10	1.10	1.10	1.13	1.13	1.13	1.13	**1.18**	1.22	1.22	1.22	1.22	1.22	1.20	1.12	1.12	1.12	1.08	1.08	1.08
362	1.10	1.10	1.10	1.13	1.13	1.13	1.13	1.18	**1.18**	1.22	1.22	1.22	1.22	1.20	1.12	1.12	1.12	1.08	1.08	1.08
363	1.10	1.10	1.10	1.13	1.13	1.13	1.13	1.18	1.17	**1.20**	1.17	1.19	1.22	1.20	1.12	1.12	1.12	1.08	1.08	1.08
364	1.10	1.10	1.10	1.13	1.13	1.13	1.13	1.18	1.17	1.17	**1.26**	1.19	1.19	1.20	1.12	1.12	1.12	1.08	1.08	1.08
365	1.10	1.10	1.10	1.13	1.13	1.13	1.13	1.18	1.17	1.19	1.19	**1.20**	1.15	1.20	1.12	1.12	1.12	1.08	1.08	1.08
366	1.10	1.10	1.10	1.13	1.13	1.13	1.13	1.18	1.17	1.22	1.24	1.15	**1.25**	1.20	1.12	1.12	1.12	1.08	1.08	1.08
367	1.10	1.10	1.10	1.13	1.13	1.16	1.19	1.18	1.17	1.22	1.22	1.13	1.13	**1.23**	1.12	1.12	1.12	1.08	1.08	1.08
370	1.10	1.10	1.10	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	**1.30**	1.16	1.16	1.16	1.12	1.12
380	1.10	1.10	1.10	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.15	**1.23**	1.16	1.16	1.12	1.12
390	1.10	1.10	1.10	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.15	1.16	**1.21**	1.13	1.12	1.12
400	1.10	1.10	1.10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.16	1.13	**1.22**	1.25	1.25
410	1.10	1.10	1.10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	**1.23**	1.25
420	1.10	1.10	1.10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.25	**1.23**
430	1.10	1.10	1.10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.17	1.17
440	1.10	1.10	1.10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.17	1.17
450	1.10	1.10	1.10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.17	1.17
461	1.10	1.10	1.10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.16	1.16
462	1.10	1.10	1.10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.16	1.16
463	1.10	1.10	1.10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.16	1.16
464	1.10	1.10	1.10	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.13	1.13	1.13	1.16	1.16
500	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
510	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
520	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
530	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
540	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
550	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
560	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
570	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
580	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
590	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Mean	1.17	1.17	1.20	1.12	1.15	1.21	1.20	1.17	1.14	1.16	1.22	1.16	1.19	1.21	1.22	1.18	1.17	1.18	1.17	1.22

Table 6 (Cont.) - Base Case Auto Occupancy Factors

gg	430	440	450	461	462	463	464	500	510	520	530	540	550	560	570	580	590	Mean
11	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.20
12	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.21
20	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.21
30	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.22
40	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
50	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
60	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.24
70	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.15
80	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
90	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17
100	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
110	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.20
120	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.20
130	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.22
140	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.20
150	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.23
160	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.23
170	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
180	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.18
190	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.18
200	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.21
210	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.21
221	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
222	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.19
231	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
232	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.22
240	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.18
250	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.20
260	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.20
270	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.22
280	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.16
291	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.15
292	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.18
300	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.20
311	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.22
312	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.13
313	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.23
314	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.27
320	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.19
331	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.12
332	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
334	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.20
335	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.15
341	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
342	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.27
352	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.23
354	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.19
361	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.20
362	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.18
363	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.19
364	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.19
365	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
366	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
367	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.15
370	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.24
380	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.18
390	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.18
400	1.17	1.17	1.17	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.20
410	1.17	1.17	1.17	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.20
420	1.13	1.17	1.17	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.23
430	**1.23**	1.17	1.17	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.20
440	1.17	**1.23**	1.17	1.16	1.16	1.16	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.20
450	1.17	1.17	**1.23**	1.22	1.22	1.22	1.22	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.21
461	1.16	1.16	1.17	**1.28**	1.25	1.19	1.20	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.26
462	1.16	1.16	1.17	1.25	**1.32**	1.25	1.25	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.26
463	1.16	1.16	1.17	1.23	1.25	**1.21**	1.20	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.20
464	1.16	1.16	1.17	1.19	1.19	1.20	**1.21**	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.12
500	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.16
510	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.23
520	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
530	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.22
540	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.23
550	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.23
560	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
570	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.13
580	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.20
590	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
Mean	1.17	1.16	1.19	1.23	1.25	1.22	1.15	1.18	1.23	1.19	1.20	1.23	1.23	1.20	1.25	1.50	1.21	1.20

1.5 Trip Length Adjustment

In stage 2 of the model the home to work auto trip distribution is modified to reflect projected changes in level of service on the road network. The same method of adjustment is used as in the simplified a.m. peak model. Simulated travel times for single occupant vehicles from the initial trip distribution are compared with the base year (1996) travel times. An elasticity factor is applied to increase, or decrease, the "impedance" value for each cell in the base matrix used as input to the trip end balancing procedure. The result of the adjustment is to increase the number of trips between origins and destinations where there is a projected improvement in travel time due to reduced demand, an increase in congestion or new road connections. An increase in travel time will result in fewer trips. The sensitivity of the adjustment is controlled by a coefficient the default value of which (0.03) has been set based on experience with the a.m. Peak model. The default value will produce a trip length distribution that lies approximately midway between one having the same mean trip length (km) and one having the same mean travel time as the observed 1996 trip distribution.

1.6 HOV assignment

The model includes routines to perform an HOV assignment and to estimate the number of new HOVs that might be formed as a result of potential timesavings. Both routines require a road network that has each HOV lane coded as a separate series of nodes and links from the general use lanes. General use links require the mode codes "i" and "j" in addition to the mode code "c". Links restricted to vehicles with two or more occupants require the mode code "i" in addition to the mode code "c". Mode code "c" should be the only auto mode on links restricted to vehicles with 3 more occupants.

The first step in the HOV assignment procedure is to stratify the total auto vehicle matrix into 3 matrices representing 1 occupant, 2 occupant and 3 plus occupant vehicles. The stratification formulae are:

$P_2 = 1.01(1- x)$

$P_3 = 0.16(1 - x)$

Where

x = mean auto occupancy used to convert auto person trips to auto vehicles (Table 6).

P_2 is the proportion of automobiles with two occupants

P_3 is the proportion of automobiles with three or more occupants.

The coefficients have been calibrated to provide a distribution that matches the auto occupancy distribution observed across 31 selected screen lines in the GTA. The observed distribution was obtained from available 1995 and 1996 Cordon Count information for the p.m. peak period. The implied auto occupancy, calculated from the distribution, will be higher than that shown in Table 6 since the calibration takes into account the exclusion of persons under the age of 11 from the other components of the model. The coefficients may be modified if desired and are different from the recommended values for use in the a.m. peak period.

A multiclass assignment produces separate link volumes and travel time matrices for each of the three categories of vehicle (1 person, 2 persons and 3 plus persons). A second procedure uses the difference in travel times between the three categories to estimate the number of new HOVs that might be formed. A factor of .01 is applied to convert both 1 and 2 occupant vehicles to 3 occupant vehicles for each minute of time saving. The factor of .01 (1%) is representative of the observed experience when carpool lanes were first introduced on the Shirley highway in Washington D.C. The factor may be modified to reflect local experience. A second multiclass assignment completes the procedure by assigning the remaining low occupancy vehicles (1 and 2 person). The HOVs are assigned as two classes (original and new).

1.7 Transit Assignment

The transit assignment may be performed as part of the same scenario as the road assignment, using an integrated road and transit network, or as a separate "transit only" scenario. The assignment is performed in two stages. GO Rail trips are assigned allowing the use of all transit modes. The integrated GTA network has been modified to include auxiliary transit access links (mode z) between the nodes that represent the GO Rail stations and all of the zone centroids within that stations catchment area. These centroid connectors must be added to any new network that is created. The assignment procedure does not "force" trips on to GO Rail if the network provides a more attractive alternative using local transit. The assigned GO Rail volumes will be slightly less than that provided by the mode split calculations. GO Rail volumes can also be obtained by aggregating the trip matrix to station catchment area (ensemble gs). These volumes will be consistent with the mode-split calculations.

Local transit trips are assigned without permitting the use of mode r or z (GO Rail and GO Rail access). The transit assignment does not include the use of local transit to provide access or egress to GO Rail stations other than in the downtown of Toronto.

A transit network is not needed for Trip Generation, Mode Split and Trip Distribution. The model can be used to analyse future transit demand on an existing network without the need for detailed specification of future service levels on every route.

1.8 Regional Sub-models

Regional sub-models for the simulation of auto travel have been developed for the Regional Municipalities of Durham and Halton. These models operate in a separate emme2bank using a finer zone system within the Region and a combination of aggregated and non-aggregated GTA zones outside the Region. The aggregation of the external zones is performed in the GTA emme2bank when the total auto driver matrix is exported. The zone aggregations are defined as one of the zone ensembles in the emme2bank. Zones that are not to be aggregated, including those within the region, are assigned to zone groups having the same number as the single GTA zone that they represent.

In the emme2bank containing the Regional sub-model the same zone ensemble as in the GTA emme2bank is used to define the local zones that make up each GTA zone within the Region. Outside the region there is a one to one correspondence with the individual GTA zones or GTA zone aggregations. The aggregated auto driver matrix from the GTA emme2bank can be imported using the standard batch entry procedure. Before the matrix is assigned the trips with origins and/or destinations within the Region are distributed between the sub-zones that make up each GTA zone in proportion to a combination of the population and employment in those zones. Relative weights assigned to population and employment have been developed on the basis of the trip generation rates and components that make up the total auto driver matrix in the GTA model. Those weights are incorporated into a macro that can be used to convert either a p.m. or an a.m. matrix. The same Regional emme2bank can be used in conjunction with both the GTA a.m. model as well as the p.m. model. The current weight factors are shown in Table 7.

Table 7 - Population and Employment Weights for Zone Splitting

	Employment Weight		Population weight	
	Origins	Destinations	Origins	Destinations
a.m. model	0.05	0.9	0.95	0.1
p.m. model	0.8	0.35	0.2	0.65

2.0 Validation

Validation of the model consists primarily of comparisons between a 1996 "Base Case" simulation, the 1996 TTS data and available cordon count information. The network used for calibration and validation is the 1996 version of the 2001 integrated network currently under development at the DMG. At the time of writing the network had not been officially released and may contain errors that affect the validation results.

2.1 Land Use Data

The trip generation rates and mode split factors have been calculated using the population and employment data contained in the 1996 TTS database. The base case simulation uses, as input, population and employment estimates provided by the 6 Regional Municipalities. The population estimates provided by the Regions are based on control totals taken from the 1996 Census. Table 8 provides a comparison of the three sets of data. The total GTA population reported in the TTS is 3% lower than that given by the census. The TTS is known to under represent infants, under the age of 1, and seniors, over the age of 75, many of whom live in collective homes not included in the survey. Since neither of these two categories of people is likely to make any significant number of trips the TTS trip rates will be artificially high when applied to the total population. No adjustment has been made for the current validation runs but a global adjustment factor of .98, applied to all the population based trip generation rates, is recommended for future use.

Table 8 - Population Data by Region

	1996 TTS	1996 Census	Base Case
Toronto	2,305,558	2,386,213	2,386,213
Durham	450,354	458,616	458,616
York	567,689	592,445	592,445
Peel	812,512	852,526	852,526
Halton	328,264	339,875	339,875
Hamilton-Wentworth	461,990	467,799	467,799
Total GTA	4,926,367	5,097,474	5,097,474

Employed Labour Force is not calculated or used directly in the model but is clearly a factor in determining trip generation rates. Table 9 compares the TTS and Census data. The Census and TTS occurred at different times of the year, which may account for some of the differences. There may also be some difference due to definition, for example the census includes people who worked the previous week but who were not actually employed on the day of the census. No adjustments to trip rates have been made or are recommended at this time.

Table 9 - Employed Labour Force by Region

	1996 TTS	1996 Census	Difference	
Toronto	1,109,733	1,098,930	10,803	1.0%
Durham	222,151	223,900	(1,749)	-0.8%
York	280,336	297,005	(16,669)	-5.6%
Peel	424,639	437,750	(13,111)	-3.0%
Halton	171,697	180,870	(9,173)	-5.1%
Hamilton-Wentworth	211,196	210,650	546	0.3%
Total GTA	2,419,753	2,449,105	(29,352)	-1.2%

Table 10 provides a comparison of employment data. The same comments, with respect to timing and definitions, apply as for the employed labour force. In addition the TTS employment figures do not include workers who live outside the TTS area. The only Region where that is likely a significant factor is Hamilton-Wentworth due to the close proximity of Brant County and Haldimand-Norfolk. The base case employment estimates are close to the census but the TTS data may provide better representation of traffic conditions in the fall. Consideration should be given to time of year for which simulation is desired when applying the model. If the employment estimates are derived from census data it may be appropriate to apply a global factor to increase the TTS employment base trip rates in order to fully represent transportation demand in the fall. No adjustment has been applied in the current validation.

Table 10 - Employment by Region

	1996 TTS	1996 Census	Base Case
Toronto	1,257,005	1,209,010	1,213,270
Durham	149,552	148,545	141,110
York	275,724	267,550	268,690
Peel	389,275	390,755	392,545
Halton	141,390	148,275	148,835
Hamilton-Wentworth	181,219	183,615	184,135
Total GTA	2,394,165	2,347,750	2,348,585

2.2 Trip Generation, Mode Split and Distribution

Applying the TTS work trip rates to the base case land use produced on origin trip total, based on employment, that was 6.5% higher than the destination total based on population. The model applied global factors to adjust the total number of origins and destinations to the mid-point. Application of the global adjustment factors that are suggested in section 2.1 would reduce the adjustment that is needed to balance the trip end totals.

Table 11 - Trip Totals and Travel Time Distributions

Trip Category	1996 TTS data			1996 Base Case Simulation		
	Total trips (Incl. Externals)	Minutes by road *		Total trips (Incl. externals)	Minutes by road *	
		Mean	S.D		Mean	S.D
From work auto	1,013,623	18.6	14.5	1,047,990	18.2	14.2
From work GO Rail	34,774	45.8	15.3	32,606		
From work transit	190,725	16.9	11.1	189,021	16.9	10.8
Non work auto	1,286,967					
NW > H Transit	138,339	12.1	9.9	158,782	11.4	10.0
H > all Transit	43,101	10.5	7.3	44,273	9.7	7.2
NW NH Auto	199,649	10.0	9.5	209,162	9.7	9.8
Total Auto Driver	1,984,067	14.0	13.3			

* For trips internal to the 6 Regions
Trip Category Abbreviations: W-Work H-Home N-Non

Table 11 compares the simulated trip total in each trip category. The mean and standard deviation of trip time shown have been generated using the travel matrix produced by an equilibrium assignment of the TTS data to the road network. The simulation includes trip movements to and from some areas not included in the TTS (Brant, Haldimand-Norfolk and the excluded sections of Northumberland, Peterborough, Simcoe, Dufferin and Wellington Counties). The simulated totals should therefore be slightly higher than the TTS

data, particularly for the auto mode. External trips have been excluded from the calculation of the mean travel time and standard deviation in order to provide a fair comparison.

The simulated non-work to home and home origin trip totals are slightly high compared to the TTS data. Some of that difference can be attributed to the higher population numbers used as input. A global adjustment of the population based trip rates, as recommended in section 2.1, would improve the fit.

Table 9 shows that the model is reproducing the observed (TTS) trip length distributions with a high degree of accuracy in all trip categories.

2.3 Comparison of Assignment Results

Table 12 compares the results of the base case simulation with assignments of the TTS data. The linear regression coefficients are taken from scattergram plots. For an ideal fit the value of a should be 0 and b should be 1.

Table 12 - Comparison of Assigned Volumes

	Network Assignment		Linear Regression (y=a+bx)		
	TTS data	1996 Base	a	B	R squared
Transit lines	Boardings (000's)				
Subway	268	282	n/a	n/a	n/a
GO Rail	27	26	13	.94	.999
GO Bus	46	48	-27	1.07	.989
Municipal bus	414	473	3	1.14	.98
Streetcar	49	52	-22	1.05	.997
Segment volumes	Passenger km (000's)				
Subway	1,777	1,878	36	1.04	.995
GO Rail	815	783	11	.94	.998
GO Bus	793	764	0	1.01	.98
Municipal bus	1,601	1,853	10	1.09	.96
Streetcar	125	128	4	1.02	.98
Link volumes (auto)	Vehicle km (millions)*				
Toronto	9.10	8.75	6	.96	.993
Durham	2.74	3.06	60	.99	.97
York	3.89	4.10	73	.99	.98
Peel	5.07	5.25	72	.97	.988
Halton	2.64	2.99	100	1.04	.97
Hamilton-Wentworth	1.45	1.78	163	1.03	.98

* Excluding centroid connectors, local streets and collectors

The number of GO Rail boardings is slightly less than the number of GO Rail trips, as shown in Table 9, because the assignment procedure does not force people to use GO Rail if there is a faster alternative using other modes of transit. The matrix data, aggregated by station assignment, provides a more consistent basis for the analysis of GO Rail ridership than does the assignment results.

The slight over simulation of transit volumes reflects the previously discussed differences in trip totals and land use assumptions. The table shows the simulated distribution of transit trips to sub-modes and individual routes is a close match to the TTS data.

The comparison of link volumes from the auto assignments reveals a slight under simulation in Toronto and over simulation of the other regions, mostly in Halton and Hamilton-Wentworth. These differences are

consistent with the differences in land use assumptions (reduced employment in Toronto) and the more complete representation of external trips.

2.4 Comparison with Cordon Counts

The link volumes from the TTS assignments and base case simulation have been extracted from emme/2 and compared with available cordon count information across 31 selected screen lines in the GTA (Excluding Hamilton-Wentworth). Table 13 provides a summary of the totals for each of the 5 Regions. Table 14 provides the details for the individual screen lines. Inter-regional screen lines are included once only. Trips across the Toronto boundary are included in the Toronto total. Which inter-regional screen lines are included in each of the other regional totals may be determined by referring to Table 14. The cordon count volumes are the observed numbers of private automobiles for the 3-hour period from 3:30 to 6:30 p.m.

The comparisons show that both the TTS data, after adjustment for the under reporting of non work/school travel, and the base case simulation produce assignments that are in close agreement with the total observed travel in each of the 5 regions. At the individual screen line level there are significant discrepancies. In most cases, not surprisingly, the simulated volumes are closer to the TTS assigned volumes than they are to the observed cordon count volumes. Factors contributing to differences between the TTS assigned volumes and the cordon count data include:

- Different year of data collection (most of the cordon count data is for 1995)
- Different time of year (summer Vs fall)
- Random day to day variations in traffic volume (TTS represents a 3 month average)
- Adequacy and accuracy of network representation (Particularly centroid connectors)

The network used in the calibration and validation to date has been a very preliminary version of the new 2001 integrated network under development at the DMG. The network is known to contain errors and is missing a number of screen line codes. Experience with the a.m. peak model suggests that errors, or deficiencies, in network representation are likely to be a more significant source of discrepancy between observed and simulated traffic volumes, than are any deficiencies in the modelling procedures. Changes have been made to both the network and modelling procedures subsequent to the intial validation. These changes primarily relate to the Region of Halton. The section on the validation of the Halton Region sub-model contains more up to date information.

Table 13 - Cordon Count Summary by Region

	Cordon Count	TTS Assignment	Base case Simulation	Ratios TTS/CC	Sim/TTS	Sim/CC
Durham	246,780	232,734	238,412	94%	102%	97%
Halton	185,862	175,121	191,961	94%	110%	103%
Toronto	1,770,889	1,715,658	1,709,309	97%	100%	97%
Peel	646,187	625,956	638,746	97%	102%	99%
York	172,634	180,371	178,319	104%	99%	103%
Total GTA	3,022,372	2,929,840	2,956,748	97%	101%	98%

Notes

1. Durham cordon counts taken in 1996, other regions in 1995.
2. The TTS data has been adjusted to take into account under reporting of non work/school travel
3. Simulation includes more complete representation of external trips than does the TTS data.

Table 14 - Screen Line Details

Toronto

	scl code	Cordon Count	TTS Assignment	Base case Simulation	Ratios TTS/CC	Sim/TTS	Sim/CC	Difference Sim-CC
	1041	6,124	7,181	6,812	117%	95%	111%	688
	1051	26,090	27,492	27,938	105%	102%	107%	1,848
	1061	22,046	22,727	24,730	103%	109%	112%	2,684
	1071	31,935	37,773	36,571	118%	97%	115%	4,636
	1081	9,727	9,666	9,195	99%	95%	95%	(532)
Tor>York		95,922	104,838	105,246	109%	100%	110%	9,324
	1042	3,360	3,819	3,414	114%	89%	102%	54
	1052	21,395	19,011	19,528	89%	103%	91%	(1,867)
	1062	15,527	13,011	13,906	84%	107%	90%	(1,621)
	1072	34,006	40,564	40,030	119%	99%	118%	6,024
	1082	7,370	4,667	4,658	63%	100%	63%	(2,712)
Yor>Tor		81,658	81,071	81,537	99%	101%	100%	(121)
	1013	15,908	15,345	19,734	96%	129%	124%	3,826
	1023	29,309	16,081	17,491	55%	109%	60%	(11,818)
	1033	26,196	22,079	23,944	84%	108%	91%	(2,252)
Peel>Tor		71,413	53,505	61,169	75%	114%	86%	(10,244)
	1014	24,030	27,621	32,404	115%	117%	135%	8,374
	1024	41,313	23,331	25,431	56%	109%	62%	(15,882)
	1034	20,642	18,718	18,495	91%	99%	90%	(2,147)
Tor>Peel		85,985	69,670	76,330	81%	110%	89%	(9,655)
Dur>Tor	1094	14,402	14,034	13,626	97%	97%	95%	(776)
Tor>Dur	1093	30,942	36,751	33,255	119%	90%	107%	2,313
Toronto In		**167,473**	**148,610**	**156,331**	**89%**	**105%**	**93%**	**(11,142)**
Toronto Out		**212,849**	**211,259**	**214,831**	**99%**	**102%**	**101%**	**1,982**
	1192	61,729	56,155	53,771	91%	96%	87%	(7,958)
	1122	42,450	46,940	47,943	111%	102%	113%	5,493
	1132	45,074	39,387	40,865	87%	104%	91%	(4,209)
	1142	83,492	67,983	73,854	81%	109%	88%	(9,638)
	1262	56,548	40,581	38,775	72%	96%	69%	(17,773)
401 SB		289,293	251,046	255,209	87%	102%	88%	(34,084)
	1191	54,337	41,670	40,773	77%	98%	75%	(13,564)
	1121	37,331	43,131	45,018	116%	104%	121%	7,687
	1131	45,944	45,324	47,428	99%	105%	103%	1,484
	1141	69,249	53,663	66,953	77%	125%	97%	(2,296)
	1261	49,362	38,393	36,375	78%	95%	74%	(12,987)
401 NB		256,223	222,180	236,546	87%	106%	92%	(19,677)
	1103	24,056	28,346	25,500	118%	90%	106%	1,444
	1113	35,573	44,645	41,559	126%	93%	117%	5,986
	1203	8,988	7,156	6,852	80%	96%	76%	(2,136)
Humber EB		68,617	80,146	73,911	117%	92%	108%	5,294
	1104	30,598	38,093	33,749	124%	89%	110%	3,151
	1114	28,310	48,670	43,106	172%	89%	152%	14,796
	1204	13,071	11,043	10,546	84%	96%	81%	(2,525)
Humber WB		71,979	97,806	87,402	136%	89%	121%	15,423
	1153	46,315	47,517	55,026	103%	116%	119%	8,711
	1253	15,149	11,579	12,618	76%	109%	83%	(2,531)
CNR EB		61,464	59,096	67,643	96%	114%	110%	6,179
	1154	35,320	27,753	35,117	79%	127%	99%	(203)
	1254	12,174	5,482	5,633	45%	103%	46%	(6,541)
CNR WB		47,494	33,235	40,749	70%	123%	86%	(6,745)

Table 14 (Cont.) - Screen Line Details

	scl code	Cordon Count	TTS Assignment	Base case Simulation	Ratios TTS/CC	Sim/TTS	Sim/CC	Difference Sim-CC
	1163	28,227	22,814	20,771	81%	91%	74%	(7,456)
	1172	12,947	11,755	10,610	91%	90%	82%	(2,337)
	1184	15,730	13,675	12,277	87%	90%	78%	(3,453)
Downtown in		56,904	48,244	43,658	85%	90%	77%	(13,246)
	1164	38,141	47,162	44,015	124%	93%	115%	5,874
	1171	22,223	20,621	19,754	93%	96%	89%	(2,469)
	1183	25,737	32,169	29,869	125%	93%	116%	4,132
Downtown out		86,101	99,952	93,639	116%	94%	109%	7,538
Other	9999	393,040	403,101	386,444	103%	96%	98%	(6,596)
Total Toronto		**1,770,889**	**1,715,658**	**1,709,309**	**97%**	**100%**	**97%**	**(61,580)**

Table 14 (Cont.) - Screen Line Details

	scl code	Cordon Count	TTS Assignment	Base case Simulation	Ratios TTS/CC	Sim/TTS	Sim/CC	Difference Sim-CC
Durham								
	2012	8,629	10,729	9,866	124%	92%	114%	1,237
	2022	7,006	6,008	5,980	86%	100%	85%	(1,026)
	2032	3,685	2,919	2,491	79%	85%	68%	(1,194)
	2042	6,244	6,204	6,094	99%	98%	98%	(150)
	2052	10,080	10,460	10,520	104%	101%	104%	440
401 SB		35,644	36,320	34,951	102%	96%	98%	(693)
	2011	9,037	8,405	8,364	93%	100%	93%	(673)
	2021	9,357	8,278	8,498	88%	103%	91%	(859)
	2031	6,395	5,541	6,319	87%	114%	99%	(76)
	2041	7,150	7,059	7,332	99%	104%	103%	182
	2051	12,542	13,869	14,152	111%	102%	113%	1,610
401 NB		44,481	43,152	44,665	97%	104%	100%	184
	2062	9,376	8,453	10,061	90%	119%	107%	685
	2072	5,460	5,545	5,972	102%	108%	109%	512
	2082	8,764	5,263	5,495	60%	104%	63%	(3,269)
	2092	5,611	3,111	3,358	55%	108%	60%	(2,253)
	2102	9,819	8,093	9,366	82%	116%	95%	(453)
Hwy 2 SB		39,030	30,464	34,251	78%	112%	88%	(4,779)
	2061	12,317	14,498	14,904	118%	103%	121%	2,587
	2071	7,343	8,054	8,829	110%	110%	120%	1,486
	2081	12,858	10,065	10,470	78%	104%	81%	(2,388)
	2091	7,836	5,251	5,889	67%	112%	75%	(1,947)
	2101	11,463	9,743	10,039	85%	103%	88%	(1,424)
Hwy 2 NB		51,817	47,611	50,131	92%	105%	97%	(1,686)
	2112	2,892	1,968	2,033	68%	103%	70%	(859)
	2122	1,537	1,699	1,763	111%	104%	115%	226
	2132	2,477	2,293	2,313	93%	101%	93%	(164)
	2142	217	712	716	328%	101%	330%	499
	2152	3,773	3,591	3,865	95%	108%	102%	92
	2162	928	750	1,344	81%	179%	145%	416
	2172	54	55	24	102%	44%	44%	(30)
Taunton SB		11,878	11,067	12,058	93%	109%	102%	180
	2111	1,889	1,790	1,997	95%	112%	106%	108
	2121	1,463	1,017	1,104	70%	108%	75%	(359)
	2131	3,053	1,547	2,002	51%	129%	66%	(1,051)
	2141	264	569	784	216%	138%	297%	520
	2151	4,258	2,772	2,856	65%	103%	67%	(1,402)
	2161	1,385	539	763	39%	142%	55%	(622)
	2171	159	54	18	34%	33%	11%	(141)
Taunton NB		12,471	8,288	9,523	66%	115%	76%	(2,948)
	2344	955	548	514	57%	94%	54%	(441)
	2354	9,942	9,350	9,167	94%	98%	92%	(775)
	2364	746	1,889	1,766	253%	93%	237%	1,020
	2374	730	542	370	74%	68%	51%	(360)
Whi>PiAj		12,373	12,329	11,817	100%	96%	96%	(556)
	2343	1,750	2,185	1,791	125%	82%	102%	41
	2353	15,682	18,723	17,393	119%	93%	111%	1,711
	2363	4,444	4,483	4,451	101%	99%	100%	7
	2373	2,210	2,959	2,723	134%	92%	123%	513
PiAj>Whi		24,086	28,350	26,358	118%	93%	109%	2,272

Table 14 (Cont.) - Screen Line Details

	scl code	Cordon Count	TTS Assignment	Base case Simulation	Ratios TTS/CC	Sim/TTS	Sim/CC	Difference Sim-CC
	2414	-	-	-	#DIV/0!	#DIV/0!	#DIV/0!	0
	2424	3,440	2,614	2,141	76%	82%	62%	(1,299)
	2434	2,732	3,242	3,519	119%	109%	129%	787
	2444	242	121	141	50%	116%	58%	(101)
Osh>Whi		6,414	5,978	5,800	93%	97%	90%	(614)
	2413	-	-	-	#DIV/0!	#DIV/0!	#DIV/0!	0
	2423	4,068	3,157	3,018	78%	96%	74%	(1,050)
	2433	4,332	5,146	5,086	119%	99%	117%	754
	2443	186	873	753	469%	86%	405%	567
Whi>Osh		8,586	9,176	8,857	107%	97%	103%	271
Total Durham		**246,780**	**232,734**	**238,412**	**94%**	**102%**	**97%**	**(8,368)**

Table 14 (Cont.) - Screen Line Details

scl code	Cordon Count	TTS Assignment	Base case Simulation	Ratios TTS/CC	Sim/TTS	Sim/CC	Difference Sim-CC
York							
3212	4,325	13,869	13,767	321%	99%	318%	9,442
3222	2,989	2,273	2,393	76%	105%	80%	(596)
3232	6,675	7,233	7,425	108%	103%	111%	751
Central York SB	13,989	23,375	23,586	167%	101%	169%	9,597
3211	14,488	7,832	9,083	54%	116%	63%	(5,405)
3221	8,271	8,992	8,987	109%	100%	109%	716
3231	15,557	17,237	16,472	111%	96%	106%	916
Central York NB	38,316	34,061	34,542	89%	101%	90%	(3,774)
3423	5,867	4,700	4,621	80%	98%	79%	(1,246)
3413	1,759	1,359	2,140	77%	158%	122%	381
Peel>York	7,626	6,059	6,761	79%	112%	89%	(865)
3424	8,512	10,309	9,891	121%	96%	116%	1,378
3414	2,770	1,198	879	43%	73%	32%	(1,891)
York>Peel	11,282	11,507	10,769	102%	94%	95%	(513)
3734	755	577	681	76%	118%	90%	(74)
3724	1,204	1,425	1,308	118%	92%	109%	104
3714	645	415	283	64%	68%	44%	(361)
Dur>York	2,604	2,417	2,272	93%	94%	87%	(332)
3733	3,308	2,932	2,792	89%	95%	84%	(516)
3723	3,137	3,730	3,720	119%	100%	119%	583
3713	320	445	249	139%	56%	78%	(71)
York>Dur	6,765	7,106	6,762	105%	95%	100%	(4)
3514	4,430	5,407	5,533	122%	102%	125%	1,103
3524	16,795	18,045	17,494	107%	97%	104%	699
400 EB	21,225	23,452	23,028	110%	98%	108%	1,803
3513	5,839	6,113	5,885	105%	96%	101%	46
3523	11,341	11,618	12,052	102%	104%	106%	711
400 WB	17,180	17,731	17,937	103%	101%	104%	757
3624	17,486	17,092	16,022	98%	94%	92%	(1,464)
3614	11,466	9,635	9,516	84%	99%	83%	(1,949)
404 EB	28,952	26,727	25,538	92%	96%	88%	(3,414)
3623	18,223	18,623	17,771	102%	95%	98%	(452)
3613	6,473	9,314	9,354	144%	100%	145%	2,882
404 WB	24,696	27,937	27,126	113%	97%	110%	2,430
Total York	**172,634**	**180,371**	**178,319**	**104%**	**99%**	**103%**	**5,686**

Table 14 (Cont.) - Screen Line Details

	scl code	Cordon Count	TTS Assignment	Base case Simulation	Ratios TTS/CC	Sim/TTS	Sim/CC	Difference Sim-CC
Peel								
	4113	11,786	11,904	12,441	101%	105%	106%	655
	4123	3,150	3,288	4,229	104%	129%	134%	1,079
	4133	6,088	6,155	9,980	101%	162%	164%	3,892
	4143	1,308	1,034	1,666	79%	161%	127%	358
Hal>Peel		22,332	22,381	28,316	100%	127%	127%	5,984
	4114	17,458	17,993	17,519	103%	97%	100%	61
	4124	17,448	19,142	18,747	110%	98%	107%	1,299
	4134	9,680	12,525	12,955	129%	103%	134%	3,275
	4144	2,188	3,451	3,480	158%	101%	159%	1,292
Peel>Hal		46,774	53,111	52,700	114%	99%	113%	5,926
	4213	14,957	15,535	15,335	104%	99%	103%	378
	4223	13,135	13,285	13,549	101%	102%	103%	414
	4233	14,244	13,191	15,919	93%	121%	112%	1,675
	4243	856	2,575	3,016	301%	117%	352%	2,160
Credit WB		43,192	44,587	47,819	103%	107%	111%	4,627
	4214	21,390	23,421	21,581	109%	92%	101%	191
	4224	15,408	16,095	15,432	104%	96%	100%	24
	4234	31,162	32,915	30,295	106%	92%	97%	(867)
	4244	2,817	8,089	7,762	287%	96%	276%	4,945
Credit EB		70,777	80,520	75,070	114%	93%	106%	4,293
	4313	14,598	17,026	17,163	117%	101%	118%	2,565
	4323	26,252	23,510	25,156	90%	107%	96%	(1,096)
	4333	17,444	15,159	16,239	87%	107%	93%	(1,205)
	4343	1,958	3,181	4,361	162%	137%	223%	2,403
	4353	13,835	8,481	9,783	61%	115%	71%	(4,052)
Hwy 10 WB		74,087	67,358	72,702	91%	108%	98%	(1,385)
	4313	14,598	17,026	17,163	117%	101%	118%	2,565
	4323	26,252	23,510	25,156	90%	107%	96%	(1,096)
	4333	17,444	15,159	16,239	87%	107%	93%	(1,205)
	4343	1,958	3,181	4,361	162%	137%	223%	2,403
	4353	13,835	8,481	9,783	61%	115%	71%	(4,052)
Hwy 10 WB		74,087	67,358	72,702	91%	108%	98%	(1,385)
	4922	8,346	10,917	10,615	131%	97%	127%	2,269
	4942	3,365	2,622	3,181	78%	121%	95%	(184)
	4962	4,794	6,180	3,914	129%	63%	82%	(880)
S of QEW SB		16,505	19,719	17,711	119%	90%	107%	1,206
	4921	6,449	6,043	7,854	94%	130%	122%	1,405
	4941	3,123	2,372	3,582	76%	151%	115%	459
	4961	3,854	5,688	4,136	148%	73%	107%	282
S of QEW NB		13,426	14,104	15,571	105%	110%	116%	2,145
	4822	26,383	28,340	27,589	107%	97%	105%	1,206
	4842	19,185	13,022	14,299	68%	110%	75%	(4,886)
	4862	9,333	8,346	8,879	89%	106%	95%	(454)
S of 403 SB		54,901	49,707	50,767	91%	102%	92%	(4,134)
	4821	21,582	21,546	23,289	100%	108%	108%	1,707
	4841	8,051	5,917	6,562	73%	111%	82%	(1,489)
	4861	7,811	8,849	8,490	113%	96%	109%	679
S of 403 NB		37,444	36,313	38,341	97%	106%	102%	897
	4722	8,492	9,484	8,519	112%	90%	100%	27
	4742	5,838	8,035	8,248	138%	103%	141%	2,410
	4762	2,527	3,506	3,494	139%	100%	138%	967
	4782	43,338	17,091	17,988	39%	105%	42%	(25,350)
S of 401 SB		60,195	38,116	38,249	63%	100%	64%	(21,946)

Table 14 (Cont.) - Screen Line Details

	scl code	Cordon Count	TTS Assignment	Base case Simulation	Ratios TTS/CC	Sim/TTS	Sim/CC	Difference Sim-CC
	4721	7,163	9,512	9,021	133%	95%	126%	1,858
	4741	7,105	9,156	9,268	129%	101%	130%	2,163
	4761	3,594	4,344	4,116	121%	95%	115%	522
	4781	28,749	26,773	26,564	93%	99%	92%	(2,185)
S of 401 NB		46,611	49,784	48,969	107%	98%	105%	2,358
	4622	6,501	8,059	8,118	124%	101%	125%	1,617
	4642	2,029	1,156	1,418	57%	123%	70%	(611)
	4662	1,013	909	992	90%	109%	98%	(21)
	4682	16,647	13,759	12,222	83%	89%	73%	(4,425)
Bra>Miss		26,190	23,883	22,749	91%	95%	87%	(3,441)
	4621	7,650	9,926	10,359	130%	104%	135%	2,709
	4641	3,142	2,700	2,811	86%	104%	89%	(331)
	4661	2,427	1,764	1,507	73%	85%	62%	(920)
	4681	27,283	25,139	22,913	92%	91%	84%	(4,370)
Miss>Bra		40,502	39,531	37,590	98%	95%	93%	(2,912)
	4022	2,793	2,652	2,802	95%	106%	100%	9
	4032	3,295	2,172	2,901	66%	134%	88%	(394)
Mayfield SB		6,088	4,825	5,702	79%	118%	94%	(386)
	4021	5,718	5,072	4,687	89%	92%	82%	(1,031)
	4031	7,358	9,588	9,100	130%	95%	124%	1,742
Mayfield NB		13,076	14,660	13,787	112%	94%	105%	711
Total Peel		**646,187**	**625,956**	**638,746**	**97%**	**102%**	**99%**	**(7,441)**

Table 14 (Cont.) - Screen Line Details

scl code	Cordon Count	TTS Assignment	Base case Simulation	Ratios TTS/CC	Sim/TTS	Sim/CC	Difference Sim-CC
Halton (The results shown in this table do not reflect the most recent changes made to the network and GTA model resulting from the validation of the Halton Region Sub-model. The results contained in section 2.5 are more recent. The following table is included for consistency with the other regions.)							
5713	5,055	3,766	4,497	74%	119%	89%	(558)
5723	15,255	16,432	16,866	108%	103%	111%	1,611
Oak Cr. EB	20,310	20,197	21,363	99%	106%	105%	1,053
5714	8,123	6,399	6,712	79%	105%	83%	(1,411)
5724	20,019	22,058	21,886	110%	99%	109%	1,867
Oak Cr. WB	28,142	28,456	28,598	101%	100%	102%	456
5613	1,740	1,073	962	62%	90%	55%	(778)
5623	14,029	15,908	16,626	113%	105%	119%	2,597
Bronte Cr. EB	15,769	16,981	17,588	108%	104%	112%	1,819
5614	3,491	2,667	2,736	76%	103%	78%	(755)
5624	20,589	26,683	26,709	130%	100%	130%	6,120
Bronte Cr. WB	24,080	29,350	29,444	122%	100%	122%	5,364
5513	4,295	2,485	3,342	58%	134%	78%	(953)
5523	9,844	11,456	11,889	116%	104%	121%	2,045
Indian Cr. EB	14,139	13,942	15,231	99%	109%	108%	1,092
5514	5,534	3,087	4,281	56%	139%	77%	(1,253)
5524	11,267	13,511	14,544	120%	108%	129%	3,277
Indian Cr. WB	16,801	16,598	18,824	99%	113%	112%	2,023
5212	1,378	1,120	1,597	81%	143%	116%	219
5222	18,443	15,434	16,418	84%	106%	89%	(2,025)
5232	10,463	6,592	7,753	63%	118%	74%	(2,710)
5242	5,437	5,949	7,028	109%	118%	129%	1,591
CNR SB	35,721	29,095	32,797	81%	113%	92%	(2,924)
5211	1,892	995	1,807	53%	182%	96%	(85)
5221	13,151	9,202	10,788	70%	117%	82%	(2,363)
5231	10,029	6,296	8,711	63%	138%	87%	(1,318)
5241	5,848	4,008	6,809	69%	170%	116%	961
CNR NB	30,920	20,501	28,115	66%	137%	91%	(2,805)
Total Halton	**185,862**	**175,121**	**191,961**	**94%**	**110%**	**103%**	**6,079**

3.0 Halton Region Sub-model

3.1 General Desciption

The output from the GTA model may be used as input to the Halton Region sub-model. The sub-model uses a more detailed zone system within the Region. The 174 GTA zones that make up the Region of Halton are sub-divided into 569 local traffic zones. The GTA traffic zones are retained in the Region of Peel and in parts of Hamilton-Wentworth. Aggregated "super-zones" are used in the remainder of the GTA. Table 15 provides a summary of the zone charactewristics and numbering sequence.

Table 15 - Halton zone system

Regional Municipality	Number of zones	Definition	Numeric Range (1st & last zone numbers)
Halton	569	Sub-divisions of GTA zones	1 - 606
Peel	248	GTA zones	1501-1749
Hamilton	29	Custom aggregations	8502 - 8641
Toronto	16	Planning Districts	9001 - 9016
Durham	8	Municipalities	9017 - 9024
York	9	Municipalities	9025 - 9033
External	26	Same as GTA model	4001 - 4410
Total	905		

The road network used in the sub-model has been adapted from the GTA road network with the inclusion of more local streets in the Region of Halton for consistency with the more detailed zone system. In the areas where zones have been aggregated the network representation includes provincial highways and major arterials only.

The Regional sub-model may be used for more detailed analysis and testing of road network alternatives based on the original demand matrix generated by the GTA model. Any changes in land use, mode split and trip distribution assumptions need to be run through the GTA model before the results can be analysed using the regional sub-model. Mode split analysis and transit assignments are best done done using the GTA model and transit network. Ease of access at both end of trip is a key component in determining the likely number of transit riders. A consistent level of zone detail is therefore desirable if inter-regional transit trips are to be modelled with any degrree of accuracy.

3.2 Zone Splitting

The connection between the Regional sub-model and the GTA model is in the transfer of the p.m. peak hour total auto driver matrix that is produced as an output from the GTA model. The matrix is aggregated to the super-zones outside the Region of Halton as part of the output process from the GTA model. The trips to and from the GTA zones within the region are sub-divided between the local zones that make up each GTA zone in accordance with the population and employment distributions within those sub-zones. The factors used to sub-divide the number of trips is based on a combination of the population and employment totals at both ends of the trips. Table 16 shows the relative weights assigned to population and employment. The weights used in the a.m. peak model are included for comparison. These weights reflect the relative magnitudes of the different trip purposes as observed in the 1996 TTS. Within those trip purpose categories home origins and destinations are assumed to relate solely to population. Work origins

and destination are assumed to relate solely to employment. For origins and destinations that are neither home nor work related the population and employment are given approximately equal weights by dividing the population by two and adding the employment. The net results have been rounded to the values shown in Table 16.

Table 16 - Population & Employment Weights Used to Spli Zones

Model	Origin Weights		Destination weights	
	Population	Employment	Population	Employment
P.M. Peak	0.2	0.8	0.65	0.35
A.M.Peak	0.9	0.1	0.2	0.8

The splitting procedure maintains the trip totals at the GTA traffic zone level that are contained in the output file from the GTA model.

3.3 Refinements to the GTA model

The development and testing of the Halton Region sub-area model also resulted in a number changes to the GTA model. These chnges include:

- The number of Halton Region zone aggregations generally used for input of trip generation rates and mode split factors was increased from 4 to 10.
- A number of GTA zones within the Region of Halton were identified as "Retail intensive". Zone specific non-work trip generation rates have been used as input to the GTA model for these zones. (See section 3.4).
- The procedure for adding the background traffic matrix (mf15) was modified to include the use of both global and origin specific growth factors based on projected growth in GO Rail ridership. The matrix is used to add the auto egress component of GO Rail trips to the final auto driver trip table prior to trip assignment.

The documentation of the operation of the GTA model and its input parameters contained in this report have been updated to reflect these changes but the validation report has not been updated. There will be some differences between the validation results reported in chapter 2 and the current output from the model. These differences should be minor outside the Region of Halton.

3.4 Retail Intensive Zones

Staff at the Region of Halton have identified a number of traffic zones within the region that are considered to be "retail intensive". The 1996 TTS data shows that some of these zones have significantly higher non-work related trip generation rates than the average for the respective municipality as a whole. These zone specific rates were applied in the Halton application of the model in order to reflect the level of traffic movement associated with the retail activity. The identified zones were excluded from the calculation of the observed (TTS) trip rates applied to the remaining zones in each municiplity. Table 17 shows the non-work auto trip generation rates obtained from the TTS data. These rates have been adjusted to take into account the known under-reporting of non-work trips in the TTS.

Table 17 - Non-work auto trip rates for Retail Intensive Zones

(Trip rate is per 1000 [Emp. + Pop./2])

Zone	Location	Orig	Dest
2063	Bulington	760	690
2030	Oakville	590	500
2059	Burlington	540	350
2057	Burlington	400	390
2062	Burlington	400	390
2068	Burlington	240	400
2016	Oakville	340	310
2163	Georgetown	320	280
2040	Oakville	270	310
2060	Burlington	300	230
2053	Burlington	270	190
2012	Oakville	240	210
2005	Oakville	260	180
Municipal averages excluding the above zones			
Halton Hills		220	190
Milton		180	150
Oakville		210	160
Burlington		190	170
The following Zones (identified as retail intensive) do not have a significantly higher rate than the average for the municipality			
2125	Milton	190	130
2159	Georgetown	140	170
2004	Oakville	190	120
2177	Acton	130	180

To provide a means of simulating the levels of traffic movement associated with retail intensive zones in the future the above zones were categorized on a scale of 1 to 5 with a corresponding graduation of the applicable trip generation rates. Zones that are expected to have a high level of retail activity in the future are added to the category that is thought to best represent the expected level of retail activity. Table 18 shows the categories as defined for 1996 and the zones that were added to each category in the generation of a 1999 base case scenario. It should be noted that modifying the non-work trip rates for selected zones has very little effect on the overall simulation as reflected in the performance indicators. The linited effect is due to the fact that, although non-work related trips are a more significant component of total travel in the p.m. peak than in the a.m., work related travel still dominates particularly when trip length is taken into consideration. The TTS data shows that shopping trips made by auto have one quarter the average trip length of work related trips made by auto. This difference in trip length is reflected in the trip distributions used by the model.

Table 18 - Future Retail Intensive Zones

Category	Zones belonging to this category in 1996	Origin Rate	Destination Rate	Zones added for 1999 simulation
1	2063	0.75	0.7	None
2	2030	0.6	0.5	None
3	2059 2057 2062	0.45	0.38	2087, 2088
4	2068 2016 2163 2040 2060	0.3	0.35	None
5	2053 2012 2005	0.25	0.2	None

3.5 Validation of Halton Region Sub-model

Simulated 1999 traffic volumes were compared with traffic counts taken in 1998 and 1999 as the primary means of validating the application of the GTA model and the regional sub-component for the Region of Halton. Table 19 shows the population and employment control totals used as input to the simulation.

Table 19 - 1999 Population and Employment Totals

	Population	Employment
Halton Hills	46,103	14,756
Milton	32,300	19,399
Oakville	137,200	59,244
Burlington	148,164	63,833
Halton	363,767	157,232
Hamilton	482,976	185,370
Peel	919,263	453,774
York	685,722	324,342
Toronto	2,400,607	1,371,134
Durham	496,655	166,003
External	1,927,016	753,390
Total	7,276,006	3,411,245

Trip generation rates were adjusted by the factors recommended for 1999 in Table . plus the zone specific non-work rates shown in Table 18 for retail intensive zones. The GO 2000 values (Shown in Table 4) were used for modal split together with the base case (1996) values for local transit. The background traffic matrix was factored by the May 2000 observed GO rail growth factors shown in Table .

Table 20 compares the simulated traffic volumes with observed traffic counts (P.M. peak hour excluding trucks) by screen line within the Region. Table 21 gives more detailed comparisons by individual count stations. Simulation results for 1996 are included together with 1995 cordon count data and the results of assigning the 1996 TTS data.

The simulated results for 1999 are, on average, slightly higher than the observed counts taken in 1998 and 1999 (7% in the peak direction and 3% in the reverse direction). Part of that difference may be due to timing. The simulation is based on trip rates observed in the fall whereas the traffic counts are taken in the summer. The simulation also appears to over estimate traffic volumes in the peak direction on the major freeways, particularly the QEW. The over representation of volumes on freeways that operate in congested conditions is a common problem with simulation models caused by the inability of the assignment procedures to reflect the onset off congested conditions and the subsequent build up of queues and delays that may extend beyond the time period being simulated. The assignment procedures used in emme2 assume that traffic condityions remain constant throughout the time period being simulated. The simulated freeway traffic volumes may well provide a more accurate reflection of actual travel demand than do the traffic counts.

Table 20 - Screen Line Summary

		P.M. Peak Direction					Reverse Direction				
	Capacity				Ratio	V/C Ratio				Ratio	V/C Ratio
SCREENLINE	per dir.	Dir.	*98/99 counts*	99sim	Sim/count	99sim	Dir.	*98/99 counts*	99sim	Sim/count	99sim
Bronte Creek	9750	W	9465	11464	1.21	1.18	E	6478	6519	1.01	0.67
16 Mile Creek	13050	W	10797	11761	1.09	0.90	E	7898	7907	1.00	0.61
Oakville South - Halton to Peel	12650	W	7251	8281	1.14	0.65	E	5206	5646	1.08	0.45
Halton/Peel btwn Hwy 403 and 401	1700	W	1054	1177	1.12	0.69	E	375	254	0.68	0.15
Halton/Peel at Hwy 401/407	9150	W	4723	7165	1.52	0.78	E	2234	2290	1.03	0.25
Halton/Peel North	2550	W	1914	1817	0.95	0.71	E	948	815	0.86	0.32
Milton East	4550	W	2228	2289	1.03	0.50	E	948	1109	1.17	0.24
Milton West	8100	W	5075	5714	1.13	0.71	E	2452	2438	0.99	0.30
Halton West - South Section	1650	W	465	652	1.40	0.40	E	138	58	0.42	0.03
Halton West - North Section	1250	W	172	125	0.73	0.10	E	81	49	0.61	0.04
Georgetown West	3400	W	229	486	2.12	0.14	E	194	288	1.48	0.08
Georgetown East	1600	W	1168	1173	1.00	0.73	E	648	634	0.98	0.40
Burlington West End	7350	E	5624	5003	0.89	0.68	W	5459	5256	0.96	0.72
Indian Creek	12900	E	6662	6379	0.96	0.49	W	8491	8749	1.03	0.68
CNR West Oakville	7550	N	3382	3736	1.10	0.49	S	3209	3142	0.98	0.42
CNR East Oakville	6050	N	3273	3073	0.94	0.51	S	2979	3286	1.10	0.54
403 Corridor	5600	N	4005	3499	0.87	0.62	S	2998	3524	1.18	0.63
Milton North	1500	N	861	777	0.90	0.52	S	494	692	1.40	0.46
Halton Central North	5750	N	2282	2679	1.17	0.47	S	1723	2396	1.39	0.42
Georgetown South	3150	N	1992	2055	1.03	0.65	S	759	1099	1.45	0.35
Georgetown North	1700	N	1129	1199	1.06	0.71	S	672	1014	1.51	0.60
CNR West Burlington	4050	N	2034	2104	1.03	0.52	S	1886	2081	1.10	0.51
CNR East Burlington	7650	S	5621	5497	0.98	0.72	N	3687	3637	0.99	0.48
South of Dundas in Burlington	7450	S	6273	6395	1.02	0.86	N	2735	2623	0.96	0.35
South of Dundas in Oakville	8650	S	3632	3152	0.87	0.36	N	2894	2683	0.93	0.31
Milton South	1600	S	577	717	1.24	0.45	N	516	460	0.89	0.29
Halton Central South	8900	S	2921	3094	1.06	0.35	N	2482	3003	1.21	0.34
Skyway	8250	S	4749	5170	1.09	0.63	N	4322	3792	0.88	0.46
Total - All screenlines	**167500**		**99558**	**106634**	**1.07**	**0.64**		**72906**	**75443**	**1.03**	**0.45**

Table 21 - Comparisons by Individual Count Stations

SCREENLINE	Capacity	*95cc*	96TTS	*96sim*	***98/99 counts***	**99sim**	V/C Ratio 99sim	Ratio Sim/count
Beach Blvd North of Liftbridge	850	295	506	341	255	36	0.04	
QEW North of the Skyway Bridge	7400	3279	4312	3820	4067	3756	0.51	
Skyway - Northbound	**8250**	**3574**	**4818**	**4161**	**4322**	**3792**	**0.46**	**0.88**
Beach Blvd North of Liftbridge	850	486	515	199	385	294	0.35	
QEW North of the Skyway Bridge	7400	4015	6286	4217	4364	4876	0.66	
Skyway - Southbound	**8250**	**4501**	**6801**	**4416**	**4749**	**5170**	**0.63**	**1.09**
Plains Rd East of the Regional Boundary	1800	639	544	388	764	862	0.48	
Hwy 403 East of Highway #6	5550	4893	4151	3808	4860	4141	0.75	
Burlington West End - Eastbound	**7350**	**5532**	**4695**	**4196**	**5624**	**5003**	**0.68**	**0.89**
Plains Rd East of the Regional Boundary	1800	550	448	146	599	306	0.17	
Hwy 403 East of Highway #6	5550	4893	4912	4736	4860	4950	0.89	
Burlington West End - Westbound	**7350**	**5443**	**5361**	**4882**	**5459**	**5256**	**0.72**	**0.96**
Waterdown Rd North of Plains Rd	750	470	70	185	401	373	0.50	
King Rd at the CNR	750	231	373	245	377	359	0.48	
Brant St at the CNR	2550	1233	684	849	1256	1372	0.54	
CNR West Burlington - Northbound	**4050**	**1934**	**1126**	**1280**	**2034**	**2104**	**0.52**	**1.03**
Waterdown Rd North of Plains Rd	750	524	431	362	460	435	0.58	
King Rd at the CNR	750	243	330	234	220	286	0.38	
Brant St at the CNR	2550	981	826	722	1206	1360	0.53	
CNR West Burlington - Southbound	**4050**	**1748**	**1587**	**1318**	**1886**	**2081**	**0.51**	**1.10**
Guelph Line at the CNR	2550	1339	1497	1605	1462	1407	0.55	
Walkers Line at the CNR	2550	1351	834	892	1108	1435	0.56	
Appleby Line at CNR	1700	816	321	865	708	454	0.27	
Burloak Dr at the CNR	850	265	60	197	409	341	0.40	
CNR East Burlington - Northbound	**7650**	**3771**	**2712**	**3559**	**3687**	**3637**	**0.48**	**0.99**
Guelph Line at the CNR	2550	1465	1813	1704	1697	1365	0.54	
Walkers Line at the CNR	2550	1889	1622	1320	1731	2033	0.80	
Appleby Line at CNR	1700	1693	1445	1347	1190	1271	0.75	
Burloak Dr at the CNR	850	870	663	615	1003	828	0.97	
CNR East Burlington - Southbound	**7650**	**5917**	**5542**	**4986**	**5621**	**5497**	**0.72**	**0.98**
Hwy #5 West of Kerns Rd.	2400	516	696	855	705	647	0.27	
Hwy #403 East of King Rd	5550	3341	3610	3385	3969	3873	0.70	
North Service Rd East of King Rd	750	518	326	207	496	518	0.69	
Lakeshore Rd East of King Rd	1500	304	65	101	338	229	0.15	
Plains Rd West of the QEW	2700	1160	1255	1422	1154	1112	0.41	
Indian Creek - Eastbound	**12900**	**5839**	**5951**	**5969**	**6662**	**6379**	**0.49**	**0.96**
Hwy #5 West of Kerns Rd.	2400	1071	1622	1258	1439	1563	0.65	
Hwy #403 East of King Rd	5550	3444	4616	4622	4339	4571	0.82	
North Service Rd East of King Rd	750	447	200	209	717	586	0.78	
Lakeshore Rd East of King Rd	1500	614	101	129	544	420	0.28	
Plains Rd West of the QEW	2700	1427	1609	1693	1452	1610	0.60	
Indian Creek - Westbound	**12900**	**7003**	**8147**	**7910**	**8491**	**8749**	**0.68**	**1.03**
Kerns Rd South of Hwy #5	400	44	27	31	91	49	0.12	
Brant St South of Hwy #5	1700	509	546	546	566	577	0.34	
Guelph Line South of Hwy #5	1700	527	917	1084	628	814	0.48	
Headon Rd South of Hwy #5	400	103	101	84	140	132	0.33	
Headon Rd South of Hwy #5	400	277	260	139	274	196	0.49	
Walkers Line South of Hwy #5	1700	390	107	192	471	257	0.15	
Appleby Line South of Hwy #5	750	437	309	328	495	527	0.70	
Orchard Drive South of Hwy #5	400	18	4	28	70	71	0.18	
South of Dundas in Burlington - Northbound	**7450**	**2305**	**2273**	**2433**	**2735**	**2623**	**0.35**	**0.96**
Kerns Rd South of Hwy #5	400	86	11	19	130	51	0.13	
Brant St South of Hwy #5	1700	826	979	828	933	738	0.43	
Guelph Line South of Hwy #5	1700	749	1490	1265	999	1213	0.71	
Walkers Line South of Hwy #5	1700	621	753	373	739	696	0.41	

Table 21 - Comparisons by Individual Count Stations (Cont.)

SCREENLINE	Capacity	*95cc*	96TTS	*96sim*	***98/99 counts***	**99sim**	V/C Ratio 99sim	Ratio Sim/count
Appleby Line South of Hwy #5	750	510	598	375	401	682	0.91	
Orchard Drive South of Hwy #5	400	117	171	44	266	321	0.80	
South of Dundas in Burlington - Southbound	**14500**	**5232**	**6278**	**5365**	**6273**	**6395**	**0.44**	**1.02**
Hwy #5 at Bronte Creek	2400	606	646	1244	671	856	0.36	
QEW at Bronte Creek	5550	4867	4452	4862	5110	4970	0.90	
Lakeshore Rd at Bronte Creek	1800	526	595	555	697	692	0.38	
Bronte Creek - Eastbound	**9750**	**5999**	**5693**	**6661**	**6478**	**6519**	**0.67**	**1.01**
Hwy #5 at Bronte Creek	2400	2320	2966	2214	2380	2673	1.11	
QEW at Bronte Creek	5550	4913	7968	6339	5600	7220	1.30	
Lakeshore Rd at Bronte Creek	1800	1340	1715	1208	1485	1571	0.87	
Bronte Creek - Westbound	**9750**	**8573**	**12649**	**9761**	**9465**	**11464**	**1.18**	**1.21**
Bronte Rd at the CNR	1800	680	464	536	862	857	0.48	
Third Line at the CNR	1500	762	771	1019	604	846	0.56	
Fourth Line at the CNR	750	477	364	361	446	457	0.61	
Kerr St at the CNR	1700	672	452	473	636	507	0.30	
Dorval Dr at the CNR	1800	984	919	853	834	1068	0.59	
CNR West Oakville - Northbound	**7550**	**3575**	**2969**	**3241**	**3382**	**3736**	**0.49**	**1.10**
Bronte Rd at the CNR	1800	799	468	452	747	684	0.38	
Third Line at the CNR	1500	936	1066	1113	646	1030	0.69	
Fourth Line at the CNR	750	532	211	328	494	416	0.56	
Kerr St at the CNR	1700	686	293	345	546	354	0.21	
Dorval Dr at the CNR	1800	851	532	667	776	658	0.37	
CNR West Oakville - Southbound	**7550**	**3804**	**2569**	**2905**	**3209**	**3142**	**0.42**	**0.98**
Trafalgar Rd at the CNR	2550	1537	1386	1590	1497	1467	0.58	
Ford Dr at the CNR	1700	694	374	745	956	824	0.48	
Winston Churchill Blvd at the CNR	1800	638	276	502	820	782	0.43	
CNR East Oakville - Northbound	**6050**	**2869**	**2036**	**2837**	**3273**	**3073**	**0.51**	**0.94**
Trafalgar Rd at the CNR	2550	1377	1683	1628	1336	1815	0.71	
Ford Dr at the CNR	1700	1204	659	643	1058	1039	0.61	
Winston Churchill Blvd at the CNR	1800	420	490	454	585	433	0.24	
CNR East Oakville - Northbound	**6050**	**3001**	**2832**	**2726**	**2979**	**3286**	**0.54**	**1.10**
Hwy 25 South of Hwy #5	1000	601	715	625	851	696	0.70	
Third Line South of Hwy #5	850	201	253	134	288	141	0.17	
Neyagawa Blvd South of Hwy #5	1700	243	645	478	148	518	0.30	
Sixth Line South of Hwy #5	1700	187	9	134	209	113	0.07	
Trafalgar Rd South of Hwy #5	1800	667	456	528	751	731	0.41	
Eighth Line South of Hwy #5	750	90	17	99	174	68	0.09	
Ninth Line South of Hwy #5	850	295	450	500	473	415	0.49	
South of Dundas in Oakville - Northbound	**8650**	**2284**	**2545**	**2498**	**2894**	**2683**	**0.31**	**0.93**
Hwy #403 North of the QEW	3700	0	2459	2488	2570	2407	0.65	
W Churchill Blvd South of Hwy #5	1900	1689	819	1010	1435	1092	0.57	
403 Corridor - Northbound	**5600**	**1689**	**3278**	**3497**	**4005**	**3499**	**0.62**	**0.87**
Hwy 25 South of Hwy #5	1000	425	566	479	477	563	0.56	
Third Line South of Hwy #5	850	508	398	254	587	319	0.38	
Neyagawa Blvd South of Hwy #5	1700	80	249	438	349	518	0.30	
Sixth Line South of Hwy #5	1700	366	386	289	355	301	0.18	
Trafalgar Rd South of Hwy #5	1800	826	1067	592	867	1066	0.59	
Eighth Line South of Hwy #5	750	288	224	156	493	216	0.29	
Ninth Line South of Hwy #5	850	396	323	147	504	168	0.20	
South of Dundas in Oakville - Southbound	**8650**	**2889**	**3213**	**2356**	**3632**	**3152**	**0.36**	**0.87**
Hwy #403 North of the QEW	3700	0	2796	2421	2098	2599	0.70	
W Churchill Blvd South of Hwy #5	1900	1484	670	791	900	925	0.49	
403 Corridor - Southbound	**22900**	**7262**	**9892**	**7923**	**2998**	**3524**	**0.15**	**1.18**
Hwy 5 at Oakville Creek	2400	710	615	1102	990	955	0.40	
Upper Middle Road at Oakville Creek	1700	410	604	688	871	1019	0.60	
QEW at Oakville Creek	5550	4617	5159	5410	5079	5344	0.96	
Lakeshore Rd at Oakville Creek	1700	517	159	225	486	314	0.18	

Table 21 - Comparisons by Individual Count Stations (Cont.)

SCREENLINE	Capacity	*95cc*	96TTS	*96sim*	***98/99 counts***	**99sim**	V/C Ratio 99sim	Ratio Sim/count
Rebecca St at Oakville Creek	1700	335	316	191	472	276	0.16	
16 Mile Creek - Eastbound	**13050**	**6589**	**6854**	**7617**	**7898**	**7907**	**0.61**	**1.00**
Hwy 5 at Oakville Creek	2400	2489	2376	2008	2287	2317	0.97	
Upper Middle Road at Oakville Creek	1700	750	1011	835	1573	1415	0.83	
QEW at Oakville Creek	5550	4741	6517	5995	5222	6460	1.16	
Lakeshore Rd at Oakville Creek	1700	918	622	530	806	647	0.38	
Rebecca St at Oakville Creek	1700	635	805	521	909	922	0.54	
16 Mile Creek - Westbound	**13050**	**9533**	**11331**	**9891**	**10797**	**11761**	**0.90**	**1.09**
Lakeshore Rd West of Winston Churchill	900	211	68	85	212	167	0.19	
Royal Windsor Dr West of W Churchill Bl	1800	470	590	435	528	439	0.24	
South Service Rd West of W Churchill Bl	850	213	40	53	337	50	0.06	
QEW West of Winston Churchill Blvd	5550	2890	3354	3839	3126	3795	0.68	
North Service Rd West of W Churchill Bl	850	121	202	215	149	321	0.38	
Hwy 5 West of Winston Churchill Blvd	2700	589	885	915	854	875	0.32	
Oakville South - Halton to Peel EB	**12650**	**4494**	**5139**	**5541**	**5206**	**5646**	**0.45**	**1.08**
Lakeshore Rd West of Winston Churchill	900	487	517	351	567	658	0.73	
Royal Windsor Dr West of W Churchill Bl	1800	965	1241	973	1078	1126	0.63	
South Service Rd West of W Churchill Bl	850	224	125	18	297	323	0.38	
QEW West of Winston Churchill Blvd	5550	3695	4999	4459	3565	4752	0.86	
North Service Rd West of W Churchill Bl	850	322	221	172	433	308	0.36	
Hwy 5 West of Winston Churchill Blvd	2700	2193	1252	886	1311	1115	0.41	
Oakville South - Peel to Halton WB	**12650**	**7886**	**8355**	**6858**	**7251**	**8281**	**0.65**	**1.14**
Trafalgar Rd. connection to 403, Peel stn 258	1000	178	148	261	230	205	0.20	
Trafalgar Rd. connection to 403, Peel stn 258	1000	737	883	738	890	856	0.86	
Lower Base Line West of 9th Line	600	0	0	2	75	190	0.32	
Lower Base Line West of 9th Line	600	0	331	6	442	337	0.56	
Britannia Rd West of 9th Line	750	110	177	219	144	64	0.09	
Derry Road East of Ninth Line	950	125	210	37	231	190	0.20	
Halton/Peel btwn Hwy 403 and 401 - Eastbound	**1700**	**235**	**387**	**256**	**375**	**254**	**0.15**	**0.68**
Britannia Rd West of 9th Line	750	396	616	505	456	443	0.59	
Derry Road East of Ninth Line	950	350	544	138	598	733	0.77	
Halton/Peel btwn Hwy 403 and 401 - Westbound	**1700**	**746**	**1160**	**642**	**1054**	**1177**	**0.69**	**1.12**
Hwy #401 West of W Churchill Blvd	5550	1947	1890	2473	1920	2243	0.40	
Hwy 407 east of Winston Churchill Blvd, Peel stn. 411	3600	0	5453	0	314	47	0.01	
Halton/Peel at Hwy 401/407 - Eastbound	**9150**	**1947**	**7344**	**2473**	**2234**	**2290**	**0.25**	**1.03**
Hwy #401 West of W Churchill Blvd	5550	3415	5828	4388	3265	5267	0.95	
Hwy 407 east of Winston Churchill Blvd, Peel stn. 411	3600	0	2671	0	1458	1899	0.53	
Halton/Peel at Hwy 401/407 - Westbound	**9150**	**3415**	**8499**	**4388**	**4723**	**7165**	**0.78**	**1.52**
Steeles Ave West of W Churchill Blvd	950	304	224	84	389	337	0.35	
#5 Side Rd. West of Winston Churchill Blvd	600	0	62	15	80	24	0.04	
Hwy #7 East of Winston Churchill Blvd	1000	403	450	369	479	453	0.45	
Halton/Peel North - Eastbound	**2550**	**707**	**736**	**467**	**948**	**815**	**0.32**	**0.86**
Steeles Ave West of W Churchill Blvd	950	757	908	487	903	757	0.80	
#5 Side Rd. West of Winston Churchill Blvd	600	0	253	48	130	256	0.43	
Hwy #7 East of Winston Churchill Blvd	1000	896	975	762	881	804	0.80	
Halton/Peel North - Westbound	**2550**	**1653**	**2136**	**1298**	**1914**	**1817**	**0.71**	**0.95**
First Line South of Derry Rd	600	77	8	5	108	21	0.03	
Hwy #25 South of Derry Rd	1000	330	576	475	408	439	0.44	
Milton South - Northbound	**1600**	**407**	**584**	**480**	**516**	**460**	**0.29**	**0.89**
First Line South of Derry Rd	600	84	26	2	105	31	0.05	
Hwy #25 South of Derry Rd	1000	368	699	582	472	686	0.69	

Table 21 - Comparisons by Individual Count Stations (Cont.)

SCREENLINE	Capacity	*95cc*	96TTS	*96sim*	***98/99 counts***	**99sim**	V/C Ratio 99sim	Ratio Sim/count
Milton South - Southbound	**1600**	**452**	**725**	**583**	**577**	**717**	**0.45**	**1.24**
Derry Rd East of Thompson Rd	950	194	37	103	213	186	0.20	
Main St East of Thompson Rd	1700	253	5	0	280	273	0.16	
Steeles Ave East of Thompson Rd.	1900	275	489	576	455	650	0.34	
Milton East - Eastbound	**4550**	**722**	**530**	**679**	**948**	**1109**	**0.24**	**1.17**
Derry Rd East of Thompson Rd	950	678	791	362	984	583	0.61	
Main St East of Thompson Rd	1700	570	549	29	540	576	0.34	
Steeles Ave East of Thompson Rd.	1900	426	896	677	704	1130	0.59	
Milton East - Westbound	**4550**	**1674**	**2236**	**1068**	**2228**	**2289**	**0.50**	**1.03**
Hwy #25 North of Hwy #401	1000	824	866	840	712	681	0.68	
Fourth Line North of Steeles Ave	500	79	205	207	149	97	0.19	
Milton North - Northbound	**1500**	**903**	**1071**	**1047**	**861**	**777**	**0.52**	**0.90**
Hwy #25 North of Hwy #401	1000	327	593	742	328	493	0.49	
Fourth Line North of Steeles Ave	500	84	299	219	166	199	0.40	
Milton North - Southbound	**1500**	**411**	**892**	**961**	**494**	**692**	**0.46**	**1.40**
Hwy #401 West of First Line	5550	1771	1779	1885	1861	1885	0.34	
Steeles Ave West of First Line	850	77	142	113	284	221	0.26	
Main St West of First Line (CNR)	750	87	111	80	74	72	0.10	
Derry Rd West of Bronte St	950	208	70	92	233	261	0.27	
Milton West - Eastbound	**8100**	**2143**	**2102**	**2170**	**2452**	**2438**	**0.30**	**0.99**
Hwy #401 West of First Line	5550	3140	4222	3849	3684	4389	0.79	
Steeles Ave West of First Line	850	270	541	259	494	388	0.46	
Main St West of First Line (CNR)	750	163	323	164	160	205	0.27	
Derry Rd West of Bronte St	950	579	622	295	737	732	0.77	
Milton West - Westbound	**8100**	**4152**	**5708**	**4568**	**5075**	**5714**	**0.71**	**1.13**
Ninth Line South of Hwy #401	850	168	324	182	172	255	0.30	
Trafalgar Rd South of Hwy #401	1900	488	511	591	610	666	0.35	
James Snow Pkwy South of Hwy #401	1900	0	530	503	322	476	0.25	
Hwy #25 South of Hwy #401	2700	805	526	875	838	893	0.33	
Tremaine Rd South of Hwy #401	600	146	226	375	190	233	0.39	
Guelph Line South of Hwy #401	950	253	323	455	350	480	0.51	
Halton Central South - Northbound	**8900**	**1860**	**2441**	**2981**	**2482**	**3003**	**0.34**	**1.21**
Ninth Line South of Hwy #401	850	124	235	40	141	202	0.24	
Trafalgar Rd South of Hwy #401	1900	499	671	420	669	601	0.32	
James Snow Pkwy South of Hwy #401	1900	0	743	566	688	644	0.34	
Hwy #25 South of Hwy #401	2700	689	773	642	760	651	0.24	
Tremaine Rd South of Hwy #401	600	93	329	317	131	135	0.23	
Guelph Line South of Hwy #401	950	287	1100	688	532	861	0.91	
Halton Central South - Southbound	**8900**	**1692**	**3850**	**2673**	**2921**	**3094**	**0.35**	**1.06**
Trafalgar Rd North of Hwy #401	1900	596	867	793	797	1044	0.55	
James Snow Pkwy North of Hwy #401	1900	270	205	207	268	550	0.29	
Hwy #25 North of Hwy #401	1000	824	866	840	712	681	0.68	
Guelph Line North of Hwy #401	950	360	448	372	505	405	0.43	
Halton Central North - Northbound	**5750**	**2050**	**2386**	**2212**	**2282**	**2679**	**0.47**	**1.17**
Trafalgar Rd North of Hwy #401	1900	405	226	502	634	1061	0.56	
James Snow Pkwy North of Hwy #401	1900	188	299	219	475	545	0.29	
Hwy #25 North of Hwy #401	1000	327	593	742	328	493	0.49	
Guelph Line North of Hwy #401	950	291	155	263	286	297	0.31	
Halton Central North - Southbound	**5750**	**1211**	**1273**	**1726**	**1723**	**2396**	**0.42**	**1.39**
Kilbride St East of Town Line	850	58	47	73	87	28	0.03	
Campbellville Rd East of Town Line	800	56	69	35	51	29	0.04	
Halton West - Southbound Section - Eastbound	**1650**	**114**	**116**	**108**	**138**	**58**	**0.03**	**0.42**
Kilbride St East of Town Line	850	127	569	390	166	270	0.32	
Campbellville Rd East of Town Line	800	173	429	264	299	382	0.48	
Halton West - Southbound Section - Westbound	**1650**	**300**	**998**	**654**	**465**	**652**	**0.40**	**1.40**
Hwy #401 West of Guelph Line	5550	1564	1911	1817	1674	1778	0.32	**1.06**
Hwy #401 West of Guelph Line	5550	2467	3283	3439	3343	3794	0.68	**1.13**

Table 21 - Comparisons by Individual Count Stations (Cont.)

SCREENLINE	Capacity	*95cc*	96TTS	*96sim*	***98/99 counts***	**99sim**	V/C Ratio 99sim	Ratio Sim/count
RR 15 east of Halton/Wellington boundary	500	0	14	0	41	15	0.03	
RR 34 east of Halton/Wellington boundary	750	0	62	7	40	35	0.05	
Halton West - Northbound Section - Eastbound	**1250**	**0**	**76**	**7**	**81**	**49**	**0.04**	**0.61**
RR 15 east of Halton/Wellington boundary	500	0	93	0	92	71	0.14	
RR 34 east of Halton/Wellington boundary	750	0	0	3	80	53	0.07	
Halton West - Northbound Section - Westbound	**1250**	**0**	**93**	**3**	**172**	**125**	**0.10**	**0.73**
Trafalgar Rd South of #10 Side Rd	950	549	821	826	564	693	0.73	
Eighth Line South of #10 Side Rd	500	48	17	2	186	228	0.46	
Ninth Line South of #10 Side Rd	850	537	600	428	551	524	0.62	
Winston Churchill Blvd. South of #10 Side Rd	850	449	716	566	691	611	0.72	
Georgetown South - Northbound	**3150**	**1583**	**2154**	**1822**	**1992**	**2055**	**0.65**	**1.03**
Trafalgar Rd South of #10 Side Rd	950	285	459	678	255	620	0.65	
Eighth Line South of #10 Side Rd	500	40	0	0	82	7	0.01	
Ninth Line South of #10 Side Rd	850	227	35	84	186	221	0.26	
Winston Churchill Blvd. South of #10 Side Rd	850	195	212	287	236	251	0.29	
Georgetown South - Southbound	**3150**	**747**	**706**	**1050**	**759**	**1099**	**0.35**	**1.45**
Hwy #7 East of Winston Churchill Blvd	1000	403	450	369	479	453	0.45	
River Drive East of the Credit River	600	138	279	168	169	180	0.30	
Georgetown East - Eastbound	**1600**	**541**	**730**	**537**	**648**	**634**	**0.40**	**0.98**
Hwy #7 East of Winston Churchill Blvd	1000	896	975	762	881	804	0.80	
River Drive East of the Credit River	600	280	437	365	287	369	0.62	
Georgetown East - Westbound	**1600**	**1176**	**1412**	**1128**	**1168**	**1173**	**0.73**	**1.00**
Wildwood Rd North of Silver Creek	500	0	114	155	98	126	0.25	
Hwy #7 North of #20 Side Rd	1200	899	1007	1025	1031	1073	0.89	
Georgetown North - Northbound	**1700**	**899**	**1120**	**1180**	**1129**	**1199**	**0.71**	**1.06**
Wildwood Rd North of Silver Creek	500	0	87	140	125	123	0.25	
Hwy #7 North of #20 Side Rd	1200	416	380	691	547	891	0.74	
Georgetown North - Southbound	**1700**	**416**	**468**	**831**	**672**	**1014**	**0.60**	**1.51**
#17 Side Rd West of Trafalgar	500	0	0	36	50	145	0.29	
#15 Side Rd West of Trafalgar Rd	700	43	146	150	56	24	0.03	
#10 Side Rd West of Trafalgar Rd	500	63	43	30	88	119	0.24	
Georgetown West - Eastbound	**3400**	**1315**	**1588**	**216**	**194**	**288**	**0.08**	**1.48**
#17 Side Rd West of Trafalgar	500	0	0	58	60	218	0.44	
#15 Side Rd West of Trafalgar Rd	700	66	185	246	65	120	0.17	
#10 Side Rd West of Trafalgar Rd	500	88	0	40	104	148	0.30	
Georgetown West - Westbound	**1700**	**106**	**189**	**216**	**229**	**486**	**0.29**	**2.12**
Hwy #25 South of Regional Rd #12	1000	560	879	893	764	867	0.87	**1.14**
Hwy #25 South of Regional Rd #12	1000	211	461	623	400	678	0.68	**1.70**
Hwy #7 East of Churchill Rd	1200	300	239	416	393	503	0.42	**1.28**
Hwy #7 East of Churchill Rd	1200	541	665	590	769	675	0.56	**0.88**
Hwy #25 North of Hwy #7	850	186	443	548	218	376	0.44	
Acton North - Northbound	**850**	**186**	**443**	**548**	**218**	**376**	**0.44**	**1.72**
Hwy #25 North of Hwy #7	850	137	440	418	106	195	0.23	
Acton North - Southbound	**850**	**137**	**440**	**418**	**106**	**195**	**0.23**	**1.84**
Hwy #7 East of First Line	1200	238	163	202	233	233	0.19	
Regional Rd #12 East of First Line	700	49	0	50	175	63	0.09	
Acton West - Eastbound	**1900**	**287**	**163**	**252**	**408**	**296**	**0.16**	**0.73**
Hwy #7 East of First Line	1200	390	413	292	440	372	0.31	
Regional Rd #12 East of First Line	700	97	13	54	77	78	0.11	
Acton West - Westbound	**1900**	**487**	**426**	**345**	**517**	**449**	**0.24**	**0.87**
RR 1 south of Halton/Wellington	850	0	179	21	290	108	0.13	

Table 21 - Comparisons by Individual Count Stations (Cont.)

SCREENLINE	Capacity	*95cc*	96TTS	*96sim*	***98/99 counts***	**99sim**	V/C Ratio 99sim	Ratio Sim/count
boundary								
Hwy #7 East of First Line	1200	390	413	292	440	372	0.31	
Hwy #25 North of Hwy #7	850	186	443	548	218	376	0.44	
RR 3 south of Halton/Wellington boundary	950	0	488	304	442	513	0.54	
Halton North - Northbound	**3850**	**576**	**1523**	**1165**	**1390**	**1368**	**0.36**	**0.98**
RR 1 south of Halton/Wellington boundary	850	0	11	8	96	36	0.04	
Hwy #7 East of First Line	1200	238	163	202	233	233	0.19	
Hwy #25 North of Hwy #7	850	137	440	418	106	195	0.23	
RR 3 south of Halton/Wellington boundary	950	0	97	135	150	290	0.31	
Halton North - Southbound	**3850**	**375**	**711**	**763**	**585**	**755**	**0.20**	**1.29**

3.5 Halton Region Mode Splits

The trip tables that are produced as output from the GTA model have been aggregated by the areas shown in Figure 4. The aggregations within the Region of Halton are the same as those used for the input of the trip generation and mode split assumptions. Table 22 shows the total transit mode splits (GO Rail + local transit) generated by the model for all trip purposes combined.

Figure 4 - Aggregations Used for Output Summaries

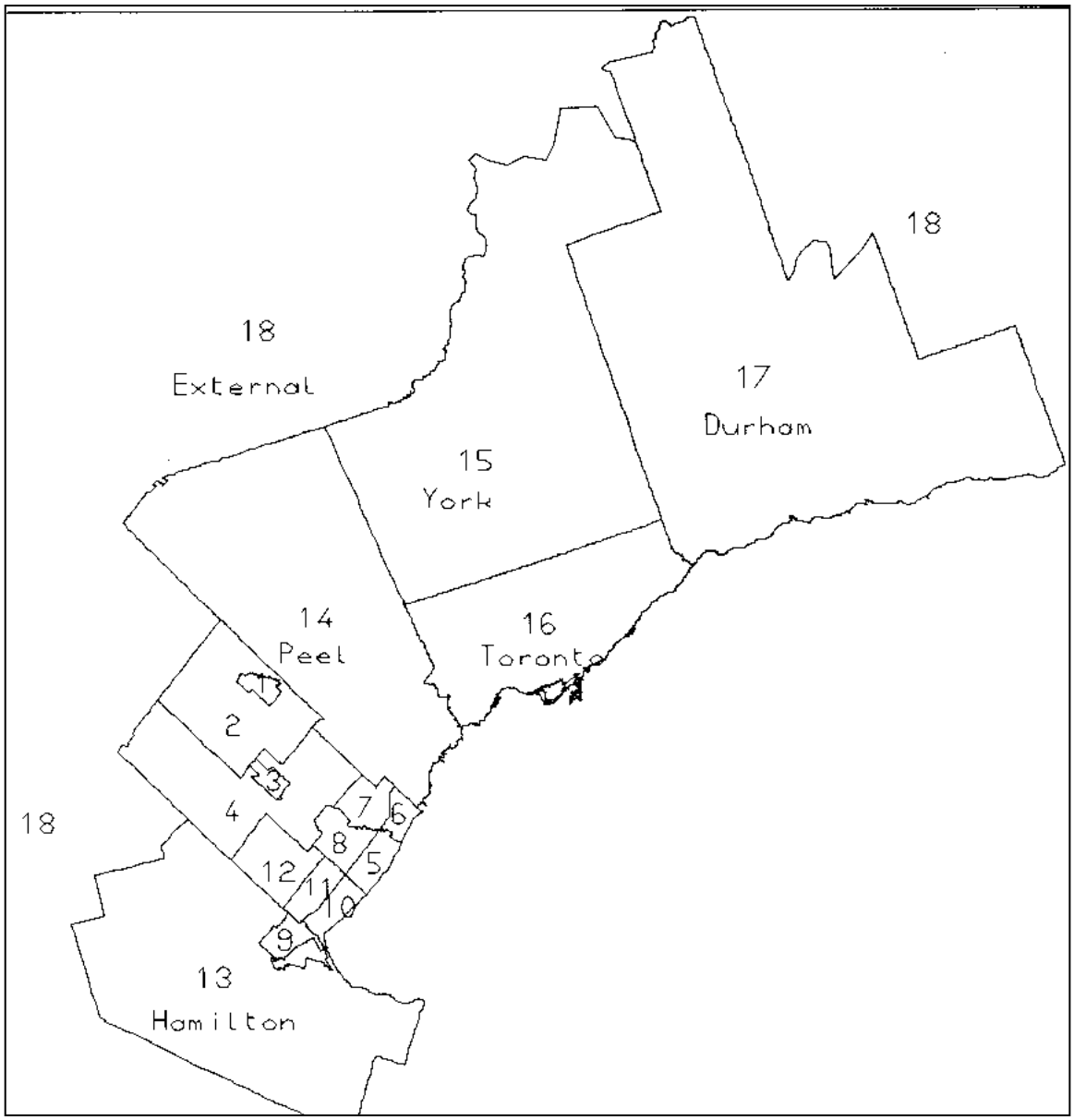


Table 22 - Mode Split Summary

Origin	Dest. >	gq01	gq02	gq03	gq04	gq05	gq06	gq07	gq08	gq09	gq10	gq11	gq12	gq13	gq14	gq15	gq16	gq17	gq18	Total
Georgetown	gq01																			
Rest of Halton H.	gq02																			
Urban Milton	gq03			0.7%	1.0%															0.4%
Rural Milton	gq04																			
S. Oakville	gq05					1.6%	2.7%	4.0%	2.0%	0.5%	1.5%			1.1%	0.8%		8.2%			2.0%
E. Oakville	gq06					3.7%	1.5%	4.0%	3.4%					3.4%	6.9%		6.0%		4.5%	3.6%
N. Oakville	gq07					6.1%	3.9%	2.5%	5.6%					2.0%	5.3%		0.3%		0.1%	3.3%
W. Oakville	gq08					2.3%	1.5%	1.1%	0.6%		1.1%			1.4%	1.1%		11.0%			1.4%
W. Burlington	gq09									0.3%	4.5%	3.1%	4.1%	2.7%						2.6%
S. Burlington	gq10						1.4%	1.4%		2.2%	2.3%	3.1%	3.3%	1.2%	1.6%					2.0%
C. Burlington	gq11									0.5%	1.7%	1.1%	1.4%	1.2%						1.1%
N. Burlington	gq12										0.7%									0.2%
Hamilton	gq13					1.6%	1.3%	1.6%	2.3%	1.6%	2.8%	0.3%		7.9%			9.3%		0.3%	7.1%
Peel	gq14	0.7%	0.2%	0.8%	0.5%	3.2%	1.3%	1.6%	3.2%			0.8%	1.1%	3.5%	5.0%	0.6%	6.9%		0.2%	4.7%
York	gq15														2.4%	2.5%	9.2%	0.2%	0.0%	3.9%
Toronto	gq16	21.3%	13.9%	29.6%	11.2%	30.8%	42.1%	42.6%	48.1%	10.8%	41.3%	26.5%	10.9%	30.0%	21.1%	16.8%	31.1%	20.3%	8.0%	28.5%
Durham	gq17														10.8%		2.7%	3.1%		2.9%
External	gq18													0.5%		1.2%	0.6%			0.7%
	Total	1.8%	1.4%	3.0%	1.2%	5.9%	8.4%	9.6%	9.3%	1.5%	4.5%	2.9%	2.0%	7.3%	8.3%	7.0%	27.7%	5.9%	2.1%	15.7%

4.0 GTA Model Operation

4.1 Initial Set-up

The recommended procedure for setting up the model is to copy the emme2bank, and the associated macros, from the directory that has been used to develop the model. A minimum of 1 Gigabyte of disk space will be required. The emme2bank itself currently occupies 872 Megabytes of disk space.

4.2 Emme2bank

The emme2bank contains a large amount of TTS data in addition to the base information and base year network needed to run the model.

Matrices

Appendix A contains a listing of the current matrix directory. The development model is subject to ongoing refinement and modification. Revisions to the allocation of matrix numbers are likely. Table 23 provides a summary of the planned allocation of numbers by primary function.

Table 23 - Matrix Allocation Table

Matrix ID	Status	Description
Ms		
1-26, 30	User Defined	Input parameters
27-29, 31-60	Calculated	Performance Indicators
61-71	Calculated	Validation check totals
72-98	Protected	TTS Performance Indicators (for comparison)
99	Reserved	Internal use
Mo/md		
1-13	User Defined	Trip rates and mode split factors
18	User Defined	Population/Employment
20-43	Calculated	Trip end totals
45-51	Calculated	Performance Indicators (by zone or link aggregation)
60-75	Protected	Base case trip rates and mode split factors
76-92	Protected	TTS data (for comparison)
97-99	Reserved	Internal use
Mf		
1-14	Protected	Base case trip distribution & other input matrices
15-16	User Defined	Auto occupancy & extra vehicle matrices
17-38	Calculated	Simulated trip and travel time matrices
43-60	Protected	TTS and calibration data

Zone Ensembles

A number of zone ensembles have been pre-defined or allocated for specific purposes as shown in Table 24.

Table 24 - Zone Ensembles

Letter	Description and/or use	Form	
A	Calibration of trip distribution	Xx	Not used in running the model.
G	Input of Trip generation Rates	Xxy	xx - Planning district (municipality) y - sub-division
M	Input of mode split factors	Xxy	xx - Planning district (municipality) y - sub-division
P	Planning district	Xx	Pre-defined (1-47)
R	Regions	X	Pre-defined (1-7)
S	GO Station catchment areas	Xx	Pre-defined
Q	Output of performance indicators		User defined

Volume Delay Functions

The 1996-travel time matrix currently contained in the emme2bank was generated using tangential volume delay functions, also contained in the emme2bank. These times are used as the base reference points when modifying the auto trip distribution to reflect projected changes in level of service. If the volume delay functions are modified the 1996 travel times need to be recalculated for consistency.

Network Scenarios

It is recommended that a new scenario be created for each model run. The road networks contained in the development data bank are based on the 1996 integrated network developed at the DMG but contain numerous modifications and corrections identified as desirable during the development process. Compatibility with the original transit itinararies has not been maintained. Scenario 96 contains the original 1996 integrated network obtained from the DMG with the additional centroid connectors (mode z) to represent auto access to GO stations. This network has been used as the base for all transit assignments.

The HOV component of the model requires an HOV network in which all links with unrestricted auto use have been coded with the mode codes c, i and j in addition to any transit or auxilliary transit codes. Mode code j must be omitted for links resticted to vehicles with 2 or more occupants and mode codes i and j omitted for links restricted to vehicles with 3 or more occupants.

Extra Attribute Data

Table 25 lists the extra attributes that have to be defined or which contain comparative TTS data.

Table 25 - Extra Attributes

Attribute	Type	Required for	Description
@lkagg	Link	Performance Indicators	User defined
@per1	Link	HOV assignment	Assigned volume of 1 person vehicles
@per2	Link	HOV assignment	Assigned volume of 2 person vehicles
@per3	Link	HOV assignment	Assigned volume of 3+ person vehicles
@lov	Link	HOV conversion	Assigned volume of remaining LOVs
@hov	Link	HOV conversion	Assigned volume of original HOVs
@nhov	Link	HOV conversion	Assigned volume of new HOVs
@tbrd	Line	Comparison	TTS assigned boardings
@tavol	Link	Comparison	TTS assigned auto volume
@ttvol	Segment	Comparison	TTS assigned transit volume

It is recommended that user field ul1 be used to identify cordon count stations for the output of screen line data. The recommended procedure is described in section 4.10.

4.3 Macros

The macros that run the model are being developed as independent modules. It is anticipated that one master macro will be used to call the modules in the proper sequence. The master macro will be modified to suit specific applications (e.g. modified trip distribution, hov assignments etc.). Table 26 lists the macros that are currently operational.

Table 26 - Macros

Macro name		Function
Pmpk.mac	*	Calls the other macros in the required order
Pmac0	*	Selects scenario and sets ID
Pmac1		Updates matrix input data using an external file
Pmac2	*	Work trip generation, mode split and distribution
Pmac4	*	Non work trip generation and distribution. Matrix aggregation
Pmac5		Transit assignment
Pmac6	*	Road assignment - (no consideration of HOV lanes)
Pmac7	*	Performance Indicator and trip end summary report
Pmac8	*	Modal split and auto performance report
Pmac9	*	Link aggregation report
Pmac10		Trip length adjustment
pmac11		Road assignment with HOV lanes
pmac12		Generation of new HOVs

The master macro "pmpk.mac" can be edited to include only those macros that are required for a given run. The macros need to be run in numerical order but do not necessarily have to be run as a single batch process provided that no modifications are made to the emme2bank between runs. The macro "pmac0" needs to be repeated as the first macro in each stage. Output files that need to be saved should be renamed before running the next stage otherwise they will be deleted when the next stage is initiated. Macro "pmac5" needs to be repeated after the trip length adjustment (pmac10) in order to obtain the assignment results with the trip length adjustment unless an HOV assignment (pmac11or pmac11 and pmac12) is to be performed in conjunction with the trip length adjustment. The last two report macros, "pmac8" and "pmac9", may be repeated after the trip length adjustment and/or HOV assignment to obtain before and after summaries.

The macro "pmac0" requires three calling arguments defined in the master macro (pmpk.mac). Those arguments are:

Arg1 The name used to identify the run (Max 6 alphanumeric characters with no spaces)
Arg2 The emme/2 scenario number for the road assignments
Arg3 The emme/2 scenario number for the transit assignments

If the results of an adjusted trip length or HOV assignment are to be saved as a new scenario, instead of over-writing the initial road assignbment, the macros must be run in 2 or 3 stages with the required changes to the value of Arg2 between each run

The macro "pmac1" reads matrix input data contained in the file "x.set", where "x" is the first argument used to call "pmac0". The set file may be used to selectively modify the simulation parameters (ms01 through ms26 and ms30), enter new population and employment data and to redefine the trip generation rates and/or mode split factors. Trip generation rates and mode-split factors, if included in the file, may be defined for individual zones or by zone groups contained in any existing zone ensemble.

The master macro "pmpk.mac" can be edited to include only those macros that are required for a given run. The recommended way to disable one of the sub-macros is to insert a "/" as the 2nd character of the call line thus making it into a comment line. The macros marked with asterisks are needed to run the model in its simplest form (i.e. No transit assignment, no adjustment of trip lengths and no HOV assignment).

The following is a sample listing of the macro (pmpk.mac) required to run the full model including trip length adjustment and an HOV assignment with the generation of new HOVs based on projected time savings.

```
Pmd                      User ID
~<pmac0 99base 1999 1996      Set run ID and select scenario
~<pmac1                  Import new parameters
~<pmac2                  Work to home trips
~<pmac3                  Work to non-home trips
~<pmac4                  Non work & total trip
~<pmac5                  Transit assignment
~<pmac6                  Initial road assignment
~<pmac7                  Global Indicators & trip end summary
~<pmac8                  Modal split and auto performance report
~<pmac9                  Link performance report
~<pmac10                 Trip length adjustment
~<pmac11                 HOV assignment
~<pmac12                 New HOV formation & assignment
~<pmac8                  Revised auto performance report
~<pmac9                  Revised link performance report
q                        Quit
```

The following command line will execute the above macro in batch mode.

```
emme2 -m pmpk.mac batch >&filename&
```

Where "filename" is a temporary file used for output of the emme2 dialog.

4.4 Input Data

The basic inputs required for a model run are a network and land use data (population and employment) by zone. The population data must be stored as origin matrix mo18 and the employment data as destination matrix md18. The population and employment data is usually imported in the ".set" file at the start of each model run. If the ".set" file is used to modify the existing vectors (mo18 and md18) it is important that all zones be specified including those with zero values.

Table 27 provides a list of the other input parameters that can be modified, together with recommended values for the years 1996, 2001, 2011 and 2021. The recommended method of modification is to include specification of the desired scalar matrices and values in the ".set" file for each model run. Any scalars not included will retain the values from the previous run.

It is recommended that a new ".set" file be created for each model run using an appropriate name to identify the year and development/network scenario. The file should be saved, along with the output summary report, in order to provide a complete record of the input data for each model run. Every ".set" file should include specification of values for all of the scalars listed in Table 19 as well as any origin or destination vectors that may be selectively modified for different years or simulation scenarios. The inclusion of the values for all years and scenarios in the appropriate ".set" files should help to prevent the accidental use of the wrong values from a previous run.

Table 27 - Recommended "Base Case" Input Parameter Values

ms	Description	1996	1999	2001	2011	2021
1	Work to home origin factor	1.04	1	1	1	1
2	Work to home destination factor	0.98	1	1.01	0.96	0.89
3	Work to non home origin factor	1.04	1	1	1	1
4	Auto from home origin factor	0.99	1	1.02	1.04	1.09
5	Auto Non home or work factor	0.99	1	1.02	1.04	1.09
6	Transit from home origin factor	0.99	1	1.02	1.04	1.09
7	Auto non work to home dest factor	0.99	1.01	1.02	1.01	1.01
8	Transit non-work to home dest. Factor	0.99	1	1.02	1.01	1.01
9	Work trip generation origin weight	0	0	0	0	0
10	Peak hour factor (auto)	0.37	0.37	0.37	0.37	0.37
11	Work to home other m/s factor	1	1	1	1	1
12	Work to home GO Rail m/s factor	1	1	1	1	1
13	Work to home transit m/s factor	1	1	1	1	1
14	Work to non home other m/s factor	1	1	1	1	1
15	Work to non home GO Rail m/s factor	1	1	1	1	1
16	Work to non home Transit m/s factor	1	1	1	1	1
17	M/s origin weight - other mode	0.5	0.5	0.5	0.5	0.5
18	M/s origin weight - GO Rail	0.7	0.7	0.7	0.7	0.7
19	M/s origin weight - Local Transit	0.5	0.5	0.5	0.5	0.5
20	GO Rail non work factor	1.08	1.08	1.08	1.08	1.08
21	Local transit excluded factor	1.05	1.05	1.05	1.05	1.05
22	Auto occupancy adjustment factor	1	1	1	1	1
23	Trip length adjustment coefficient	0.03	0.03	0.03	0.03	0.03
24	2 person hov coefficient	1.01	1.01	1.01	1.01	1.01
25	3 person hov coefficient	0.16	0.16	0.16	0.16	0.16
26	Hov conversion factor	0.01	0.01	0.01	0.01	0.01
36	Bacground traffic factor (GO Rail egress)	1	1	1	1	1

Factors that need to be considered when defining or modifying the above assumptions

- Bias in the TTS
- Ageing of the population
- Strength of the economy
- Socio-economic trends
- Technology
- Level of service & cost (Transit)
- Cost of driving
- Auto availability
- Driver licensing
- School bus policies
- Environmental policies
- Peak spreading

4.5 Modification of Trip Generation Rates and Mode Split Factors

The base trip generation rates and mode split factors may be modified in one of the following ways prior to running the model.

1. Changing the appropriate global adjustment factor(s). (See table 19)
2. Performing matrix calculations to adjust the base case data. The development emme2bank contains protected copies of the base case input matrices. These protected copies may be used as input to calculations with the results replacing the input matrices to the model (See appendix A). Zone groupings may be used to perform selective calculations.
3. Importing new rates or factors to the required matrices. The required matrices may be included in the ".set" file at the start of each model run.

An example where the modification of trip rates may be appropriate is with respect to retail intensive zones identified in Halton Region (See section 3.4)

4.6 Trip Distribution

The trip distribution can be modified by the creation of a new base matrix for the desired mode and trip purpose combination(s) (mf01 through mf08). It is recommended that a protected copy of the original matrix be made prior to removing the protection from the matrix to be modified. Applying a factor greater than 1 to the desired cells in the original base matrix will increase the number of simulated trips between those O-D pairs. A factor of less than 1 will reduce the number of the trips. The magnitude of the change, however, is likely to be somewhat less than the factor due to the moderating effect of the trip end balancing procedure.

4.7 Auto Occupancy

The auto occupancy matrix (mf16) may be modified by:

1. Applying the appropriate global adjustment factor (ms22).
2. Performing matrix calculations using the protected copy of the base case matrix (mf14) as input
3. Importing a new matrix (mf16).

4.8 Background Traffic (GO Rail Egress)

In the current applications of the model the background traffic matrix (mf15) is used to represent the auto egress component of trips made by GO Rail. The matrix may be modified by:

1. Applying the appropriate global adjustment factor (ms36).
2. Applying origin specific adjustment factors (mo9). Table 28 identifies the GTA traffic zones that contain GO Rail stations together with recommended growth factors for the years 2001 and 2011. These factors are based on the observed growth in GO Rail ridership between 1996 and May of 2000 and projected GO Rail ridership based on GO Transit's 10-year capital development plan. The projections assume no change in egress mode split and do not take into account future parking constraints. Table 29 identifies the zones associated with subway park n' ride and reported use in 1996 (TTS data).
3. Performing matrix calculations using the protected copy of the base case matrix (mf12) as input.
4. Importing a new matrix (mf15)

Table 28 - GO Rail Stations and Growth Factors

GTA Zone	Station	96 TTS pm peak driver egr.	96 > 00 Obs. Growth Total riders	Recommended Grwowth Factors 2001	2011
16	Mimico	66	0.95	1	1
1	Long Branch	102	1.07	1	1
1547	Port Credit	849	0.96	1	1
1539	Clarkson	1809	1.13	1.1	1.1
2014	Oakville	1416	1.06	1.1	1.5
2003	Oakville West	509	1.44	1.5	1.6
2077	Appleby	443	1.48	1.5	1.6
2059	Burlington	698	1.44	1.5	1.5
2052	Aldershot	110	1.63	2	2
2520	Hamilton	95	2.88	3	3
368	Danforth	60	0.81	1	1
402	Scarborough	502	1.66	1.7	1.7
405	Eglinton	438	1.38	1.4	1.5
458	Guildwood	262	1.12	1.1	1.2
449	Rouge Hill	694	1.17	1.2	1.3
541	Pickering	1338	1.02	1	1.5
569	Ajax	851	1.08	1.1	1.3
616	Whitby	1085	1.48	1.5	1.8
664	Oshawa	526	1.54	1.5	1.7
22	Kipling	102	1.07	1	1
1561	Dixie	338	1.25	1.3	1.3
1566	Cooksville	684	1.28	1.3	1.3
1578	Erindale	646	1.07	1.1	1.4
1503	Streetsville	265	1.88	2	4
1512	Meadowvale	418	1.23	1.3	3
2124	Milton	299	1.15	1.2	2.5
169	Bloor	0	1.02	1	1
124	Weston	132	1.27	1.3	1.3
61	Etobicoke North	315	1.35	1.4	1.4
1611	Malton	194	1.50	1.5	2
1629	Bramalea	526	1.37	1.4	2
1649	Brampton	830	1.13	1.1	2
2164	Georgetown	243	1.24	1.3	3
1076	Maple	76	2.53	3	4.5
1286	King City	71	2.19	2	3
1239	Aurora	174	1.99	2	3
1254	Newmarket	229	1.76	2	3
4100	Bradford	173	2.56	3	4
324	Oriole	142	0.91	1	1
328	Old Cummer	151	1.34	1.4	1.4
1150	Langstaff	316	1.47	1.5	1.7
1122	Richmond Hill	468	1.12	1.1	1.5
380	Agincourt	132	1.74	2	2
1181	Milliken	20	1.86	2	3
1185	Unionville	213	1.80	2	4
1206	Markham	207	1.69	1.8	4
1331	Stouffville	0	1.57	1.6	3

Table 29 - Subway Park and Ride

Zone	Station	96 TTS pm peak Driver egr.
33	Kipling	1072
34	Islington	757
45	Old Mill	130
98	Downsview	91
104	Lawrence West	59
106	Wilson	914
142	Keele	81
143	High Park	80
144	Runnymede	39
157	Dundas W	64
169	Keele	98
196	Castlefrank	72
199	St Clair	89
225	Union	218
232	Bloor/Yonge	83
258	Broadview	90
262	Greenwood	57
295	Yorkdale	1084
300	York Mills	207
307	Shepperd	259
317	Finch	2435
396	Victoria Park	177
399	Warden	369
410	Kennedy	859
426	Scarborough TC	55

4.9 Other Adjustment Factors

Other factors that can be adjusted prior to a model run are:

1. The weight assigned to the work trip origin total relative to the work trip destination total.
2. The weight assigned to the origin trip totals by mode relative to the destination total for the same mode.
3. GO Rail non-work factor.
4. Local transit excluded factor.

Refer to Appendix A in order to identify the appropriate matrix scalars.

4.10 Model Outputs

The primary outputs from a simulation run are the trip matrices and network assignments. Analysis of the results is possible within emme/2 or selected data may be exported for external analysis. Assignment results will remain in the emme2bank until the applicable scenario is deleted, modified or used for another model run. Subsequent model runs will over write matrix information. Output information that can be obtained from each model run includes the following reports:

1. A report listing the values of all the matrix scalars. This report can be used as a permanent record of the input parameters, control totals, calculated trip totals and global performance indicators. The report is generated by the macro "pmac7"

2. The following totals for each zone group defined in zone ensemble "gq"
   - Population.
   - Employment
   - From work trip origins
   - From home trip origins
   - To home trip destinations
   - Non home base non work trip origins

   The report is generated by the macro "pmac7".

3. The following trip end totals for each zone group defined in zone ensemble "gq"
   - GO Rail origins
   - Local transit origins
   - Auto person origins
   - Auto driver origins
   - GO Rail destinations
   - Local transit destinations
   - Auto person destinations
   - Auto driver destinations

   The report is generated by the macro "pmac7"

4. The following factors calculated for each zone group in zone ensemble "gq"
   - Activity rate (jobs per 1000 population)
   - Origin transit modal split (all trips)
   - Destination transit mode split (all trips)
   - Self-containment (% of all trip destinations that have their origin within the same zone group).
   - Mean auto person trip time by destination based on 1996 Levels of Service.
   - Mean auto person trip time by destination based on the projected level of service given by an equilibrium assignment to a future network.
   - Mean auto occupancy by destination

   The report is generated by the macro "pmac8"

5. The following trip matrices aggregated by zone group in zone ensemble "gq"
   - Peak hour auto driver trips
   - Peak period auto person trips
   - Peak period GO Rail trips
   - Peak period local transit trips

   The report is generated by the macro "pmac8". This part of the output report may be imported to a spreadsheet for the purpose of calculting O-D specific mode splits.

6. The following totals and averages are calculated for the link aggregations defined by non-zero values of the extra link attribute "@lkagg". The aggregations may be defined to represent screen lines, geographic areas, categories of road, or combinations of these attributes.
   - Number of links in the aggregation
   - Total assigned vehicle km
   - Total assigned vehicle hours
   - Mean speed (kph)
   - Capacity utilisation (assigned vehicle km / vehicle km of capacity)
   - Total link volume
   - Volume to capacity ratio

   The calculation of capacity utilisation differs from volume to capacity ratio in that the length of each link in the aggregation is used to weight the result. Capacity utilisation is the appropriate measure to use as the average for a geographic area. Volume to capacity ratio is more appropriate for screen line crossings. The report is generated by the macro "pmac9".

The output reports are generated using the standard emme/2 output modules 3.12 and 3.14. There are some limitations inherent in that format.

- The emme/2 report format shows the sum, mean, minimum and maximum values at the end of each table. The mean value shown is an unweighted average that does not take into account the different sizes of the aggregations.
- The number of zone groups defined in zone ensemble "gq"and the printer device option will determine the size of the output report and the number of pages required to print the aggregated trip matrices. The maximum number of aggregations that can be printed on a single page at 15 cpi (Device option set for HP Laserjet) is 9. The maximum for 2 pages per trip matrix is 19.
- Origin and destination vectors are used to store the results of the calculations for each link aggregation. The zone numbers shown are the reference numbers for each link aggregations used in these vectors. There is no relationship to actual zones or zone system other than that a zone number must be defined as a centroid in the network in order for it to be a valid reference number.

Matrix and link attribute data may be exported for external analysis. Table 17 provides a list of the extra attribute data that is available in addition to the standard link attributes and assignment results. Appendix A contains a complete list of the available matrices. Appendix B contains an example of the output reports produced by the macros "pmac8" and "pmac9".

4.11 Transfer of Data to Regional Sub-model

The transfer is made by using the "punch" option in module 3.14 to output the peak hour auto driver matrix (mf27) aggregated by the zone ensemble that defines the GTA zone aggregations used in the Regional sub-model ("gd" for Durham and "gh" for Halton). The matrix identification in the output file should be edited to the desired value for use in the emme2bank containing the Regional sub-model.

Caution - the output file will only contain the aggregated cells that have non-zero values for the current model run. Using the output to modify an existing matrix in the Regional emme2bank could result in errors if any of the zero cells had non-zero values in a previous run since those values will not be over-written. Delete the previous matrix before reading in the new matrix.

After the aggregated trip matrix from the GTA emme2bank has been imported to the Regional emme2bank the macro "split_zone.mac" may be used to sub-divide the trip table to the more detailed zone system within the regional sub-model. This macro should be run from the main menu (primary select) within emme2 and has 4 calling arguments

Arg1 The letters "am" or "pm" to denote whether the imported matrix is for the a.m. or p.m. peak hour.
Arg2 The identification number of the aggregated matrix imported from the GTA emme2bank
Arg3 The identification number to be used for the "split" matrix
Arg4 The identification number of the origin(mo) and destination (md) vectors containing the population and employment data for the detailed zones within the Region.

The splitting procedure maintains the origin and destination trip totals at the aggregated zone level. Proportioning factors may therefore be used instead of actual population and employment data. It is not necessary to have population or employment data for the external zone aggregations or for individual zones that are not being split. Both the population and employment vectors must have one non-zero value for at least one zone within an agregation or GTA zone that is to be split.

Appendix A - Emme/2 Matrix Directory

Matrix Directory

Matrix:	Flags:	Modified:	Description:	Value:
ms01: whof		00-07-01 11:08	Work trip origin factor	1
ms02: whdf		99-10-05 08:51	Work to home destination factor	1
ms03: wnhdf		00-07-01 11:09	Work to non-home destination factor	1
ms04: nwaf		00-07-01 11:10	Non-work origin auto factor	1
ms05: anhwof		99-10-05 08:51	Auto Non home or work factor	.99
ms06: thof		99-10-05 08:51	Transit home origin factor	1
ms07: anwhdf		99-10-05 08:51	Auto non work to home dest factor	1.01
ms08: tnwhdf		99-10-05 08:51	Transit non work to home dest. factor	1
ms09: georwt		99-10-05 08:51	Trip generation origin weight	0
ms10: pkhrfc		01-05-08 07:05	Peak hour auto driver conversion factor	.37
ms11: whotf		99-10-05 08:51	Work to home other m/s factor	1
ms12: whgrf		99-10-05 08:51	Work to home GO Rail m/s factor	1
ms13: whtrf		99-10-05 08:51	Work to home transitl m/s factor	1
ms14: wnhotf		99-10-05 08:51	Work to non home other m/s factor	1
ms15: wnhgrf		99-10-05 08:51	Work to non home GO Rail m/s factorm	1
ms16: wnhtrf		99-10-05 08:51	Work to non home Transit m/s factor	1
ms17: msowo		99-10-30 09:30	m/s origin weight - other mode	.5
ms18: msowg		99-10-30 09:30	m/s origin weight - GO Rail	.7
ms19: msowt		99-10-30 09:32	m/s origin weight - local transit	.5
ms20: grnwf		99-10-30 09:34	GO Rail non work factor	1.08
ms21: ltexf		99-10-30 09:34	Local transit excluded factor	1.05
ms22: occfac		99-10-30 09:35	auto occupancy adjustment factor	1
ms23: tlacf		99-10-30 09:36	Trip length adjustment coefficient	.03
ms24: hov2p		99-10-30 09:36	2 person hov coefficient	1.01
ms25: hov3p		99-10-30 09:37	3 person hov coefficient	.16
ms26: newhov		99-10-30 09:37	new hov factor	.01
ms27: totpop		01-05-18 16:39	99pmh3 Total population	7276006
ms28: totemp		01-05-18 16:39	99pmh3 Total employment	3448892
ms29: ratio		01-05-18 16:39	99pmh3 Employment per 1000 population	474
ms30: tadt		01-05-29 10:39	99pmh3 peak hour auto driver trips	798166
ms31: whtot		01-05-18 16:38	99pmh3 From work total trips	1415008
ms32: hwot		01-05-18 16:39	99pmh3 From Work other trips	57121
ms33: whgot		01-05-18 16:39	99pmh3 From Work GO Rail trips	50243
ms34: whtr		01-05-18 16:39	99pmh3 From Work transit trips	197900
ms35: wha		01-05-18 16:39	99pmh3 From work auto trips	1109742
ms36: bacfac		01-05-08 07:13	Background traffic factor	1
ms41: nwauto		01-05-29 10:36	99pmh3 non work origin auto trips	1422776
ms42: snwhtt		01-05-29 10:37	99pmh3 non work to home transit trips	163026
ms43: sfhat		00-06-12 19:49	96base from home auto trips	481252
ms44: sfhtt		01-05-29 10:38	99pmh3 from home transit trips	45082
ms46: stadt		01-05-29 10:38	99pmh3 total auto person trips	2532519
ms47: stgt		01-05-29 10:44	99pmh3 total GO Rail trips	54151
ms48: sttt		01-05-29 11:01	99pmh3 total transit trips	426167
ms49: smbrd		01-05-29 11:46	99pmh3 subway boardings	285824
ms50: smpkm		01-05-29 11:46	99pmh3 subway passenger km	1924382
ms51: ssbrd		01-05-29 11:46	99pmh3 streetcar boardings	45372
ms52: sspkm		01-05-29 11:46	99pmh3 streetcar passenger km	126812
ms53: sbbrd		01-05-29 11:46	99pmh3 TTC bus boardings	337025
ms54: sbpkm		01-05-29 11:46	99pmh3 TTC bus passenger km	1406576
ms55: srbrd		01-05-29 11:46	99pmh3 GO Rail boardings	53949
ms56: srpkm		01-05-29 11:46	99pmh3 GO Rail passenger km	1698474
ms57: sgbrd		01-05-29 11:46	99pmh3 GO Bus boardings	39108
ms58: sgpkm		01-05-29 11:46	99pmh3 GO Bus passenger km	635324
ms59: unwao		01-05-29 10:35	99pmh3 Unadj. Non work auto origins	1424020352
ms60: unwad		01-05-29 10:35	99pmh3 unadj non-work auto destinations	1421532800
ms61: uwhto		01-05-18 16:38	Unadj. From work origin total	1453478016
ms62: uwhtd		01-05-18 16:38	Unadj. From work Dest total	1415008384
ms63: uwhoo		01-05-18 16:38	unadj. from work other origins	5797046
ms64: uwhod		01-05-18 16:38	unadj. From work other dest.	5627324
ms65: uwhgo		01-05-18 16:39	unadj. From work GO Rail origins	4865657
ms66: uwhgo		01-05-18 16:39	unadj. From work GO Rail dest.	5394764
ms67: uwhto		01-05-18 16:39	unadj. From work transit origins	19509724
ms68: uwhtd		01-05-18 16:39	unadj. From work transit dest.	20070384
ms70: sobbrd		01-05-29 11:46	99pmh3 other bus boardings	92249
ms71: sobpkm		01-05-29 11:46	99pmh3 other bus passenger km	560670
ms72: ttsrat	/r	99-10-30 08:51	TTS Employment per 1000 population	466
ms73: ttadt	/r	99-10-30 08:51	TTS_total_auto_driver trips	1984067
ms74: twht	/r	99-09-29 08:41	TTS work to home all modes total trips	1051969
ms75: twnht	/r	99-09-29 08:43	TTS work to non home all modes total	239635

Appendix A - Emme/2 Matrix Directory

Matrix:	Flags:	Modified:	Description:	Value:
ms76: twhot	/r	99-09-29 08:43	TTS work to home other trips	43959
ms77: twnhot	/r	99-09-29 08:43	TTS work to non home other trips	8506
ms78: tnhwat	/r	99-09-29 08:43	TTS_non_home_or_work_auto total trips	199649
ms79: twhat	/r	99-09-29 08:44	TTS_work_to_home_auto total trips	808514
ms80: twhgt	/r	99-09-29 08:44	TTS_work_to_home_GO_Rail total trips	32315
ms81: twhtt	/r	99-09-29 08:44	TTS_work_to_home_transit total trips	167181
ms82: twnhat	/r	99-09-29 08:44	TTS_work_to_non_home_auto total trips	205131
ms83: twnhgt	/r	99-09-29 08:45	TTS_work_to_non_home_GO_Rail total trips	2460
ms84: twnhtt	/r	99-09-29 08:45	TTS_work_to_non_home_transit total trips	23538
ms85: tnwhat	/r	99-09-29 08:46	TTS_non_work_to_home_auto total trips	607829
ms86: tnwhtt	/r	99-11-03 18:51	TTS_non_work_to_home_transit total trips	153924
ms87: tfhat	/r	99-09-29 08:46	TTS_from_home_auto total trips	461203
ms88: tfhtt	/r	99-09-29 08:47	TTS_from_home_transit total trips	43101
ms89: TTS	/r	00-02-13 10:38	TTS subway boardings	331638
ms90: tmpkm	/r	00-02-13 10:39	TTS subway passenger km	2572686
ms91: tcbrd	/r	00-02-13 10:39	TTS streetcar boardings	42272
ms92: tcpkm	/r	00-02-13 10:39	TTS streetcar passenger km	159233
ms93: TTS	/r	00-02-13 10:39	TTS bus boardings (Excl. GO)	392272
ms94: tbpkm	/r	00-02-13 10:40	TTS bus passenger km (Excl. GO)	1956549
ms95: trbrd	/r	00-02-13 10:40	TTS GO rail boardings	37403
ms96: trpkm	/r	00-02-13 10:40	TTS GO Rail passenger km	1178654
ms97: tgbrd	/r	00-02-13 10:41	TTS GO bus boardings	84065
ms98: tgpkm	/r	00-02-13 10:41	TTS GO bus passenger km	2642868
ms99: temp		01-05-28 08:42	number of links	0
mo01: wkorrt		01-05-18 16:38	Work trip origin rate	
mo04: nwhor		01-05-18 16:38	Non work auto home origin rate	
mo05: nwnhor		01-05-18 16:38	Non work auto non home origin Rate	
mo06: trhoor		99-10-05 08:51	Transit home origin rate	
mo09: bacorf		01-05-08 07:15	GO access factors	
mo11: otorms		01-05-18 16:38	Work trip origin other m/s	
mo12: grorms		01-05-18 16:38	2016A Work trip origin GO Rail m/s	
mo13: trorms		01-05-18 16:38	Work trip origin Transit m/s	
mo18: pop99		01-05-18 16:38	1999 population	
mo20: nwpor		01-05-29 10:35	99pmh3 non-work pre-bal auto origins	
mo21: snwor		01-05-29 10:36	99pmh3 non work origin auto origins	
mo23: snwhto		01-05-29 10:37	99pmh3 non work to home transit origins	
mo25: sfhto		01-05-29 10:37	99pmh3 from home transit origins	
mo27: aut_po		01-05-29 10:38	99pmh3 total auto person origins	
mo28: totgoo		01-05-29 10:39	99pmh3 total GO Rail origins	
mo29: tottro		01-05-29 10:58	99pmh3 total transit origins	
mo31: whto		01-05-18 16:38	99pmh3 From work total origins	
mo32: whoto		01-05-18 16:39	99pmh3 From Work other origins	
mo33: whgoo		01-05-18 16:39	From Work GO Rail origins	
mo34: whtro		01-05-18 16:39	99pmh3 From Work transit origins	
mo35: whao		01-05-18 16:39	99pmh3 From Work auto origins	
mo39: temp		00-06-30 10:08	TTS from work transit origins	
mo41: tptwko		01-03-05 00:37	21pmbf Total work origins	
mo42: tothor		01-05-29 11:46	99pmh3 total home origins	
mo43: auto_o		01-05-29 10:39	99pmh3 peak hour auto driver origins	
mo45: trorms		01-05-29 11:50	99pmh3 origin transit m/s (%)	
mo47: actrat		01-05-29 11:47	99pmh3 employment per 1000 population	
mo48: vehhr		01-05-28 08:41	99pmh3 assigned vehicle hours (links)	
mo50: caput		01-05-28 08:41	99pmh3 capacity utilization (%)	
mo51: lkvol		01-05-28 08:41	99pmh3 total link volume (veh)	
mo59: go21eo		00-02-13 15:42	GO Rail 2018E m/s origin adjustment	
mo60: bwhtor	/r	99-10-30 08:37	Base work to home total trip rate	
mo62: bwnhor	/r	99-10-30 08:37	Base work to non home origin rate	
mo63: bfhaor	/r	99-10-30 08:36	Base from home auto origin rate	
mo64: bnhwar	/r	99-10-30 08:36	Base non home or work auto origin rate	
mo65: bfhtor	/r	99-10-30 08:36	Base from home transit origin rate	
mo70: bwhoom	/r	99-10-30 08:35	Base work to home other origin m/s	
mo71: bwhgom	/r	99-10-30 08:35	Base work to home GO origin m/s	
mo72: bwhtom	/r	99-10-30 08:35	base work to home transit origin m/s	
mo73: bwnhom	/r	99-10-30 08:34	Base work to non home other m/s	
mo74: bwnhgm	/r	99-10-30 08:33	Base work to non home GO Rail m/s	
mo75: bwnhtm	/r	99-10-30 08:33	Base work to non home transit m/s	
mo76: ttspop	/r	99-10-30 08:33	TTS population	
mo77: 96bpop	/r	99-10-30 08:33	1996 Base case population	

Appendix A - Emme/2 Matrix Directory

Matrix:		Flags:	Modified:	Description:
mo78:	twho	/r	99-10-30 08:32	TTS_work_to_home_all_modes origins
mo79:	twnho	/r	99-10-30 08:32	TTS_work_to_non_home_all origins
mo80:	twhoo	/r	99-09-24 08:19	TTS_work_to_home_other_origins
mo81:	twnhoo	/r	99-09-24 08:23	TTS_work_to_non_home_other origins
mo82:	tnhwao	/r	99-09-24 08:28	TTS_non_work_or_home_auto origins
mo83:	twhao	/r	99-09-24 08:29	TTS_work_to_home_auto origins
mo84:	twhgo	/r	99-09-24 08:30	TTS_work_to_home_GO origins
mo85:	twhto	/r	99-09-24 08:30	TTS_work_to_home_transit origins
mo86:	twnhao	/r	99-09-24 08:32	TTS_work_to_non_home_auto origins
mo87:	twnhgo	/r	99-09-24 08:33	TTS_work_to_non_home_GO origins
mo88:	twnhto	/r	99-09-24 08:33	TTS_work_to_non_home_transit origins
mo89:	tnwha	/r	99-09-24 09:05	TTS_non_work_to_home_auto origins
mo90:	tnwhto	/r	99-11-03 18:51	TTS_non_work_to_home_transit origins
mo91:	tfhao	/r	99-09-24 08:39	TTS_from_home_auto origins
mo92:	tfhto	/r	99-09-24 08:40	TTS_from_home_transit origins
mo96:	tempgo		00-08-03 08:53	TTS total Go origins
mo97:	temp3		99-10-31 18:01	Temp - GO Rail (agg)
mo98:	temp2		01-05-29 11:50	temp2 - transit (agg)
mo99:	temp1		01-05-29 11:50	temp -auto + GO + transit (agg)
md01:	wkhde		00-08-03 09:25	work to home destination rate
md02:	wkhde		01-05-18 16:38	work to home destination rate
md03:	wknhde		01-05-18 16:38	work to non-home destination rate
md04:	nwhde		01-05-18 16:38	Non work auto home destination rate
md05:	nwnhde		01-05-18 16:38	Non work auto non home destination rate
md08:	trnwhd		00-07-03 10:38	Transit non-work to home dest. rate
md11:	otdems		01-05-18 16:38	Work trip dest. other m/s
md12:	grdems		01-05-18 16:38	2016A Work trip dest. GO Rail m/s
md13:	trdems		01-05-18 16:38	Work trip dest. Transit m/s
md18:	emp99		01-05-18 16:38	1999 Employment
md20:	nwpde		01-05-29 10:35	99pmh3 non-work pre-bal auto dest
md21:	snwde		01-05-29 10:36	99pmh3 non work origin auto dest.
md23:	snwhtd		01-05-29 10:37	99pmh3 non work to home transit dest.
md25:	sfhtd		01-05-29 10:37	99pmh3 from home transit dest.
md27:	aut_pd		01-05-29 10:38	99pmh3 total auto person dest.
md28:	totgod		01-05-29 10:41	99pmh3 total GO Rail dest.
md29:	tottrd		01-05-29 11:00	99pmh3 total transit dest.
md31:	whtde		01-05-18 16:38	%t!% From work total destinations
md32:	whotd		01-05-18 16:39	99pmh3 From Work other destinations
md33:	whgod		01-05-18 16:39	From Work GO Rail destinations
md34:	whtrd		01-05-18 16:39	99pmh3 From Work transit destinations
md35:	whad		01-05-18 16:39	99pmh3 From Work auto destinations
md41:	nolink		01-05-28 08:42	99pmh3 number of links
md42:	tothde		01-05-29 11:46	99pmh3 total home destinations
md43:	auto_d		01-05-29 10:39	99pmh3 peak hour auto driver dest.
md44:	selfco		01-05-29 11:50	99pmh3 self containment (% of dest.)
md45:	trdems		01-05-29 11:50	99pmh3 destination transit m/s (%)
md46:	mt98		01-05-29 11:51	99pmh3 mean auto person time (96LOS)
md47:	mtequ		01-05-29 11:51	99pmh3 mean auto person time (equi.)
md48:	vehkm		01-05-28 08:41	99pmh3 assigned vehicle km (links)
md49:	autocc		01-05-29 11:52	99pmh3 mean dest. auto occupancy
md51:	vcrat		01-05-28 08:41	99pmh3 volume/capacity ratio (link)
md52:	tnwd		00-06-27 08:26	TTS non work auto destinations
md53:	nwbcof		00-06-27 08:55	non work balancing coefficients
md59:	go21ed		00-02-13 15:42	GO Rail 2018E dest. m/s adjustment
md60:	gbflag		00-01-03 10:03	Zone numbers used in ensemble gb
md61:	bwhdr	/r	99-10-30 08:41	Base work to home destination rate
md66:	bnwhar	/r	99-10-30 08:40	Base non work to haome auto dest. rate
md67:	bnwhtr	/r	99-10-30 08:40	Base non work to home transit dest. rate
md70:	bwhodm	/r	99-10-30 08:40	Base work to home other dest. m/s
md71:	bwhgdm	/r	99-10-30 08:39	Base work to home GO Rail dest. m/s
md72:	bwhtdm	/r	99-10-30 08:39	Base work to home transit dest. m/s
md76:	ttsemp	/r	99-10-30 08:39	TTS employment
md77:	96bemp	/r	99-10-30 08:39	1996 base case employment
md78:	twhd	/r	99-10-30 08:38	TTS_work_to_home_all_modes dest.
md79:	twnhd	/r	99-10-30 08:38	TTS_work_to_non_home_all dest.
md80:	twhod	/r	99-09-24 08:21	TTS_work_to_home_other dest.
md81:	twnhod	/r	99-09-24 08:24	TTS_work_to_non_home_other dest.
md82:	tnhwad	/r	99-09-24 08:28	TTS_non_work_or_home_auto dest.
md83:	twhad	/r	99-09-24 08:29	TTS_work_to_home_auto dest.
md84:	twhgd	/r	99-09-24 08:30	TTS_work_to_home_GO dest.
md85:	twhtd	/r	99-09-24 08:30	TTS_work_to_home_transit dest.
md86:	twnhad	/r	99-09-24 08:32	TTS_work_to_non_home_auto dest.

Appendix A - Emme/2 Matrix Directory

Matrix:	Flags:	Modified:	Description:
md87: twnhgd	/r	99-09-24 08:33	TTS_work_to_non_home_GO dest.
md88: twnhtd	/r	99-09-24 08:33	TTS_work_to_non_home_transit dest.
md89: tnwhad	/r	99-09-24 09:06	TTS_non_work_to_home_auto dest.
md90: tnwhtd	/r	99-11-03 18:50	TTS_non_work_to_home_transit dest.
md91: tfhad	/r	99-09-24 08:39	TTS_from_home_auto dest.
md92: tfhtd	/r	99-09-24 08:40	TTS_from_home_transit dest.
md96: temp		00-08-03 08:54	TTS GO destinations
md97: temp3		01-05-29 11:51	temp - aggregated auto time (equil.)
md98: temp2		01-05-29 11:51	temp - auto drivers excl. extras
md99: temp1		01-05-29 11:51	temp - aggregated auto persons
mf01: wkabas	/r	00-06-30 09:16	From work auto base
mf02: wgbase	/r	00-06-30 09:40	From work GO Rail base
mf03: wtbase	/r	00-06-30 10:06	From work transit base
mf04: nwabas	/r	00-06-30 08:44	Non work origin auto base
mf05: nwhtrb	/r	00-06-30 10:27	Non-work to home transit base
mf06: fhtrb	/r	00-06-30 10:28	From home transit base
mf07: nwhab	/r	99-10-30 07:57	Non work to home auto base
mf09: fhab	/r	99-10-30 07:56	From home auto base
mf11: nhwab	/r	99-10-30 07:51	Non home or work auto base
mf12: extra	/r	99-10-30 08:09	Base extra auto driver trips
mf13: 96time	/r	99-09-12 08:29	1996 Auto Travel Times
mf14: bauocc	/r	99-10-30 08:21	Base auto occupancy (TTS)
mf15: extrab		01-05-08 07:16	Base case extra auto driver trips
mf16: Base		99-10-30 08:20	Base case auto occupancy
mf17: swhg		01-05-18 16:40	99pmh3 GO rail trips (Transposed)
mf18: swht		01-05-18 16:44	99pmh3 From work transit
mf19: swha		01-05-18 16:44	99pmh3 From work auto
mf20: temp		00-08-03 08:57	GO base balanced to TTS ends
mf23: nwauto		01-05-29 10:35	99pmh3 non work origin auto
mf24: snwht		01-05-29 10:36	99pmh3 non work to home transit
mf26: sfht		01-05-29 10:37	99pmh3 from home transit
mf28: stad		01-05-29 10:38	99pmh3 total auto person
mf30: stt	/c	01-05-29 10:47	99pmh3 total transit (Transposed)
mf31: temp		01-05-29 10:35	temp non work origin auto
mf32: timall		01-05-29 11:46	99pmh3 auto travel times
mf33: tim2		00-07-04 09:23	96base Travel times for 2 person veh.
mf34: tim3		00-07-04 09:24	96base Travel times for 3+ person veh.
mf35: t1per		00-07-04 08:47	96base 1 person vehicles
mf36: t2per		00-07-04 08:46	96base two person vehicles
mf37: t3per		00-07-04 08:46	96base 3 plus person vehicles
mf38: tadt		01-05-29 10:38	99pmh3 peak hour auto driver trips
mf39: temp		00-06-30 10:11	mf3 balanced to TTS
mf40: twktr		00-06-30 08:13	TTS work trip transit
mf41: tts3hr		01-05-03 23:28	TTS pm peak 3 hour (1530-1829)
mf42: tts1hr		01-05-03 23:29	TTS pm peak hour (1630-1729)
mf43: ttotgo	/r	99-11-03 18:57	TTS total GO Rail
mf44: ttsttr	/r	99-11-03 18:50	TTS total transit
mf45: index	/r	99-10-30 08:07	Time indeces (for calibration)
mf46: cells	/r	99-10-30 08:06	Number of cells - ga x ga
mf47: whauto		99-10-30 07:59	TTS work to home auto
mf48: wntold	/r	00-06-30 08:41	OLD work to non-home transit base
mf49: wntold	/r	00-06-30 08:39	OLD work to non-home GO Rail base
mf50: wnaold	/r	00-06-30 08:38	OLD work to non-home auto base
mf51: whtold	/r	00-06-30 08:37	OLD work to home transit base
mf52: whgold	/r	00-06-30 08:36	Old work to home GO Rail base
mf53: whbold	/r	00-06-30 08:35	OLD work to home base
mf54: nwhtr	/r	99-11-03 18:49	TTS non-work to home transit
mf55: TTSnwa	/r	00-06-30 08:32	TTS non-work origin auto trips
mf56: htran	/r	99-10-30 07:45	TTS transit trips from home
mf57: TTSwka	/r	00-06-30 08:26	TTS From work auto trips
mf58: TTSwkg	/r	00-06-30 08:28	TTS From work GO Rail trips
mf59: TTSwkt	/r	00-06-30 08:29	TTS From work local transit trips
mf60: ttstot	/r	99-10-30 08:08	TTS total auto driver

Appendix B - Sample Printout of Performance Indicators

```
EMME/2 Module:  3.14       Date: 01-07-30 08:15       User: E145/DMG.UTYU.~Pmd
Page:26051
 Project:        PM Peak model
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 MATRICES BY ZONE GROUPS
 **********************


 Data matrices:         mo18: pop99     1999 population                          (01-06-28
19:49)
                        md18: emp99     1999 Employment                          (01-06-28
19:49)
                        mo31: whto      99pmh4 From work total origins           (01-06-28
19:49)
                        mo42: tothor    99pmh4 total home origins                (01-07-30
08:15)
                        md42: tothde    99pmh4 total home destinations           (01-07-30
08:15)
                        mo21: snwor     99pmh4 non work origin auto origins      (01-06-28
19:57)

 Constraint matrix:     none

 Ensemble:              gq: Halton performance indicators                        (01-07-30
08:13)
 Aggregation:           sum

 Submatrix:             all zones


   zone      mo18      md18      mo31      mo42      md42      mo21
  group     pop99     emp99      whto    tothor    tothde     snwor

   gq01     25751      9607      4855      8560     16789      8560
   gq02     20352      5149      3034      6633     10821      6633
   gq03     23209     14193      6460      7964     13707      7964
   gq04      9091      5206      2620      3086      5327      3086
   gq05     38126     20731     11498     13696     23081     13650
   gq06     23759     16782      8333      9050     16546      9022
   gq07     46379     15449      8660     15394     27341     15337
   gq08     28936      6282      3125      8893     16247      8859
   gq09     15643      6233      3070      5293      8727      5276
   gq10     64387     34844     16957     29025     48010     28954
   gq11     64822     20961     11130     20451     37330     20380
   gq12      3312      1795      1079      1147      1652      1143
   gq13    482976    185370     88669    146379    254937    143678
   gq14    919263    453774    237379    241633    506300    238262
   gq15    685722    324342    176557    190167    381722    188778
   gq16   2400607   1371134    737601    571355   1265723    534829
   gq17    496655    166003     76259    153927    275558    153160
   gq18   1927016    753390     16113     28827     83007     28827

    sum   7276006   3411245   1413399   1461480   2992825   1416398
    avg    404223    189514     78522     81193    166268     78689
    min      3312      1795      1079      1147      1652      1143
    max   2400607   1371134    737601    571355   1265723    534829
```

Appendix B - Sample Printout of Performance Indicators

```
EMME/2 Module:  3.14       Date: 01-07-30 08:15       User: E145/DMG.UTYU.~Pmd
Page:26052
 Project:        PM Peak model
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 MATRICES BY ZONE GROUPS
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 Data matrices:         mo28: totgoo    99pmh4 total GO Rail origins             (01-06-28
20:01)
                        mo29: tottro    99pmh4 total transit origins             (01-06-28
20:18)
                        mo27: aut_po    99pmh4 total auto person origins         (01-06-28
19:59)
                        mo43: auto_o    99pmh4 peak hour auto driver origins     (01-06-28
20:01)
                        md28: totgod    99pmh4 total GO Rail dest.               (01-06-28
20:03)
                        md29: tottrd    99pmh4 total transit dest.               (01-06-28
20:19)
                        md27: aut_pd    99pmh4 total auto person dest.           (01-06-28
20:00)
                        md43: auto_d    99pmh4 peak hour auto driver dest.       (01-06-28
20:01)

 Constraint matrix:     none

 Ensemble:              gq: Halton performance indicators                        (01-07-30
08:13)
 Aggregation:           sum

 Submatrix:             all zones
```

zone group	mo28 totgoo	mo29 tottro	mo27 aut_po	mo43 auto_o	md28 totgod	md29 tottrd	md27 aut_pd	md43 auto_d
gq01	0	0	13247	4043	304	0	16356	5015
gq02	0	0	9592	2868	87	58	10577	3253
gq03	0	54	14191	4591	305	101	13111	4210
gq04	0	0	5637	1764	27	35	5218	1652
gq05	126	369	24695	8126	814	547	21638	7135
gq06	265	356	16704	6022	1106	274	15100	5107
gq07	18	796	23637	7404	2086	535	24640	8153
gq08	67	99	11832	3700	1208	303	14819	4952
gq09	0	212	8048	2595	42	84	8435	2675
gq10	38	906	45216	14734	1233	912	45823	14745
gq11	0	344	31293	9635	572	517	36129	11478
gq12	0	4	2190	677	7	26	1616	537
gq13	59	16922	222438	67816	824	17652	235234	72019
gq14	255	22538	461111	147918	12603	29389	465677	149107
gq15	9	14409	355318	112747	3932	22632	355352	114334
gq16	38840	366621	1016816	319756	6128	348227	924149	286675
gq17	220	6660	226963	72944	7958	8222	258627	83851
gq18	0	301	44957	13975	661	1077	81384	26417
sum	39897	430591	2533885	801315	39897	430591	2533885	801315
avg	2217	23922	140771	44518	2217	23922	140771	44518
min	0	0	2190	677	7	0	1616	537
max	38840	366621	1016816	319756	12603	348227	924149	286675

Appendix B - Sample Printout of Performance Indicators

```
 •(s0p15H•&l6C EMME/2 Module:  3.14       Date: 01-07-30 08:20       User: E145/DMG.UTYU.~Pmd
Page:26076
 Project:        PM Peak model
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 MATRICES BY ZONE GROUPS
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 Data matrices:         mo47: actrat    99pmh4 employment per 1000 population    (01-07-30
08:16)
                        mo45: trorms    99pmh4 origin transit m/s (%)            (01-07-30
08:18)
                        md45: trdems    99pmh4 destination transit m/s (%)       (01-07-30
08:19)
                        md44: selfco    99pmh4 self containment (% of dest.)     (01-07-30
08:19)
                        md46: mt98      99pmh4 mean auto person time (96LOS)     (01-07-30
08:19)
                        md47: mtequ     99pmh4 mean auto person time (equi.)     (01-07-30
08:19)
                        md49: autocc    99pmh4 mean dest. auto occupancy         (01-07-30
08:20)

 Constraint matrix:     none

 Ensemble:              gq: Halton performance indicators                        (01-07-30
08:13)
 Aggregation:           maximum

 Submatrix:             all zones
```

zone group	mo47 actrat	mo45 trorms	md45 trdems	md44 selfco	md46 mt98	md47 mtequ	md49 autocc
gq01	373.00	.00	.00	64.37	14.58	17.46	1.23
gq02	252.00	.00	.54	54.96	21.36	24.35	1.20
gq03	611.00	.38	.75	69.70	16.68	18.25	1.19
gq04	572.00	.00	.66	66.72	23.54	26.66	1.18
gq05	543.00	1.46	2.38	70.18	17.89	34.39	1.18
gq06	706.00	2.05	1.66	59.81	16.06	114.97	1.17
gq07	333.00	3.26	1.96	58.04	16.87	33.90	1.17
gq08	217.00	.83	1.86	66.95	16.03	32.65	1.17
gq09	398.00	2.57	.98	71.15	19.52	23.98	1.17
gq10	541.00	1.96	1.90	72.58	16.35	20.82	1.19
gq11	323.00	1.09	1.39	73.35	16.62	22.54	1.18
gq12	541.00	.18	1.58	71.80	21.73	28.12	1.18
gq13	383.00	7.07	6.96	82.74	15.01	16.38	1.22
gq14	493.00	4.66	5.79	69.62	14.79	17.24	1.19
gq15	472.00	3.90	5.93	61.42	17.14	18.93	1.19
gq16	571.00	25.78	27.24	85.70	12.08	13.22	1.21
gq17	334.00	2.85	2.99	74.82	17.67	18.79	1.18
gq18	390.00	.67	1.30	.13	65.23	72.38	1.18
sum	8053.00	58.69	65.86	1174.03	359.14	555.03	21.39
avg	447.39	3.26	3.66	65.22	19.95	30.83	1.19
min	217.00	.00	.00	.13	12.08	13.22	1.17
max	706.00	25.78	27.24	85.70	65.23	114.97	1.23

Appendix B - Sample Printout of Performance Indicators

```
Emme2 Module:  3.14       Date: 01-07-30 08:20       User: E145/DMG.UTYU.~Pmd           Page:26077
 Project:        PM Peak model
 Matrix   mf38:  tadt      99pmh4 peak hour auto driver trips
Ensemble:             gq: Halton performance indicators             01-07-30 08:13
 Aggregation:         sum
            destination groups
             gq01     gq02     gq03     gq04     gq05     gq06     gq07     gq08     gq09     gq10
 origin
 groups
   gq01      2086      585      111       62       19        2        0       16        4       18

   gq02       753      879      108       74       20        3        2       14        4       20

   gq03       123       98     1933      453      109       35       56       73       25      140

   gq04        63       45      405      292       55       13       27       35       19       66

   gq05        12       14       97       49     2193      731     1012      907      131      675

   gq06        34       26       53       31      832     1062      913      562       54      252

   gq07        45       32       70       45      860      630     1976      613       70      324

   gq08         5        4       38       19      569      323      555     1056       55      261

   gq09         5        2        7        5       58       33       51       36      330      654

   gq10        21       18       49       17      306      161      251      197      656     5869

   gq11         9        4      101       59      162      106      170      110      458     2401

   gq12         1        0        9        5       14        9       16       10       33      175

   gq13        29       22       51       29      232      120      193      160      397     1900

   gq14      1178     1003      615      250      885     1245     1809      598      205      890

   gq15        56       54       58       14       38       46       75       36       12       55

   gq16       368      286      279      124      637      517      926      430      129      616

   gq17         0        0        7        5       20        8       16       18        4       10

   gq18       227      181      219      119      126       63      105       81       89      419
    sum      5015     3253     4210     1652     7135     5107     8153     4952     2675    14745
            destination groups
             gq11     gq12     gq13     gq14     gq15     gq16     gq17     gq18      sum
 origin
 groups
   gq01        17        1       36      489       41      125        5      426     4043

   gq02        13        0       30      473       33       96        2      344     2868

   gq03       118       19      238      495       19      176       12      469     4591

   gq04        58        3      115      241       11       88        3      225     1764

   gq05       439       22      650      718       68      252       44      112     8126

   gq06       271       12      344     1029       56      302        8      181     6022

   gq07       306       17      414     1322       65      398        9      208     7404

   gq08       152        8      206      274       21      100       13       41     3700

   gq09       527       30      648       77        7       34        4       87     2595

   gq10      2994      162     2887      403       36      189       25      493    14734

   gq11      3416      108     1765      280       26      191        0      269     9635

   gq12       149       19      168       25        3       17        0       24      677

   gq13      1316       70    58433      626      120      429       23     3666    67816

   gq14       771       31     1480   106630     4162    19841      727     5598   147918

   gq15       105        4      128     4858    72063    25408     4528     5209   112747

   gq16       528       17     1079    28775    34013   232678    12721     5633   319756

   gq17        23        0       28      240     1417     3980    64203     2965    72944

   gq18       275       14     3370     2152     2173     2371     1524      467    13975
    sum     11478      537    72019   149107   114334   286675    83851    26417   801315
```

Appendix B - Sample Printout of Performance Indicators

```
 EMME/2 Module:  3.14       Date: 01-07-30 08:20       User: E145/DMG.UTYU.~Pmd           Page:26079
 Project:        PM Peak model
 Matrix   mf28:  stad      99pmh4 total auto person
Ensemble:             gq: Halton performance indicators             01-07-30 08:13
 Aggregation:         sum
            destination groups
             gq01     gq02     gq03     gq04     gq05     gq06     gq07     gq08     gq09     gq10
 origin
 groups
   gq01      7091     2050      347      199       61        5        8       42       11       52

   gq02      2645     3075      349      209       62        6        9       45       12       62

   gq03       380      306     5955     1460      342      108      178      228       85      437

   gq04       191      151     1351      956      166       56       88      106       51      214

   gq05        39       37      311      151     6606     2345     3134     2584      407     2026

   gq06       107       81      174       93     2201     3037     2088     1290      158      779

   gq07       139      106      225      135     2809     2058     6468     1997      207     1001

   gq08        18       12      119       55     1857     1023     1810     3453      167      806

   gq09        15        8       29       11      176      100      151      116     1087     2155

   gq10        67       50      156       62      940      494      769      602     2116    17995

   gq11        28       17      321      178      491      331      520      331     1513     7895

   gq12         4        0       30       14       43       30       47       30      112      571

   gq13        72       56      176       84      698      379      614      468     1236     5799

   gq14      3594     3030     1835      803     2672     3239     5289     1820      555     2635

   gq15       182      164      157       45      128      115      236       90       40      178

   gq16      1032      853      838      341     1905     1531     2845     1298      381     1796

   gq17         0        0       27       16       66       29       47       45       10       35

   gq18       752      581      711      406      415      214      339      274      287     1387
    sum     16356    10577    13111     5218    21638    15100    24640    14819     8435    45823

            destination groups
             gq11     gq12     gq13     gq14     gq15     gq16     gq17     gq18      sum
 origin
 groups
   gq01        60        3      101     1503      120      359       14     1221    13247

   gq02        53        1       89     1488       98      289       11     1089     9592

   gq03       365       19      721     1487       61      542       35     1482    14191

   gq04       176       13      344      751       29      265       12      717     5637

   gq05      1345       63     1923     2253      209      777      128      357    24695

   gq06       759       35     1033     3238      167      931       22      511    16704

   gq07       934       46     1248     4152      208     1216       20      668    23637

   gq08       463       23      623      863       64      306       42      128    11832

   gq09      1734       94     1723      240       20      108       13      268     8048

   gq10      9390      471     8665     1246      109      586       76     1422    45216

   gq11     11253      353     5676      870       80      590        0      846    31293

   gq12       493       59      543       78        9       51        0       76     2190

   gq13      4004      224   193359     1937      346     1309       71    11606   222438

   gq14      2247       89     4370   335773    12374    60937     2163    17686   461111

   gq15       294       16      398    14495   228604    80132    13564    16480   355318

   gq16      1584       57     3227    87418   101244   754647    38256    17563  1016816

   gq17        76        1       74      800     4524    12771   199178     9264   226963

   gq18       899       49    11117     7085     7086     8333     5022        0    44957
    sum     36129     1616   235234   465677   355352   924149   258627    81384  2533885
```

Appendix B - Sample Printout of Performance Indicators

```
 EMME/2 Module:  3.14       Date: 01-07-30 08:20       User: E145/DMG.UTYU.~Pmd           Page:26081
 Project:        PM Peak model
 Matrix   mf29:  totgo     99pmh4 Total GO Rail trips
Ensemble:             gq: Halton performance indicators            01-07-30 08:13
 Aggregation:         sum
            destination groups
             gq01     gq02     gq03     gq04     gq05     gq06     gq07     gq08     gq09     gq10
 origin
 groups
   gq01         0        0        0        0        0        0        0        0        0        0

   gq02         0        0        0        0        0        0        0        0        0        0

   gq03         0        0        0        0        0        0        0        0        0        0

   gq04         0        0        0        0        0        0        0        0        0        0

   gq05         0        0        0        0        0        6       11        0        0        0

   gq06         0        0        0        0        0       10       19        0        0        0

   gq07         0        0        0        0        0        0        0        0        0        0

   gq08         0        0        0        0        0        4        6        0        0        0

   gq09         0        0        0        0        0        0        0        0        0        0

   gq10         0        0        0        0        0        7       11        0        0        0

   gq11         0        0        0        0        0        0        0        0        0        0

   gq12         0        0        0        0        0        0        0        0        0        0

   gq13         0        0        0        0       11        5       10       11        0        0

   gq14        25        7        0        0        9        0        0       20        0        0

   gq15         0        0        0        0        0        0        0        0        0        0

   gq16       279       80      305       27      794     1074     2029     1177       42     1233

   gq17         0        0        0        0        0        0        0        0        0        0

   gq18         0        0        0        0        0        0        0        0        0        0
    sum       304       87      305       27      814     1106     2086     1208       42     1233

            destination groups
             gq11     gq12     gq13     gq14     gq15     gq16     gq17     gq18      sum
 origin
 groups
   gq01         0        0        0        0        0        0        0        0        0

   gq02         0        0        0        0        0        0        0        0        0

   gq03         0        0        0        0        0        0        0        0        0

   gq04         0        0        0        0        0        0        0        0        0

   gq05         0        0       21       19        0       69        0        0      126

   gq06         0        0       31      122        0       59        0       24      265

   gq07         0        0        4        9        0        4        0        1       18

   gq08         0        0        9       10        0       38        0        0       67

   gq09         0        0        0        0        0        0        0        0        0

   gq10         0        0        0       20        0        0        0        0       38

   gq11         0        0        0        0        0        0        0        0        0

   gq12         0        0        0        0        0        0        0        0        0

   gq13         0        0        0        0        0       22        0        0       59

   gq14         0        0       16       12        0      135        0       31      255

   gq15         0        0        0        0        9        0        0        0        9

   gq16       572        7      743    12379     3923     5713     7858      605    38840

   gq17         0        0        0       32        0       88      100        0      220

   gq18         0        0        0        0        0        0        0        0        0
    sum       572        7      824    12603     3932     6128     7958      661    39897
```

Appendix B - Sample Printout of Performance Indicators

```
 EMME/2 Module:  3.14       Date: 01-07-30 08:20       User: E145/DMG.UTYU.~Pmd           Page:26083
 Project:        PM Peak model
 Matrix   mf30:  stt   /c  99pmh4 total transit (Transposed)
Ensemble:             gq: Halton performance indicators            01-07-30 08:13
 Aggregation:         sum

           origin groups
            gq01     gq02     gq03     gq04     gq05     gq06     gq07     gq08     gq09     gq10
 destination
 groups
   gq01        0        0        0        0        0        0        0        0        0        0

   gq02        0        0        0        0        0        0        0        0        0        0

   gq03        0        0       39       15        0        0        0        0        0        0

   gq04        0        0        0        0        0        0        0        0        0        0

   gq05        0        0        0        0      105       60      120       52        2       30

   gq06        0        0        0        0       85       36       68       45        0        0

   gq07        0        0        0        0      182       84      167      118        0        0

   gq08        0        0        0        0       43       12       15       20        0        9

   gq09        0        0        0        0        0        0        0        0        3      102

   gq10        0        0        0        0        0        0        0        0       48      433

   gq11        0        0        0        0        0        0        0        0        7      138

   gq12        0        0        0        0        0        0        0        0        0        4

   gq13        0        0        0        0        0        0        0        0       20      166

   gq14        0        0       15        4       78       41       84       41        0        0

   gq15        0        0        0        0        0        0        0        0        0        0

   gq16        0       58       47       16       54       41       81       27        4       30

   gq17        0        0        0        0        0        0        0        0        0        0

   gq18        0        0        0        0        0        0        0        0        0        0
    sum        0       58      101       35      547      274      535      303       84      912

           origin groups
            gq11     gq12     gq13     gq14     gq15     gq16     gq17     gq18      sum
 destination
 groups
   gq01        0        0        0        0        0        0        0        0        0

   gq02        0        0        0        0        0        0        0        0        0

   gq03        0        0        0        0        0        0        0        0       54

   gq04        0        0        0        0        0        0        0        0        0

   gq05        0        0        0        0        0        0        0        0      369

   gq06        0        0        5      117        0        0        0        0      356

   gq07        0        0       22      223        0        0        0        0      796

   gq08        0        0        0        0        0        0        0        0       99

   gq09       56        4       47        0        0        0        0        0      212

   gq10      305       16      104        0        0        0        0        0      906

   gq11      126        5       68        0        0        0        0        0      344

   gq12        0        0        0        0        0        0        0        0        4

   gq13       13        0    16573        0        0      113        0       37    16922

   gq14       17        1      141    17651       73     4392        0        0    22538

   gq15        0        0        0      353     5943     8078       29        6    14409

   gq16        0        0      640    10980    16528   335332     1859      924   366621

   gq17        0        0        0       65        0      261     6334        0     6660

   gq18        0        0       52        0       88       51        0      110      301
```

Appendix B - Sample Printout of Performance Indicators

```
EMME/2 Module:  3.14       Date: 01-07-30 08:34       User: E145/DMG.UTYU.~Pmd
Page:26302
 Project:        PM Peak model
 ---------------------------------------------------------------------------------------------
-----


 MATRICES BY ZONES
 *****************


 Data matrices:         md41: nolink    99pmh4 number of links                  (01-07-30
08:34)
                        md48: vehkm     99pmh4 assigned vehicle km (links)      (01-07-30
08:34)
                        mo48: vehhr     99pmh4 assigned vehicle hours (links)   (01-07-30
08:34)
                        md49: mspeed    99pmh4 mean link speed (kph)            (01-07-30
08:34)
                        mo50: caput     99pmh4 capacity utilization (%)         (01-07-30
08:34)
                        mo51: lkvol     99pmh4 total link volume (veh)          (01-07-30
08:34)
                        md51: vcrat     99pmh4 volume/capacity ratio (link)     (01-07-30
08:34)

 Constraint matrix:     md48: vehkm     99pmh4 assigned vehicle km (links)      (01-07-30
08:34)
 Constraint interval:        0           0      exclude

 Submatrix:             all zones
```

zone	md41 nolink	md48 vehkm	mo48 vehhr	md49 mspeed	mo50 caput	mo51 lkvol	md51 vcrat
1	4810	9121852	173306	53	172	12152642	155
2	4810	3085446	46117	67	67	4042424	81
3	2912	4139625	68728	60	107	4467419	117
4	3689	5128467	79447	65	98	5862520	99
5	2393	3169532	54201	58	120	3403234	120
6	2346	2186142	38283	57	85	3223870	98
7	302	3708129	51584	72	72	475883	85
12	6	30276	1164	26	371	33504	364
13	32	85365	1634	52	204	104979	193
14	17	68018	1377	49	199	75944	200
21	6	12049	144	84	151	13623	148
23	13	3237	40	81	16	2255	21
27	14	14152	158	90	43	6771	44
31	32	66883	1641	41	159	80372	148
32	13	19191	268	72	95	11878	113
34	10	12697	190	67	68	12043	101
41	17	58983	844	70	173	61437	162
43	10	11072	138	80	60	7808	66
45	17	61182	871	70	192	52305	182
54	15	37178	421	88	139	28372	120
56	2	17384	265	66	236	14565	243
65	2	11919	117	102	162	10005	167
72	15	12090	127	95	27	5247	28
sum	21483	31060870	521065	1564	3016	34149100	3055
avg	934	1350473	22655	68	131	1484744	133
min	2	3237	40	26	16	2255	21
max	4810	9121852	173306	102	371	12152642	364