National Capital Region Transportation Planning Board

FY-2010 Development Program for TPB Travel Forecasting Models: DRAFT

June 30, 2010

Title	Date	June 30, 2010
FY-2010 Development Program for TPB Travel Forecasting Models	**Number of pages**	--
	Publication no.	
	Availability	See below

Agency
The National Capital Region Transportation Planning Board (NCRTPB or TPB).

The TPB is the designated Metropolitan Planning Organization (MPO) for transportation for the Washington region. Members of the TPB include representatives of local governments; state transportation agencies; the Maryland and Virginia General Assemblies; the Washington Metropolitan Area Transit Authority; and non-voting members from the Metropolitan Washington Airports Authority and federal agencies.

Credits	
Program Administration:	Ronald Milone
Authors:	Ronald Milone, Hamid Humeida, Mark Moran, Meseret Seifu, & Maria Martchouk

Abstract: This report describes work activities undertaken during FY-2010 supporting improved travel forecasting methods for the metropolitan Washington, D.C. region. The Version 2.3 travel model is an incremental refinement to the currently adopted Version 2.2 travel model, supported with new data on the new 3,722 TPB TAZ area system. This work represents a continuation of an ongoing models development plan that was formulated in FY-93 by the Travel Forecasting Subcommittee (TFS), a subcommittee of the TPB's Technical Committee.

Copies of this report can be found on the MWCOG Website:
www.mwcog.org

> Metropolitan Washington Council of Governments
> 777 N. Capitol Street, N.E., Suite 300
> Washington, D.C. 20002-4239
> Tel. (202) 962-3200

Table of Contents

List of Figures

List of Tables

Chapter 1   Introduction

The National Capital Region Transportation Planning Board (TPB) maintains a travel modeling capability that supports regional transportation and air quality planning studies as well as corridor and project planning work conducted by numerous state and local agencies throughout the Washington, D.C. region. The TPB recognizes that its travel modeling capability must be refined on a continuing basis to respond to changing federal requirements, to address new questions being asked by decision makers, and to incorporate advances in the state-of-the practice. The TPB FY-2010 Unified Planning Work Program (UPWP) includes this activity under element 4.C (Models Development). This report describes models development activities undertaken during FY-2010, the period between July 1, 2009 and June 30, 2010.

The Models Development program is overseen by the Travel Forecasting Subcommittee (TFS), a subcommittee to the TPB Technical Committee. The TFS is comprised of representatives from state and local transportation agencies in the Washington, D.C. region and the Washington Metropolitan Area Transit Authority (WMATA). TFS participants also include transportation consultants working in the region and interested members of the general public. TPB staff strives to promote consensus among the various stakeholders in the formulation and review of ongoing development activities. The TFS meetings occur on a bi-monthly schedule beginning in July.

Given that readily available forecasting procedures are needed to serve regularly scheduled planning activities, there are always inherent uncertainties about when and how proposed improvements should be phased into production. The Models Development program has been designed to manage uncertainty by structuring model improvement activities among five concurrent "tracks":

- **Track 1 – Application:** Short-term improvements made to the currently adopted travel model while more advanced models remain in development. These improvements consist of, for example, updates to coefficients with newly collected data or building additional capabilities into the existing model structure.
- **Track 2 – Methods Development:** Longer-term improvements involving the incorporation of advanced forecasting methods that are not yet operational. Methods improvements may be associated with a structurally advanced four-step model or a "next generation" model. The plan is that, at some point, one of the candidate "methods" models would replace the application model.
- **Track 3 – Research:** Keeping abreast of advanced travel forecasting theory that has not yet made its way into accepted transportation planning practice.
- **Track 4 – Data Collection:** Collecting travel information to serve the needs of the above tracks.
- **Track 5 – Maintenance:** Promoting guidance on the model application through information sharing, documentation and training.

The above tracks are established to occur over a multi-year period, allowing for longer-term improvements to proceed off-line while the application model is maintained to support immediate planning needs. The longer-term improvements are phased into application only when deemed appropriate by TPB staff, in consultation with the TFS. Specific activities associated with each track are

formulated by TPB staff based on recommendations of ongoing model review, emerging study needs, and changes in federal guidance.

1.1 FY-2010 Models Development Program Background

The TPB's currently adopted travel forecasting process is known as the Version 2.2 model[1]. Version 2.2 is a conventional "four-step" travel forecasting process, which is common practice among most medium and large MPOs across the U.S.[2]   The model is applied on a microcomputer using TP+/Cube Base software and operates on a 2,191 transportation analysis zone (TAZ) system. During FY-2010, some program resources were devoted to the support and maintenance of the existing application model, including the preparation of various inputs and adding minor features. However, the primary focus of models development work during FY-2010 was the ongoing development of a new travel forecasting process known as the Version 2.3 travel model. Version 2.3 is an incremental refinement to the currently adopted Version 2.2 model that includes two principal improvements, a nested-logit mode choice modeling process and updated truck models. The Version 2.3 model was released in draft two years ago on the existing 2,191 TAZ system,[3] and currently remains in development, due to the TPB's more recent decision to re-calibrate the Version 2.3 model using: 1) a more detailed zone system recently developed as part of COG's Cooperative Forecasting process, and 2) new sources of travel data that were planned for release during FY-2010, the most prominent of which being the 2007/08 Household Travel Survey (HTS).   Consequently, most of the Version 2.3 activities were concerned with reviewing the new TAZ system, adapting existing highway and transit networks to the new TAZ system, checking the HTS, and preparing a wide array of base-year calibration data on the new zone geography.

TPB had initially planned to begin estimation and calibration work during the second half of the fiscal year, but several factors resulted in delay. The 3,722 TAZ system was initially released at the beginning of FY-2010 as a basis for developing the next set of land activity forecasts, Round 8.0 Cooperative Forecasts.   The 3,722 zone system has the same physical extent as that of the existing 2,191 TAZ system, but affords a substantially higher level of spatial resolution.   The design of the new area system was developed by the land use planning community and was influenced by the establishment of "activity centers and clusters", about 60 areas of concentrated development along major transportation facilities.[4] TPB's modeling staff, which reviewed the zonal polygons over the NAVTEQ street base map during the first half of FY-2010, uncovered a small number of zones with undesirable characteristics from a transportation modeling perspective. For example, some TAZs represented bodies of water with no land activity, while others were irregularly shaped around, or well beneath the grain of, the highway

---

[1] Ronald Milone et al., *TPB Travel Forecasting Model, Version 2.2: Specification, Validation, and User's Guide* (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, March 1, 2008)

[2] VHB, Inc., *Determination of the State of the Practice in Metropolitan Area Travel Forecasting, Findings of the Surveys of Metropolitan Planning Organizations*, Prepared for Committee B0090 TRB/National Research Council, June 2007

[3] Ronald Milone et al., *TPB Travel Forecasting Model, Version 2.3: Specification, Validation, and User's Guide*, Draft report (National Capital Region Transportation Planning Board, June 30, 2008)

[4] These areas were identified and approved by COG's Metropolitan Development Policy Committee (MDPC) and the Planning Directors Technical Advisory Committee (PDTAC) on March of 2007.

system.   As a result, two variations of the new TAZ system have been established, one for the initially developed system which will be preserved for the purposes of land activity forecasts (the 3,722 COG TAZ system) and another slightly refined system to be used for the purposes of transportation modeling (the 3,722 TPB TAZ system).   The 3,722 TPB TAZ are system is comprised of 3,662 physical zones and 47 external stations (as implied, 13 of TAZ numbers are not used).

The network development underlying the new TAZ system has proven to be an especially challenging undertaking given that 1) new methods for development and maintenance have also been in development, 2) expanded zonal dimensions have necessitated a wholesale renumbering of highway and transit nodes, and 3) transit network building procedures have also been revisited. The development of base–year land activity on the new TAZ system has also been a challenge, given that it had to be developed essentially from the ground up.

A substantial amount of staff effort went into the examination of the 2007/2008 Household Travel Survey data which will serve as the backbone of the Version 2.3 development effort. Several versions of the basic survey files (i.e., the vehicle, household, person, and trip level) were developed during the first half of FY-2010 following ongoing quality control checks. The final file versions were released during the second half of FY-2010 at which time several demographic and travel-related summaries were prepared. Staff also spent time collecting and tabulating transit ridership data, 2007 traffic counts, and a variety of demographic statistics from the American Community Survey (ACS).

Despite the aforementioned challenges, TPB staff is nonetheless planning to build upon the substantial progress made during FY-2010 and to release Version 2.3 by the end of calendar year 2010 so that it will be available for use in air quality planning work by early 2011.

In addition to the two principal new features of the Version 2.3 model mentioned above, staff envisions adding a few additional refinements, based on recent reviews of the 2007/08 HTS data. Staff intends to subdivide the Non-Home Base (NHB) purpose among the two subtypes: Non-Home-Base Work (NHW) and Non-Home Base Other (NHO). These purpose distinctions will be maintained, at minimum, through trip generation and trip distribution steps of the model. It is unclear whether mode choice models will be viable for the two particular purposes, but it is quite evident that the temporal travel profiles of NHW and NHO trips are markedly different.   Staff also plans to develop trip generation rates so that motorized and non-motorized person travel will be included for *all* modeled purposes. (The existing Version 2.2 model addresses the non-motorized travel for the HBW purpose only.)   The more robust development of non-motorized person trip models should be facilitated by the use of a more detailed TAZ system. Finally the duration, and possibly the number, of time periods used in the existing Version 2.2 model is anticipated to be revisited for Version 2.3, based on a review of temporal distributions summarized from the 2007/08 HTS.

As in previous years, TPB continued to retain the services of a transportation consultant (currently, Cambridge Systematics, Inc.) to provide technical support on a task order basis.   This contractual arrangement was established primarily to provide for an ongoing assessment of the TPB's travel modeling performance and practices. It also serves to provide TPB with written guidance on specific

models development issues raised by TPB staff drawing upon knowledge of travel modeling practices at other MPOs. Receiving this type of independent feedback on the TPB's modeling practices has been useful in formulating short-term improvements to the currently adopted travel model and in charting the future direction of the TPB's Models Development program.   During FY-2010, TPB asked the consultant for written guidance on four areas:

1. Further Investigation of Assignment Convergence (Task 7)
2. Short Term Model Enhancements: Trip Purposes and Special Generators (Task 8)
3. Short Term Model Enhancements: Time of Day Model, Queue Delay Function, and Two-Step Assignment (Task 9)
4. Short Term Model Enhancements: Transit-Related Enhancements (Task 10)

These reports will be compiled and published as a self-standing document, which will be reviewed by both the TPB staff and the TFS.

1.2 Structure of the Report

The following chapters provide a more detailed discussion of the FY-2010 models development activities outlined above. The activities relating to data collection, cleaning, and analysis are presented in Chapter 2. Applications Track activities are discussed in Chapter 3 including recent modifications to the Version 2.2 model as well as the Version 2.3 development work completed thus far.   Methods Development and Research Track activities aimed at keeping TPB staff current with best practices and advanced methods are discussed in Chapter 4. Finally, a discussion of the models development program direction in the coming fiscal year (FY-2011) and beyond is discussed in Chapter 5.   This report also contains appendices containing detailed reference summaries from the 2007/08 Household Travel Survey.

Chapter 2   Data Collection, Cleaning, and Analysis

2.1 Census/ACS summaries

2.1.1 Overview

Both the Version 2.2 and Version 2.3 Travel Model use a series of demographic sub-models to apportion the number of households in a TAZ by three separate dimensions: household size (1, 2, 3, 4+ persons); household income (four quartiles); and vehicle ownership/availability (0, 1, 2, 3+ vehicle available). [5] This results in 64 classes of households for each zone. The last two updates of the demographic sub-models were completed in 2004 using the 1990 Census Transportation Planning Package (CTPP) data; and in 2006 using the 2000 CTPP data.

The 2000 Census was the last decennial census to include the "long form", a roughly one-in-six sample of the population that included many questions about commuting travel. The long form was the basis for the CTPP data in 1990 and 2000. The American Community Survey (ACS) is a project of the U.S. Census Bureau that replaces the long form in the decennial census. It is an on-going survey of approximately 250,000 households a month. This section of the report documents a recent analysis of the ACS aimed at obtaining information that will be considered in the update of the three demographic sub-models. The target year used for this analysis is 2007, since this is the year of the latest COG Household Travel Survey[6] and thus the base-year for estimation/calibration of the Version 2.3 Travel Model on the new 3,722-TAZ area system.

All summary tables presented in this section are done at the county level (also referred to as the jurisdiction level). The ACS data does not generally support development of models at a finer level of geography because of different levels of aggregation, different thresholds, and privacy concerns regarding the release of data.   Table 1 presents a jurisdiction-level summary of the basic independent variables from the 2007 ACS data sets.

---

[5] Ronald Milone et al., *TPB Travel Forecasting Model, Version 2.2: Specification, Validation, and User's Guide* (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, March 1, 2008).

[6] NuStats. *2007/2008 COG/TPB Household Travel Survey: Draft Report of Methods*. (Washington, D.C.: Metropolitan Washington Council of Governments National Capital Region Transportation Planning Board, 2008).

Table 1 Jurisdiction-Level Summary Data for TPB Modeled Area

	Total Households	Population in Households	Population in GROUP QUARTERS	Total Population in GQ + HHS	Workers in Households 16 +	Average HH Size	Average Vehs per HH	Average Wrks Per HH	Median HH Income 2007 Dollars	Mean HH Income 2007 $ B19025/ B25002
ACS Table Reference >>>>	B25002	B11002	B26001	B01003	C08014	B25010	Computed	Computed	B19013	B25002
2007 ACS 1-Year Estimates										
District of Columbia	**251,039**	**552,984**	**35,308**	**588,292**	**280,850**	**2.20**	**0.91**	**1.12**	**54,317**	**88,335**
Anne Arundel County	188,874	493,852	18,302	512,154	257,382	2.61	2.02	1.36	80,402	98,883
Calvert County	29,141	87,653	570	88,223	45,670	3.01	2.41	1.57	95,134	105,991
Carroll County	58,783	161,217	8,003	169,220	83,820	2.74	2.36	1.43	82,492	96,801
Charles County	49,001	139,417	1,027	140,444	75,116	2.85	2.25	1.53	83,412	92,993
Frederick County	81,861	219,499	5,206	224,705	116,564	2.68	2.10	1.42	77,027	91,695
Howard County	98,866	268,129	5,540	273,669	142,587	2.71	2.08	1.44	101,672	118,688
Montgomery County	343,540	922,312	8,501	930,813	487,598	2.68	1.80	1.42	91,835	124,056
Prince George's County	297,614	807,902	20,868	828,770	418,449	2.71	1.75	1.41	68,370	82,050
St. Mary's County	36,841	97,711	2,667	100,378	50,164	2.65	2.21	1.36	75,769	87,731
Total Maryland -1 Year (2007) ACS	**1,184,521**	**3,197,692**	**70,684**	**3,268,376**	**1,677,350**	**2.70**	**1.94**	**1.42**		**102,592**
Arlington County	91,529	202,100	2,468	204,568	126,786	2.21	1.46	1.39	94,876	121,568
Fairfax County	366,243	1,001,954	8,287	1,010,241	542,349	2.74	1.99	1.48	105,241	131,107
Fauquier County	23,243	65,133	824	65,957	35,400	2.80	2.52	1.52	84,888	109,461
Loudoun County	86,607	278,655	142	278,797	146,544	3.22	2.06	1.69	107,207	130,409
Prince William County	122,984	357,164	3,247	360,411	188,497	2.90	2.16	1.53	87,243	101,032
Spotsylvania County *	41,602	119,194	0	119,194	58,323	2.87	2.30	1.40	74,881	83,597
Stafford County	39,419	119,665	1,058	120,723	60,268	3.04	2.28	1.53	87,629	104,757
Alexandria City	61,822	139,246	778	140,024	80,884	2.25	1.32	1.31	80,806	109,713
Total Virginia -1 Year (2007) ACS	**833,449**	**2,283,111**	**16,804**	**2,299,915**	**1,239,051**	**2.74**	**1.96**	**1.49**		**119,741**
ACS 3-Years Average (2005 -2007)										
King George County	7,693	21,001	618	21,619	10,535	2.73	2.44	1.37	74,375	83,599
Fairfax City	8,311	21,903	840	22,743	11,776	2.64	1.92	1.42	93,441	108,311
Fredericksburg City	8,560	19,915	2,003	21,918	9,104	2.33	1.41	1.06	42,909	68,157
Manassas City	11,703	34,323	1,810	36,133	17,287	2.93	2.02	1.48	74,221	91,253
Jefferson County	18,704	48,430	1,265	49,695	23,649	2.59	2.18	1.26	63,462	78,278
Total ACS 3-Yr (2005 -2007)	**54,971**	**145,572**	**6,536**	**152,108**	**72,351**	**2.65**	**2.02**	**1.32**		**84,750**
Total Modeled Area	**2,323,980**	**6,179,359**	**129,332**	**6,308,691**	**3,269,602**	**2.66**	**1.84**	**1.41**	**84,280**	**106,780**
MSA**	**1,958,104**	**5,211,345**	**94,780**	**5,306,125**	**2,761,695**	**2.66**	**1.79**	**1.41**	**83,200**	**107,462**
USA	**112,377,977**	**293,499,975**	**8,121,184**	**301,621,159**	**137,903,739**	**2.61**	**1.78**	**1.23**	**50,740**	**69,193**

Source: American Community Survey (ACS) Data for Year 2007 and Avg. of 2005-07 (for jurisdictions with population < 65k)

*Only the northern portion of Spotsylvania Co. is in the modeled area, however this summary reflects the total county.

**"Metropolitan Statistical Area/Micropolitan Statistical Area". The Washington, D.C. MSA is referred to as "Washington-Arlington-Alexandria,DC-VA-MD-WV Metro Area" in the American Factfinder.

***Number of vehicles refers to cars, trucks, or vans.

2.1.2 The ACS Data Sources

As stated above, the year 2007 was the focus year for this analysis. The ACS summary tables were extracted from two data sets: The one-year ACS data (2007) and the three-year data set (2005-2007).[7] The one-year (2007) data set provides information about geographic areas with a population of 65,000 or more. Most of the jurisdictions within the TPB modeled area satisfy this condition at the county/jurisdiction summary level. The second ACS data set provides the average characteristics over three years (2005-2007) for geographic areas with a population of 20,000 or more. This data set was used to cover jurisdictions that do not meet the 65,000 threshold, including King George County, VA; Jefferson County, WV; Manassas City; Fairfax City; and Fredericksburg City.   One advantage of the one-year (2007) data set is that it corresponds to the calibration year for the new Version 2.3 Travel Model. It should be noted that both the one-year and the three-year data sets are based on the July 1, 2007 population estimates, which were independently prepared by the Census Bureau Population Estimate Program. These population estimates were used in the ACS survey factoring procedure. The ACS data can be downloaded from the following sites:

- American Factfinder web site (http://factfinder.census.gov/)

- TRB web site (http://www.trbcensus.com/)

- AASHTO web site (http://ctpp.transportation.org)

2.1.3 Distribution of Households by Income Quartiles

The household income sub-model is used to estimate the share of total households in each of the four income quartiles, given the median household income for the zone and the regional median. The zonal and regional medians are used to develop a zonal wealth index. The 2007 ACS is used to update the income sub-model by computing the four income quartiles and the regional median.

As shown in Table 2 and Table 3, the 2007 ACS provides tabulations of households by a maximum of 16 income intervals, compared to 26 intervals in the 2000 CTPP and 11 intervals for the 2007 HTS. The computation procedure used to compute the regional median income and the income quartiles is shown in Table 3 and Figure 1 and are summarized as follows:

Quartile	Point Estimate (2007 dollars)	Interval (2007 dollars)
25%	$46,209	Less than $50,000
50% (Median)	**$84,280**	**$50,000 to < $100,000**
75%	$137,001	$100,000 to < $150,000
100%		> $150,000

---

[7] The first 5-year estimates, based on ACS data collected from 2005 through 2009, will be released sometime in the summer of 2010.

Table 2 Distribution of Households by Jurisdiction and Income Strata

	Distribution of Households by Jurisdiction & Income Group (Income Groups in 2007 Inflation-Adjusted Dollars)																	Household Income (2007 $)	
	< 10k	10k -<15k	15k -<20k	20k -<25k	25k -<30k	30k -<35k	35k -<40k	40k -<45k	45k -<50k	50k -<60k	60k -<75k	75k -<100k	100k-<125k	125k-<150k	150k-<200k	> 200k	Total	Median	Mean
DC	25,469	13,791	11,350	12,688	10,297	12,435	10,662	11,412	8,829	16,950	20,579	26,544	18,204	13,573	17,062	21,194	251,039	$54,317	$88,335
ANN	5,705	4,798	3,948	5,525	6,211	5,623	5,713	6,319	7,046	13,785	21,708	32,167	23,195	16,149	15,596	15,386	188,874	$80,402	$98,883
CAL	1,072	1,066	516	509	633	847	548	428	514	1,607	3,689	3,991	5,357	2,519	3,093	2,752	29,141	$95,134	$105,991
CAR	2,049	1,563	1,645	2,199	1,546	2,286	2,103	1,972	1,087	5,066	5,595	8,279	9,404	5,206	5,209	3,574	58,783	$82,492	$96,801
CHS	1,307	1,435	1,418	834	1,689	1,440	1,227	1,908	1,686	3,023	5,367	8,295	7,733	4,258	4,658	2,723	49,001	$83,412	$92,993
FRD	1,831	1,693	1,343	3,508	2,154	3,285	2,930	3,172	3,656	6,365	9,691	10,953	11,641	7,815	7,273	4,551	81,861	$77,027	$91,695
HOW	1,900	1,951	1,191	2,053	1,455	3,367	2,005	2,416	2,763	6,385	10,272	12,475	13,970	9,440	13,073	14,150	98,866	$101,672	$118,688
MTG	8,019	6,240	8,753	8,681	8,623	10,625	10,469	12,766	11,596	21,502	32,882	45,038	39,930	25,864	41,299	51,253	343,540	$91,835	$124,056
PG	13,912	8,523	6,526	8,776	10,053	12,409	12,490	14,714	11,476	28,702	36,075	49,408	29,443	20,342	21,121	13,644	297,614	$68,370	$82,050
STM	1,320	1,753	1,146	841	1,232	944	827	1,463	1,575	2,581	4,512	6,569	4,981	2,528	2,842	1,727	36,841	$75,769	$87,731
ARL	3,444	1,498	1,912	1,579	2,345	1,788	3,560	3,324	1,890	5,889	8,464	12,629	10,578	7,412	11,550	13,667	91,529	$94,876	$121,568
FFX	9,807	4,466	5,290	5,729	7,084	7,988	8,117	11,046	10,212	20,952	30,824	49,621	47,196	37,342	49,712	60,857	366,243	$105,241	$131,107
FAQ	815	391	587	484	841	280	878	871	815	1,249	2,756	3,455	3,715	1,796	2,180	2,130	23,243	$84,888	$109,461
LDN	1,859	641	1,116	1,119	2,145	1,389	1,604	2,169	2,151	3,573	9,349	11,724	12,894	10,348	11,527	12,999	86,607	$107,207	$130,409
PW	1,473	2,209	2,605	3,070	2,784	2,625	3,989	3,459	5,566	8,183	13,746	22,064	17,240	11,402	13,056	9,513	122,984	$87,243	$101,032
SPT	1,097	1,961	1,202	1,637	1,430	1,355	1,734	1,117	1,410	3,357	4,533	8,523	4,143	3,273	3,155	1,675	41,602	$74,881	$83,597
STF	532	538	889	770	660	1,209	1,030	1,475	1,947	3,078	4,374	5,720	5,010	4,057	4,277	3,853	39,419	$87,629	$104,757
ALX	2,994	1,434	1,087	1,261	1,687	2,152	2,377	2,911	2,479	4,297	5,700	8,629	7,727	4,621	5,401	7,065	61,822	$80,806	$109,713
KIN	223	71	400	330	283	323	101	352	274	724	774	1,469	971	605	402	391	7,693	$74,375	$83,599
FFC	118	218	126	120	53	143	244	305	153	618	822	1,665	1,298	707	917	804	8,311	$93,441	$108,311
FRDS	766	619	583	591	509	447	512	514	234	529	926	922	474	343	264	327	8,560	$42,909	$68,157
MANS	307	454	176	292	383	591	506	511	437	830	1,453	1,529	2,051	721	854	608	11,703	$74,221	$91,253
JEF	848	761	705	698	952	773	781	836	809	1,431	2,452	2,841	1,693	941	1,365	818	18,704	$63,462	$78,278
Modeled Area	86,867	58,074	54,514	63,294	65,049	74,324	74,407	85,460	78,605	160,676	236,543	334,510	278,848	191,262	235,886	245,661	2,323,980	$84,280	$106,780

Table 3 Computation Procedure of 2007 Regional Income Quartiles (TPB Modeled Area)

Income Interval	Frequency		Cumulative			
	HHS	PCT	HHS	2007 ACS		
$200,000 or more	245,661	10.6%	**2,323,980**	100.0%		
$150,000 to $199,999	235,886	10.2%	2,078,319	89.4%		
$125,000 to $149,999	191,262	8.2%	1,842,433	**79.3%**	$137,001	<<<< 3rd Income Quartile
$100,000 to $124,999	278,848	12.0%	1,651,171	**71.0%**	1,742,985	75% of Total Households
$75,000 to $99,999	334,510	14.4%	1,372,323	**59.1%**	$84,280	<<<< 2nd Income Quartile (MEDIAN)
$60,000 to $74,999	236,543	10.2%	1,037,813	**44.7%**	1,161,990	50% of Total Households
$50,000 to $59,999	160,676	6.9%	801,270	34.5%		
$45,000 to $49,999	78,605	3.4%	640,594	**27.6%**	$46,209	<<<< 1st Income Quartile
$40,000 to $44,999	85,460	3.7%	561,989	**24.2%**	580,995	25% of Total Households
$35,000 to $39,999	74,407	3.2%	476,529	20.5%		
$30,000 to $34,999	74,324	3.2%	402,122	17.3%		
$25,000 to $29,999	65,049	2.8%	327,798	14.1%		
$20,000 to $24,999	63,294	2.7%	262,749	11.3%		
$15,000 to $19,999	54,514	2.3%	199,455	8.6%		
$10,000 to $14,999	58,074	2.5%	144,941	6.2%		
Less than $10,000	86,867	3.7%	86,867	3.7%		
Total Region	**2,323,980**	100.0%				
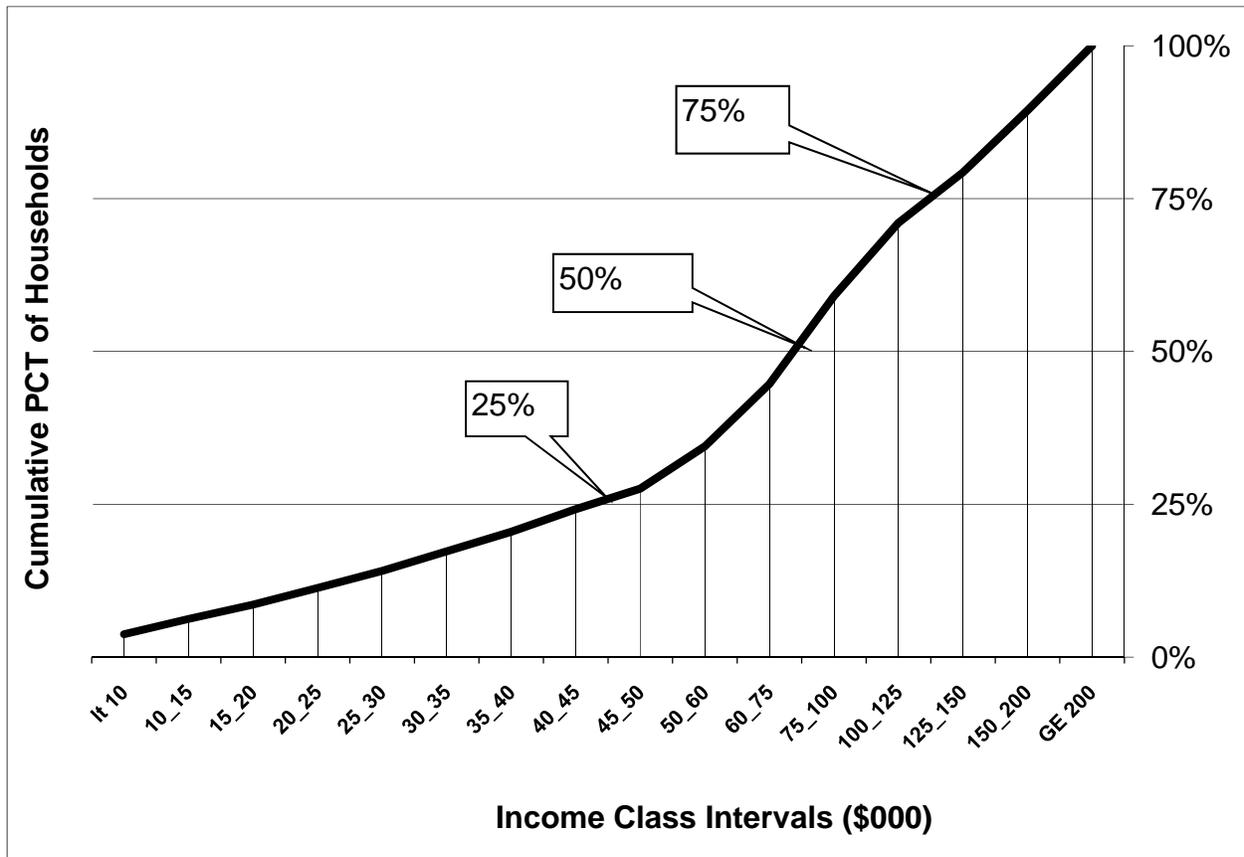
Figure 1 Cumulative Distribution of 2007 Households By Income Strata

Note: Computed from 2007 ACS & 2005-2007 TPB Modeled Area

The mean income was computed by dividing total aggregate income by the number of household units. Shown in Figure 2, the regional median income ($84,280) is considerably lower than the regional mean income ($106,780). The median income will approach the mean income if the income data is symmetrically distributed.   As shown in Figure 2, in every county, the median income is significantly lower than the mean income. Loudoun County had the highest median income ($107,200) while Fairfax County had the highest mean income ($131,100).

Shown in Table 4 is the percent distribution of the 2007 ACS households based on the above updated income quartiles.
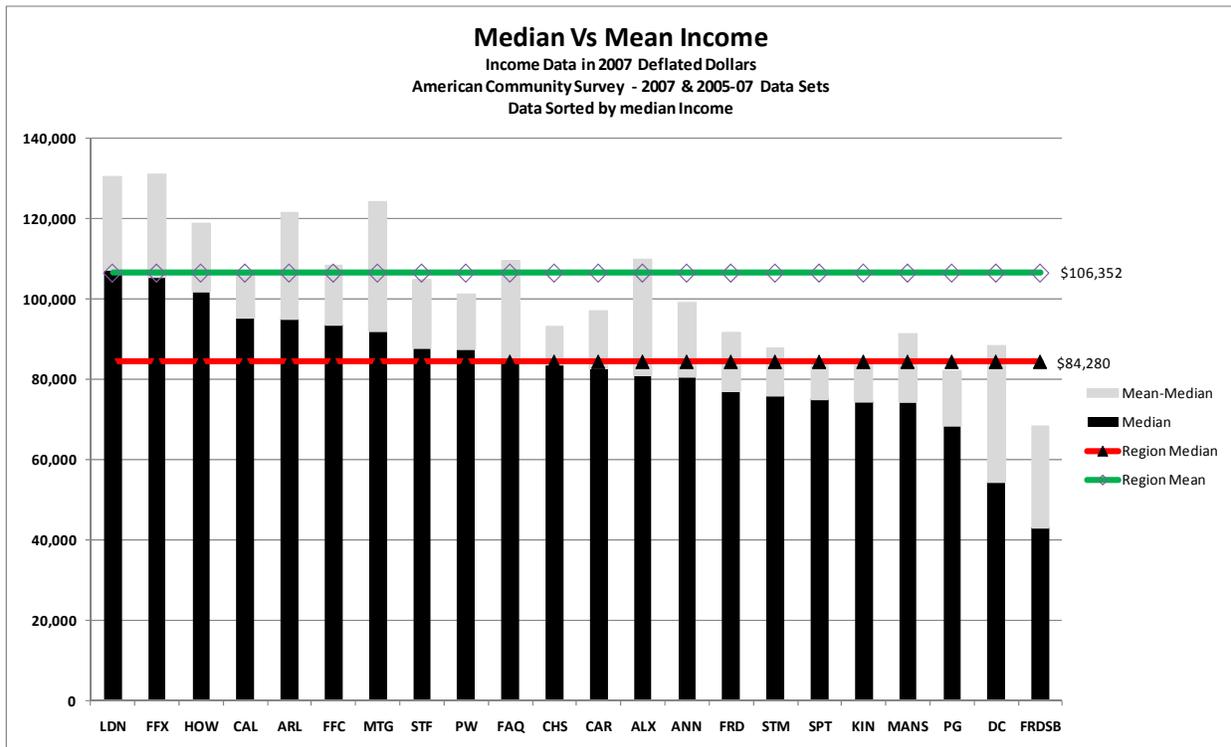
Figure 2 Comparison of 2007 Median & Mean Income by Jurisdiction of modeled area

Table 4 Percent Distribution of Households by Jurisdiction and Income Quartiles based on 2007 ACS

	2007 ACS									
	1st Quartile	2nd Quartile	3rd Quartile	4th quartile		1st Quartile	2nd Quartile	3rd Quartile	4th quartile	
	< 50K	50K-<100K	100K-<150K	>150K	Total	<50K	50K-<100K	100K-<150K	>150K	Total
Point Est.	$46,209	$84,280	$137,000	$137,000		$46,209	$84,280	$137,000		
DC	116,933	64,073	31,777	38,256	**251,039**	46.6%	25.5%	12.7%	15.2%	100.0%
ANN	50,888	67,660	39,344	30,982	**188,874**	26.9%	35.8%	20.8%	16.4%	100.0%
CAL	6,133	9,287	7,876	5,845	**29,141**	21.0%	31.9%	27.0%	20.1%	100.0%
CAR	16,450	18,940	14,610	8,783	**58,783**	28.0%	32.2%	24.9%	14.9%	100.0%
CHS	12,944	16,685	11,991	7,381	**49,001**	26.4%	34.1%	24.5%	15.1%	100.0%
FRD	23,572	27,009	19,456	11,824	**81,861**	28.8%	33.0%	23.8%	14.4%	100.0%
HOW	19,101	29,132	23,410	27,223	**98,866**	19.3%	29.5%	23.7%	27.5%	100.0%
MTG	85,772	99,422	65,794	92,552	**343,540**	25.0%	28.9%	19.2%	26.9%	100.0%
PG	98,879	114,185	49,785	34,765	**297,614**	33.2%	38.4%	16.7%	11.7%	100.0%
STM	11,101	13,662	7,509	4,569	**36,841**	30.1%	37.1%	20.4%	12.4%	100.0%
ARL	21,340	26,982	17,990	25,217	**91,529**	23.3%	29.5%	19.7%	27.6%	100.0%
FFX	69,739	101,397	84,538	110,569	**366,243**	19.0%	27.7%	23.1%	30.2%	100.0%
FAQ	5,962	7,460	5,511	4,310	**23,243**	25.7%	32.1%	23.7%	18.5%	100.0%
LDN	14,193	24,646	23,242	24,526	**86,607**	16.4%	28.5%	26.8%	28.3%	100.0%
PW	27,780	43,993	28,642	22,569	**122,984**	22.6%	35.8%	23.3%	18.4%	100.0%
SPT	12,943	16,413	7,416	4,830	**41,602**	31.1%	39.5%	17.8%	11.6%	100.0%
STF	9,050	13,172	9,067	8,130	**39,419**	23.0%	33.4%	23.0%	20.6%	100.0%
ALX	18,382	18,626	12,348	12,466	**61,822**	29.7%	30.1%	20.0%	20.2%	100.0%
KIN	2,357	2,967	1,576	793	**7,693**	30.6%	38.6%	20.5%	10.3%	100.0%
FFC*	1,480	3,105	2,005	1,721	**8,311**	17.8%	37.4%	24.1%	20.7%	100.0%
FRDS*	4,775	2,377	817	591	**8,560**	55.8%	27.8%	9.5%	6.9%	100.0%
MANS*	3,657	3,812	2,772	1,462	**11,703**	31.2%	32.6%	23.7%	12.5%	100.0%
JEF*	7,163	6,724	2,634	2,183	**18,704**	38.3%	35.9%	14.1%	11.7%	100.0%
Total Modeled Area	**640,594**	**731,729**	**470,110**	**481,547**	**2,323,980**	**28%**	**31%**	**20%**	**21%**	
Cumulative Pct of Tot Households						**28%**	**59%**	**79%**	**100%**	

2.1.4 Distribution of Households by Household Size

As shown in Table 5, the average household size for the region is 2.66 with a range from 2.2 (DC) to 3.22 (Loudoun Co). A comparison of the 2007 ACS and 2000 CTPP distribution of households by size is shown in Table 6. Table 6 indicates that the average household size increased from 2.62 in the 2000 CTPP to 2.66 in the 2007 ACS. It is also noted that single-person households increased (from 26% in 2000 to 28% in 2007) and large size (3+ person) households decreased from 44% in 2000 to 41% in 2007.

A comparison between the 2007 ACS and the 2007/08 HTS is shown in Table 7. The table indicates a small difference in the number of household units (2,331,474 vs. 2,323,980, or less than 1%), but a larger difference in household population (5,845,000 vs. 6,179,000, or about 5%). As a result, the HTS average household size (2.51) is less than that of the ACS (2.66). In a recent presentation to the Travel Forecasting Subcommittee (TFS), COG staff attributed the decrease in household size to inconsistent estimation of household population. Staff explained that in the ACS, household-based estimates are derived from a household survey, but population-based estimates are proportioned or raked to independent population totals that are produced by the Census Bureau.[8] The inconsistency is clearly shown when an average household size is computed for households with 7+ persons. As shown in Table 5, the total household population could be estimated by multiplying each category of households by its respective number of persons (e.g., multiply one-person households by 1, two-person households by 2, etc.). The average size for the last category (7+ person households) could be estimated by deducting the computed household population of categories 1 to 6 person households from the aggregate total household population for all categories (ACS table B25009) and then dividing the result by the total number of households in the group 7+ persons. As shown in Table 5, applying this method produced illogical estimates for the 7+ person households (see the second to last column in Table 5). For example, the average size of the 7+ category produced an average of 66.85 persons in DC and 16.13 persons for all counties. Based on the 2000 CTPP, COG staff found that the average household size for the 7+ person group is about 8 persons. Consequently, TPB staff chose to use this average in the factoring of the 2007 HTS.

---

[8] See the TFS highlights from November 20, 2009. The ACS uses the county intercensal population estimates as controls for the survey totals. The ACS data do not agree with the official estimates at all geographic levels because of the varying levels of aggregation used during the final stage of weighting.

Table 5 Distribution of Households Size & Aggregate Household Population – Estimation of Avg. Household Size

	Distribution of Households by Household Size								Number of Households		Aggregate HH Pop	Est of Psns for 7 + hhs Based on HHS/VEH		Implied	PSN/HH ACS Table
	1-PSN	2-PSN	3-PSN	4-PSN	5-PSN	6-PSN	7+ PSN	B25009 Total HHS	1 - 6 PSN	7+ PSN	B11002	1 - 6 PSN	7+ PSN	Avg 7+	B25046
District of Columbia	120,261	72,412	28,014	17,576	8,091	3,617	1,068	**251,039**	249,971	1,068	552,984	481,588	71,396	66.85	**2.20**
Anne Arundel County, Maryland	47,422	63,263	32,980	26,428	12,747	4,127	1,907	**188,874**	186,967	1,907	493,852	467,097	26,755	14.03	**2.61**
Calvert County, Maryland	5,472	9,441	4,589	6,652	2,311	457	219	**29,141**	28,922	219	87,653	79,026	8,627	39.39	**3.01**
Carroll County, Maryland	9,510	19,462	10,984	11,148	4,876	1,282	1,521	**58,783**	57,262	1,521	161,217	158,050	3,167	2.08	**2.74**
Charles County, Maryland	10,086	16,278	9,823	7,380	3,673	1,310	451	**49,001**	48,550	451	139,417	127,856	11,561	25.63	**2.85**
Frederick County, Maryland	18,931	24,672	16,792	12,932	6,479	1,847	208	**81,861**	81,653	208	219,499	213,856	5,643	27.13	**2.68**
Howard County, Maryland	20,083	29,894	18,557	18,796	7,789	3,181	566	**98,866**	98,300	566	268,129	268,757	-628	-1.11	**2.71**
Montgomery County, Maryland	85,440	108,265	59,754	52,347	24,352	8,031	5,351	**343,540**	338,189	5,351	922,312	860,566	61,746	11.54	**2.68**
Prince George's County, Maryland	87,040	84,558	51,136	41,627	19,067	8,467	5,719	**297,614**	291,895	5,719	807,902	722,209	85,693	14.98	**2.71**
St. Mary's County, Maryland	8,591	10,303	6,665	6,491	2,854	1,135	802	**36,841**	36,039	802	97,711	96,236	1,475	1.84	**2.65**
Arlington County, Virginia	38,147	28,973	11,679	8,407	2,928	950	445	**91,529**	91,084	445	202,100	185,098	17,002	38.21	**2.21**
Fairfax County, Virginia	90,896	117,361	61,189	60,287	23,583	8,481	4,446	**366,243**	361,797	4,446	1,001,954	919,134	82,820	18.63	**2.74**
Fauquier County, Virginia	5,032	8,434	3,777	3,049	1,582	537	832	**23,243**	22,411	832	65,133	56,559	8,574	10.31	**2.80**
Loudoun County, Virginia	24,338	21,675	14,107	17,184	6,444	1,803	1,056	**86,607**	85,551	1,056	278,655	221,783	56,872	53.86	**3.22**
Prince William County, Virginia	21,836	35,902	23,766	22,266	10,238	4,861	4,115	**122,984**	118,869	4,115	357,164	334,358	22,806	5.54	**2.90**
Spotsylvania County, Virginia	8,248	12,391	7,717	7,851	3,628	1,423	344	**41,602**	41,258	344	118,136	114,263	3,873	11.26	**2.84**
Stafford County, Virginia	5,796	13,271	8,184	6,644	2,999	1,365	1,160	**39,419**	38,259	1,160	119,665	106,651	13,014	11.22	**3.04**
Alexandria city, Virginia	28,500	19,390	7,031	4,735	1,384	451	331	**61,822**	61,491	331	139,246	116,939	22,307	67.39	**2.25**
King George County, Virginia	1,338	2,741	1,228	1,503	296	305	282	**7,693**	7,411	282	21,001	19,826	1,175	4.17	**2.73**
Fairfax city, Virginia	2,507	2,773	1,145	1,127	498	200	61	**8,311**	8,250	61	21,903	19,686	2,217	36.34	**2.64**
Fredericksburg city, Virginia	3,617	2,487	1,244	733	307	106	66	**8,560**	8,494	66	19,915	17,426	2,489	37.71	**2.33**
Manassas city, Virginia	2,123	2,858	2,172	2,216	1,513	305	516	**11,703**	**11,187**	**516**	**34,323**	**32,614**	1,709	**3.31**	**2.93**
Jefferson County, West Virginia	4091	6705	2902	2980	1266	552	208	**18,704**	18496	208	48430	47769	661	3.18	**2.59**
	649,305	713,509	385,435	340,359	148,905	54,793	31,674	**2,323,980**	**2,292,306**	**31,674**	**6,178,301**	**5,667,347**	510,954	**16.13**	**2.66**

13

Table 6 Distribution of Households: ACS 2007 Vs CTPP 2000

	ACS 2007						CTPP 2000 Tables					
	Distribution of HHs - Computed from ACS Table B25044					PSN/HH	Distribution of HHs - Computed from CTPP 2000 Tables FF-SF3-P9 / FF-SF3-P9					PSN/HH
	1-psn	2-psn	3-psn	4+ psn	Total	B25046	1-psn	2-psn	3-psn	4-psn	Total	FF-SF3-P9
District of Columbia	47.9%	28.8%	11.2%	12.1%	100%	**2.20**	43.7%	27.4%	12.7%	16.2%	100%	**2.16**
Anne Arundel County, Maryland	25.1%	33.5%	17.5%	23.9%	100%	**2.61**	21.3%	33.4%	18.7%	26.6%	100%	**2.65**
Calvert County, Maryland	18.8%	32.4%	15.7%	33.1%	100%	**3.01**	16.3%	31.0%	18.8%	33.8%	100%	**2.91**
Carroll County, Maryland	16.2%	33.1%	18.7%	32.0%	100%	**2.74**	17.5%	32.4%	18.9%	31.2%	100%	**2.80**
Charles County, Maryland	20.6%	33.2%	20.0%	26.2%	100%	**2.85**	17.1%	30.5%	20.9%	31.5%	100%	**2.86**
Frederick County, Maryland	23.1%	30.1%	20.5%	26.2%	100%	**2.68**	20.0%	32.6%	18.7%	28.7%	100%	**2.72**
Howard County, Maryland	20.3%	30.2%	18.8%	30.7%	100%	**2.71**	20.7%	31.4%	18.5%	29.4%	100%	**2.71**
Montgomery County, Maryland	24.9%	31.5%	17.4%	26.2%	100%	**2.68**	24.4%	31.3%	16.8%	27.5%	100%	**2.66**
Prince George's County, Maryland	29.2%	28.4%	17.2%	25.2%	100%	**2.71**	24.1%	28.8%	19.0%	28.1%	100%	**2.74**
St. Mary's County, Maryland	23.3%	28.0%	18.1%	30.6%	100%	**2.65**	21.1%	30.9%	18.8%	29.2%	100%	**2.71**
Arlington County, Virginia	41.7%	31.7%	12.8%	13.9%	100%	**2.21**	40.7%	31.5%	12.1%	15.6%	100%	**2.14**
Fairfax County, Virginia	24.8%	32.0%	16.7%	26.4%	100%	**2.74**	21.4%	32.3%	17.6%	28.8%	100%	**2.73**
Fauquier County, Virginia	21.6%	36.3%	16.3%	25.8%	100%	**2.80**	18.6%	34.6%	18.4%	28.3%	100%	**2.74**
Loudoun County, Virginia	28.1%	25.0%	16.3%	30.6%	100%	**3.22**	18.5%	31.5%	18.9%	31.1%	100%	**2.82**
Prince William County, Virginia	17.8%	29.2%	19.3%	33.7%	100%	**2.90**	17.0%	29.2%	19.8%	33.9%	100%	**2.94**
Spotsylvania County, Virginia	19.8%	29.8%	18.5%	31.8%	100%	**2.84**	16.7%	31.1%	20.2%	32.0%	100%	**2.88**
Stafford County, Virginia	14.7%	33.7%	20.8%	30.9%	100%	**3.04**	13.9%	29.4%	20.5%	36.2%	100%	**3.02**
Alexandria city, Virginia	46.1%	31.4%	11.4%	11.2%	100%	**2.25**	43.4%	31.6%	11.6%	13.5%	100%	**2.04**
King George County, Virginia	17.4%	35.6%	16.0%	31.0%	100%	**2.73**	20.5%	33.0%	18.9%	27.6%	100%	**2.70**
Fairfax city, Virginia	30.2%	33.4%	13.8%	22.7%	100%	**2.64**	23.5%	35.6%	17.9%	23.0%	100%	**2.62**
Fredericksburg city, Virginia	42.3%	29.1%	14.5%	14.2%	100%	**2.33**	39.3%	33.4%	14.0%	13.4%	100%	**2.09**
Manassas city, Virginia	18.1%	24.4%	18.6%	38.9%	100%	**2.93**	21.0%	27.7%	18.0%	33.4%	100%	**2.91**
Jefferson County, West Virginia	21.9%	35.8%	15.5%	26.8%	100%	**2.59**	23.1%	35.4%	18.4%	23.1%	100%	**2.54**
	27.9%	**30.7%**	**16.6%**	**24.8%**	**100%**	**2.66**	**25.5%**	**30.9%**	**17.2%**	**26.4%**	**100%**	**2.62**

Table 7 Household Size: Comparison 2007 HTS Vs 2007 ACS

	2007/2008 HTS			ACS 2007 & 2005-07			Ratio HTS / ACS		
	HH Units	HH Population	HH Size	HH Units	HH Population	HH Size	HH Units	HH Population	HH Size
District of Columbia	252,124	492,769	1.95	251,039	552,984	2.20	1.00	1.12	1.13
Anne Arundel County	190,802	481,856	2.53	188,874	493,852	2.61	0.99	1.02	1.04
Calvert County	29,255	81,871	2.80	29,141	87,653	3.01	1.00	1.07	1.07
Carroll County	57,201	164,817	2.88	58,783	161,217	2.74	1.03	0.98	0.95
Charles County	50,062	134,569	2.69	49,001	139,417	2.85	0.98	1.04	1.06
Frederick County	82,603	216,384	2.62	81,861	219,499	2.68	0.99	1.01	1.02
Howard County	99,393	265,041	2.67	98,866	268,129	2.71	0.99	1.01	1.02
Montgomery County	342,382	888,001	2.59	343,540	922,312	2.68	1.00	1.04	1.04
Prince George's County	294,326	755,090	2.57	297,614	807,902	2.71	1.01	1.07	1.06
St. Mary's County	36,562	96,085	2.63	36,841	97,711	2.65	1.01	1.02	1.01
Total Maryland	1,182,587	3,083,714	2.61	1,184,521	3,197,692	2.70	1.00	1.04	1.04
Arlington County	91,200	182,522	2.00	91,529	202,100	2.21	1.00	1.11	1.10
Fairfax County	367,961	942,287	2.56	366,243	1,001,954	2.74	1.00	1.06	1.07
Fauquier County	22,936	59,278	2.58	23,243	65,133	2.80	1.01	1.10	1.08
Loudoun County	92,204	245,038	2.66	86,607	278,655	3.22	0.94	1.14	1.21
Prince William County	124,264	354,545	2.85	122,984	357,164	2.90	0.99	1.01	1.02
Spotsylvania County	41,436	116,309	2.81	41,602	119,194	2.87	1.00	1.02	1.02
Stafford County	39,398	113,481	2.88	39,419	119,665	3.04	1.00	1.05	1.05
Alexandria City	61,429	116,047	1.89	61,822	139,246	2.25	1.01	1.20	1.19
Total Virginia	840,828	2,129,507	2.53	833,449	2,283,111	2.74	0.99	1.07	1.08
ACS 3-Yrs Avg. (2005 -2007)									
King George County	8,228	23,882	2.90	7,693	21,001	2.73	0.94	0.88	0.94
Fairfax City	8,067	19,626	2.43	8,311	21,903	2.64	1.03	1.12	1.08
Fredericksburg City	9,028	17,431	1.93	8,560	19,915	2.33	0.95	1.14	1.21
Manassas City	11,919	29,690	2.49	11,703	34,323	2.93	0.98	1.16	1.18
Jefferson County	18,693	48,685	2.60	18,704	48,430	2.59	1.00	0.99	0.99
Total ACS	55,935	139,314	2.49	54,971	145,572	2.65	0.98	1.04	1.06
Total Modeled Area	2,331,474	5,845,304	2.51	2,323,980	6,179,359	2.66	1.00	1.06	1.06

2.1.5 Distribution of Households by Vehicle Availability

The vehicle availability sub-model, which has multinomial logit form, is used to estimate the number of households in each zone with 0, 1, 2, or 3+ vehicles per household. The observed 2007 ACS data provides information for validation of the model at the jurisdiction level by household size and income. Shown in Table 8 is the distribution of households by jurisdiction and vehicles available, and information about the average number of vehicles per household.[9] The average number of vehicles per household increased from 1.73 in the 2000 CTPP [10] to 1.84 in the 2007 ACS (Table 8). The lowest vehicle ownership rates are found in the inner jurisdictions of DC, Arlington and Alexandria. The highest rates are found in the outer jurisdictions of Fauquier County, King George County, Calvert County, Carroll County, and Spotsylvania County. Comparing the household distribution by vehicles available in the CTPP 2000 and the 2007 ACS, we find a decrease in the zero-vehicle households and an increase in the 4+ vehicles households. Table 9 presents a jurisdictional comparison of the percent distribution of households by vehicles available in the 2007 ACS and the 2000 CTPP.

---

[9] Average number of vehicles was computed by dividing the aggregate number of vehicles available by the number of *households* in each jurisdiction. The ACS defines occupied *housing units* as the universe for the aggregate number of vehicles available.

[10] Ronald Milone et al., FY-*2005 Development Program for TPB Travel Forecasting Models.,* (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, 2005),pages 6-3, 6-4.

Table 8 Aggregate and Average Number of Vehicles Available Per Occupied Household Unit

| | Distribution of Households by Vehicle Available ACS Table B25044 | | | | | | | | | Aggregate No of Vehs Table | Estim Avg No of Vehs for HHS with 5 + Based on household VEHs | | | Veh/HH ACS Table |
| | | | | | | | | Number of Households | | | | | | |
	0-VEH	1-VEH	2-VEH	3-VEH	4-VEH	5 + VEH	Total	0 - 4 VEH	5 + VEH	B25046	0-4 Vehs	Est 5+ Vehs	Avg 5+ Veh	B25046
District of Columbia	89,143	109,226	42,287	7,333	2,251	799	**251,039**	250,240	799	229,069	224,803	4,266	5.34	**0.91**
Anne Arundel County, Maryland	8,472	50,321	79,565	35,301	10,998	4,217	**188,874**	184,657	4,217	381,445	359,346	22,099	5.24	**2.02**
Calvert County, Maryland	537	5,719	11,476	6,131	3,868	1,410	**29,141**	27,731	1,410	70,183	62,536	7,647	5.42	**2.41**
Carroll County, Maryland	2,323	11,045	23,103	13,595	4,928	3,789	**58,783**	54,994	3,789	138,554	117,748	20,806	5.49	**2.36**
Charles County, Maryland	1,307	13,069	16,589	10,881	5,209	1,946	**49,001**	47,055	1,946	110,080	99,726	10,354	5.32	**2.25**
Frederick County, Maryland	3,078	20,700	33,440	16,842	5,695	2,106	**81,861**	79,755	2,106	172,190	160,886	11,304	5.37	**2.10**
Howard County, Maryland	2,440	24,722	44,292	19,282	6,333	1,797	**98,866**	97,069	1,797	205,726	196,484	9,242	5.14	**2.08**
Montgomery County, Maryland	26,284	112,020	136,089	48,956	14,284	5,907	**343,540**	337,633	5,907	619,840	588,202	31,638	5.36	**1.80**
Prince George's County, Maryland	27,761	106,437	101,453	42,870	13,285	5,808	**297,614**	291,806	5,808	521,598	491,093	30,505	5.25	**1.75**
St. Mary's County, Maryland	1,551	7,877	14,924	8,380	2,919	1,190	**36,841**	35,651	1,190	81,307	74,541	6,766	5.69	**2.21**
Arlington County, Virginia	9,378	44,960	26,962	7,488	1,900	841	**91,529**	90,688	841	133,485	128,948	4,537	5.39	**1.46**
Fairfax County, Virginia	11,646	107,820	156,835	63,093	18,484	8,365	**366,243**	357,878	8,365	728,687	684,705	43,982	5.26	**1.99**
Fauquier County, Virginia	693	4,199	8,087	5,346	3,327	1,591	**23,243**	21,652	1,591	58,537	49,719	8,818	5.54	**2.52**
Loudoun County, Virginia	1,197	22,455	41,528	15,336	4,010	2,081	**86,607**	84,526	2,081	178,542	167,559	10,983	5.28	**2.06**
Prince William County, Virginia	2,877	28,249	55,910	23,432	8,966	3,550	**122,984**	119,434	3,550	265,288	246,229	19,059	5.37	**2.16**
Spotsylvania County, Virginia	1,855	8,179	15,643	9,970	3,970	1,985	**41,602**	39,617	1,985	95,766	85,255	10,511	5.30	**2.30**
Stafford County, Virginia	475	8,276	16,985	8,400	4,083	1,200	**39,419**	38,219	1,200	90,023	83,778	6,245	5.20	**2.28**
Alexandria city, Virginia	6,676	33,419	18,029	2,979	632	87	**61,822**	61,735	87	81,377	80,942	435	5.00	**1.32**
King George County, Virginia	188	1,317	3,172	1,707	747	562	**7,693**	7,131	562	18,788	15,770	3,018	5.37	**2.44**
Fairfax city, Virginia	378	2,344	3,814	1,193	502	80	**8,311**	8,231	80	15,995	15,559	436	5.45	**1.92**
Fredericksburg city, Virginia	1,141	4,080	2,374	714	212	39	**8,560**	8,521	39	12,032	11,818	214	5.49	**1.41**
Manassas city, Virginia	532	3,047	4,995	2,256	556	317	**11,703**	11,386	317	23,664	22,029	1,635	5.16	**2.02**
Jefferson County, West Virginia	629	4,272	7,962	3,796	1,292	753	**18,704**	17,951	753	40,794	36,752	4,042	5.37	**2.18**
	200,561	733,753	865,514	355,281	118,451	50,420	**2,323,980**	2,273,560	50,420	4,272,970	4,004,428	268,542	**5.33**	**1.84**

Table 9 Percent Distribution of Households by Vehicle Available: 2007 ACS Vs 2000 CTPP

| | 2007 ACS Percent Distribution of Households by Vehicle Available | | | | | | 2000 CTPP Percent Distribution of Households by Vehicle Available | | | | | |
| | Computed from ACS Table B25044 | | | | | | CTPP 2000 Tables | | | | | |
	0-VEH	1-VEH	2-VEH	3-VEH	4+ VEH	Total	0-VEH	1-VEH	2-VEH	3-VEH	4+ VEH	Total
District of Columbia	35.5%	43.5%	16.8%	2.9%	1.2%	100.0%	36.6%	43.6%	15.7%	3.1%	1.0%	100%
Anne Arundel County, Maryland	4.5%	26.6%	42.1%	18.7%	8.1%	100.0%	5.2%	28.6%	43.7%	16.1%	6.4%	100%
Calvert County, Maryland	1.8%	19.6%	39.4%	21.0%	18.1%	100.0%	3.5%	21.3%	42.3%	23.0%	9.9%	100%
Carroll County, Maryland	4.0%	18.8%	39.3%	23.1%	14.8%	100.0%	4.4%	21.2%	44.8%	20.7%	9.0%	100%
Charles County, Maryland	2.7%	26.7%	33.9%	22.2%	14.6%	100.0%	4.8%	24.8%	42.8%	18.9%	8.7%	100%
Frederick County, Maryland	3.8%	25.3%	40.8%	20.6%	9.5%	100.0%	4.9%	25.1%	43.8%	18.0%	8.3%	100%
Howard County, Maryland	2.5%	25.0%	44.8%	19.5%	8.2%	100.0%	4.2%	26.3%	47.8%	16.6%	5.1%	100%
Montgomery County, Maryland	7.7%	32.6%	39.6%	14.3%	5.9%	100.0%	7.5%	34.3%	41.6%	12.5%	4.1%	100%
Prince George's County, Maryland	9.3%	35.8%	34.1%	14.4%	6.4%	100.0%	10.3%	38.5%	34.1%	12.4%	4.7%	100%
St. Mary's County, Maryland	4.2%	21.4%	40.5%	22.7%	11.2%	100.0%	5.4%	26.4%	43.0%	18.0%	7.3%	100%
Arlington County, Virginia	10.2%	49.1%	29.5%	8.2%	3.0%	100.0%	12.2%	48.5%	29.8%	7.2%	2.4%	100%
Fairfax County, Virginia	3.2%	29.4%	42.8%	17.2%	7.3%	100.0%	4.0%	29.4%	45.9%	15.1%	5.6%	100%
Fauquier County, Virginia	3.0%	18.1%	34.8%	23.0%	21.2%	100.0%	3.9%	21.0%	39.4%	23.2%	12.5%	100%
Loudoun County, Virginia	1.4%	25.9%	47.9%	17.7%	7.0%	100.0%	2.5%	23.3%	51.2%	17.1%	5.9%	100%
Prince William County, Virginia	2.3%	23.0%	45.5%	19.1%	10.2%	100.0%	3.4%	25.9%	45.4%	17.9%	7.3%	100%
Spotsylvania County, Virginia	4.5%	19.7%	37.6%	24.0%	14.3%	100.0%	3.0%	23.8%	43.3%	21.0%	8.9%	100%
Stafford County, Virginia	1.2%	21.0%	43.1%	21.3%	13.4%	100.0%	2.3%	19.4%	46.9%	21.9%	9.5%	100%
Alexandria city, Virginia	10.8%	54.1%	29.2%	4.8%	1.2%	100.0%	11.1%	52.4%	29.5%	5.6%	1.5%	100%
King George County, Virginia	2.4%	17.1%	41.2%	22.2%	17.0%	100.0%	4.9%	25.5%	38.8%	20.1%	10.7%	100%
Fairfax city, Virginia	4.5%	28.2%	45.9%	14.4%	7.0%	100.0%	3.7%	32.4%	42.3%	14.9%	6.6%	100%
Fredericksburg city, Virginia	13.3%	47.7%	27.7%	8.3%	2.9%	100.0%	13.8%	42.9%	30.4%	9.9%	3.0%	100%
Manassas city, Virginia	4.5%	26.0%	42.7%	19.3%	7.5%	100.0%	4.7%	28.9%	45.1%	16.3%	5.0%	100%
Jefferson County, West Virginia	3.4%	22.8%	42.6%	20.3%	10.9%	100.0%	6.6%	28.8%	39.7%	16.5%	8.3%	100%
	8.6%	**31.6%**	**37.2%**	**15.3%**	**7.3%**	**100.0%**	**9.9%**	**33.1%**	**38.6%**	**13.4%**	**5.1%**	**100%**

2.2 2007 Traffic Counts

Traffic counts are an important input to both model calibration and model validation. They can be used in order to select peak periods, estimate peak hour factors, assess seasonal and daily traffic variability, and to verify traffic flows estimated by the model. Section 2.2.1 describes the counts that are available for the calibration year, 2007, in the metropolitan Washington region. Section 2.2.2 discusses the derivation of peak hour factors for the AM peak, PM peak and Off Peak periods based on the hourly counts obtained from the Regional Transportation Data Clearinghouse (RTDC). In addition, volumes observed during each hour of the peak periods are analyzed to determine the peak hour distribution across the count stations. Section 2.2.3 describes the analysis of the seasonal and weekday variability in the weekday counts obtained from permanent count stations in Virginia and Maryland. Only permanent count stations could be used for seasonal analysis because it was necessary to select stations that had data throughout the year. The RTDC did not include any data from permanent stations in the District of Columbia and thus no such analysis could be conducted.

2.2.1 Available Traffic Counts

This section details the number of vehicle counts available for 2007 from the RTDC.[11] The District of Columbia, Maryland, and Virginia each use different conventions and terminology regarding traffic counts. Maryland draws a distinction between "permanent", continuous automatic traffic recorders (ATRs) and "program counts." Maryland has 79 permanent ATRs and 3,000 program counts.[12] According to recent documentation, "Program count data is collected (both directions) at regular locations on a three year cycle (one-third of these are counted each year). Growth Factors are applied to counts which were not taken during the current year and the counts are factored based on the past yearly growth of an associated ATR. Counters are placed for 48 hours on a Monday or Tuesday and are picked up that Thursday or Friday, respectively."[13] By contrast, Virginia uses the terms "continuous count" and "short term traffic count."[14] In the District of Columbia, traffic counts are collected (both direction) at pre-selected locations on a three-year cycle on road segments that are part of the Highway Performance Monitoring System (HPMS).[15] [16] In the RTDC, the terms "permanent count" and "temporary count"/"program count" are used. To add to the confusion, there is also a third type of count, called a "special count," that is used for places that are not counted on a regular basis, but may be counted for a special purpose, such as a specific study. These "special counts" are not part of the RTDC.

---

[11] Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, *Regional Transportation Data Clearinghouse User Guide, Draft report* (Washington, D.C., May 29, 2009).

[12] This is in the entire state, not just the section of the state in the TPB modeled area.

[13] Highway Information Services Division, "2009 Traffic Volume Maps By County" Maryland State Highway Administration, 2009, http://www.marylandroads.com/index.aspx?PageId=792.

[14] Traffic Engineering Division, Commonwealth of Virginia, Department of Transportation, Average Daily Traffic Volumes With Vehicle Classification Data on Interstate, Arterial and Primary Routes (Virginia Department of Transportation, 2008).

[15] District Department of Transportation, *2008 Traffic Volumes*, (Washington, D.C.: District Department of Transportation, October 2009)

[16] District Department of Transportation, "Traffic Volume Maps," District Department of Transportation website, n.d., http://ddot.dc.gov/DC/DDOT/About+DDOT/Maps/Traffic+Volume+Maps.

The RTDC segments traffic counts into the following categories: Average Annual Weekday Traffic (AAWT), Average Annual Daily Traffic (AADT), and hourly counts. Hourly counts are further categorized as follows:

- Short-term counts: Less than one week. The source of these counts is usually program counts.
- Medium-term counts: More than one week, but not continuous. The source of these counts is typically permanent count stations that are not working continuously throughout the year.
- Continuous counts: These come from the permanent count stations.

The RTDC also provides traffic counts at external stations, which can be used to extract external-internal (X-I, I-X) and through trips (X-X).

2.2.1.1 AAWT/AADT

The RTDC contains 2,680 AAWT counts for 2007, of which 1,247 were collected in Maryland, 1,432 in Virginia and 1 in West Virginia. No AAWT counts are available for District of Columbia. The RTDC also contains 3,056 AADT counts for 2007, including 376 counts for District of Columbia, 1,247 for Maryland, 1,432 for Virginia, and 1 for West Virginia. Maryland and Virginia have 29 permanent counts stations each, while the District of Columbia has 10 permanent count stations.[17] For DC, only the AADT are available from permanent stations (not the AAWT). For more details see Table 10. Figure 3 and Figure 4 indicate the location of links with permanent count stations.

Table 10 AAWT and AADT counts by State for 2007

State	AAWT	AADT	AAWT from permanent stas.	AADT from permanent stas.
DC	0	376	0	10
Maryland	1247	1247	29	29
Virginia	1432	1432	44	44
West Virginia	1	1	0	0
Total	2680	3056	73	83

Note: This includes both counts actually taken in 2007 and factored counts from previous years, such as 2005 and 2006.

---

[17] The RTDC includes DC permanent count station data from only permanent count stations owned by Mobility Technologies. There are 30 permanent count stations shown on DC's 2007 traffic count map, but these are planned stations, not currently functioning stations. DC is in the midst of a multi-year project to replace the permanent count stations throughout the city and some of the stations are very close to being operational.
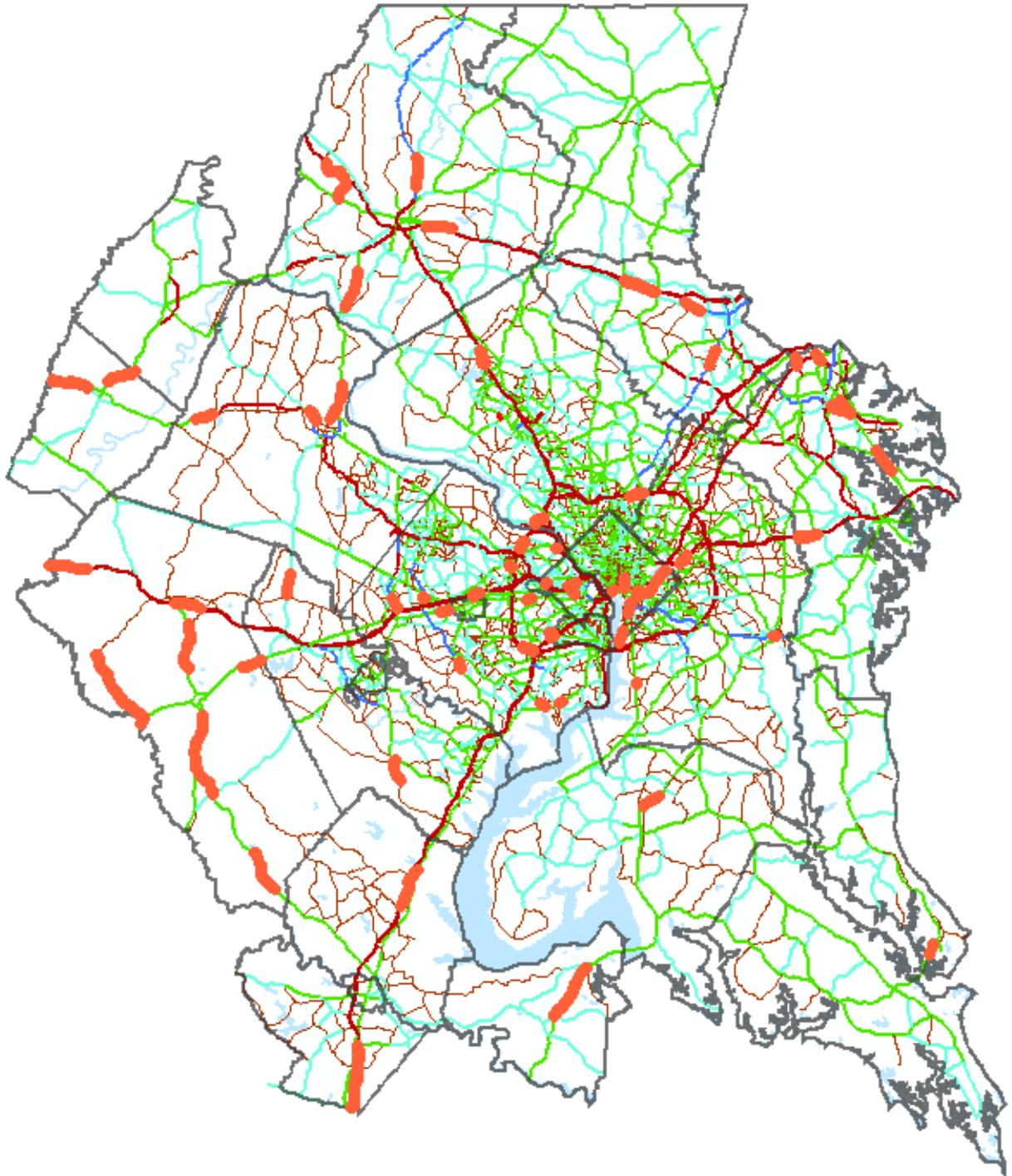
Figure 3 Links with permanent count stations: Entire region
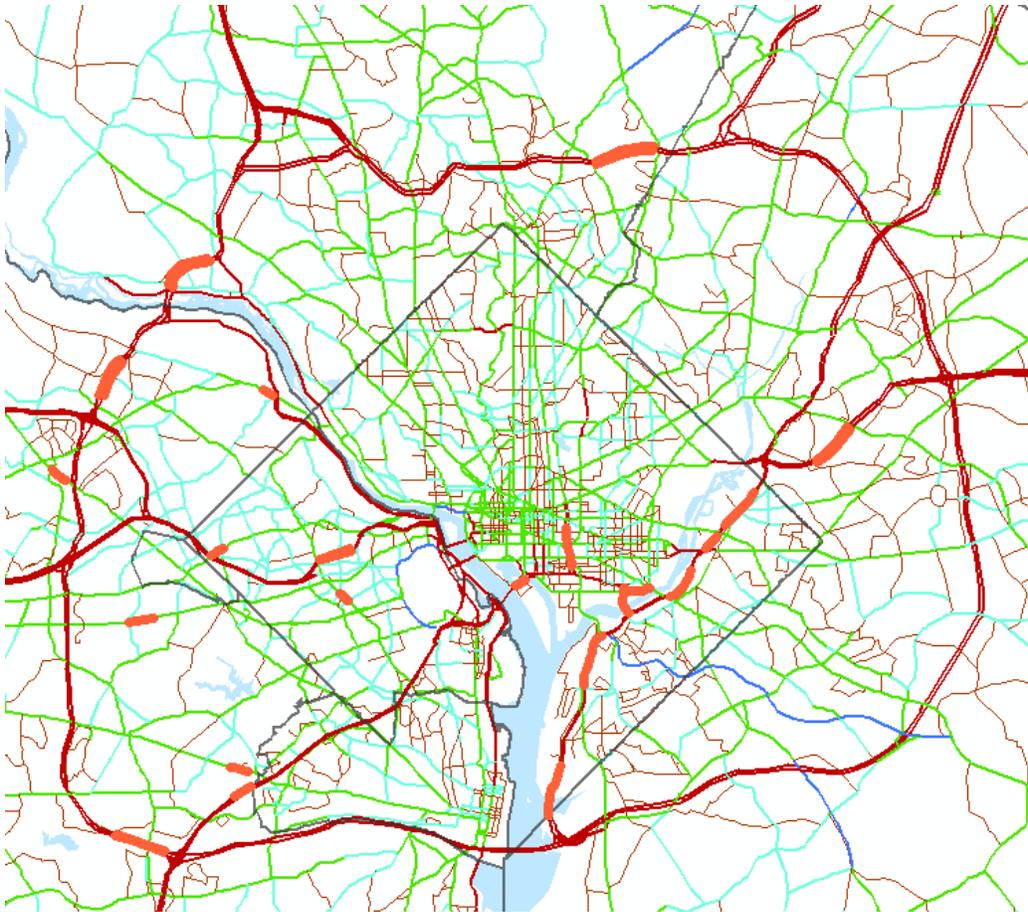
Figure 4 Links with permanent count stations: Inside the Beltway

The counts available for 2007 include those actually collected in 2007 as well as those factored from previous years. Table 11 shows the number of counts obtained each year.

Table 11 Number of Stations with Counts Completed in Each Year

State	Number of Stations with AADT counts							
	Counts from current year	Factored counts in the 1st previous Year	Factored counts in the 2nd previous year	Factored counts in the 3rd previous year or prior	Factored counts taken in the previous year (w/ growth factor)	Counts on parallel facilities	Counts from perm. stations	Total
DC	92	86	13	0	175	0	10	376
Maryland	421	436	349	12	0	0	29	1247
Virginia	348	0	0	0	876	179	29	1432
Total	861	522	362	12	952	51	68	3055

2.2.1.2 Hourly Counts

A total of 33,023 days of counts are available for Virginia and 21,709 days of counts available for Maryland. These were collected at 909 stations in Virginia and 682 stations in Maryland. There are no hourly counts available for District of Columbia. The total number of stations with more than 100 days of counts is 94 and more than 240 weekday counts is 73. See Table 12 for details. Stations with more than 240 weekday counts in Virginia and Maryland are described in Table 13 and Table 14, respectively.

Table 12 Number of Stations with Hourly Counts by State

State	Days of Counts	Number of Stations	Stations with 0-10 days counts	Stations with 10-100 days counts	Stations with >100 days counts	Stations with >240 weekdays
DC	0	0	0	0	0	0
Maryland	21,709	682	639	2	41	29
Virginia	33,023	909	856	0	53	42
Total	54,732	1,591	1495	2	94	73

Note: There is a discrepancy in the number of permanent stations that provide AADT counts and those that provide hourly counts. It may be a result of some counts not having been entered in to the RTDC or AADT counts missing a code indicating the type of station where it was collected.

Table 13 Virginia Stations with More Than 240 Hourly Weekday Counts

NDPR	STA	ROUTE_ID	NAME	FROM	TO	Lns
0504505046	90212	US29	Lee Hwy	Sycamore St	VA 237 - Washington Blvd	4
0514705355	90217	VA120	N Glebe Rd	Pershing Dr	Henderson Rd	4
0606906065	90240	US50	Arlington Blvd	Barrett Rd	Graham Rd	4
0624306122	90170	US1	Richmond Hwy	Dogue Creek	VA 235 - Mount Vernon Mem Hwy	4
0625506239	90278	VA123	Ox Rd	Sydney Rd	VA 645 - Burke Lake Rd	4
0632206332	90078	US29	Lee Hwy	VA 665 - Waples Mill Rd	Federalist Way	4-5
0644110171	190093	VA619	Joplin Rd	VA 234 - Dumfries Rd	no name	2
0657310828	90176	VA123	Chain Bridge Rd	VA 695 - Kirby Rd	Ranleigh Rd	4
0705307051	90027	US15	James Madison Hwy	VA 701 - Logmill Rd	VA 601 - Waterfall Rd	2
0712507124	90021	US15	James Monroe Hwy	Selma La	Stanford Farm Rd	2
0712607182	190098	US15_b	James Monroe Hwy	US 15bp - Leesburg Bypass	Battlefield Pkwy	2
0712807127	90063	VA7	Harry Byrd Hwy	Leesburg WCL	west of Farm Market Rd	4
0724307138	90049	VA7	Harry Byrd Hwy	VA 7bus - Loudoun St W	VA 831 - Yellow Schoolhouse	4
1026510269	190037	I66	westbound	lane ramp	no landmark	3
1027210268	90114	I66	eastbound	no landmark	lane ramp	3
1056306012	190096	VA236	Little River Tpk	Southland Ave	Seminole Ave	4
1061006693	90190	VA7	Leesburg Pike	west ramp - I 495	International Dr	6
1200512006	190029	I66	Custis Memorial Pkwy - WB	no landmark	ramp - VA 120 - Glebe Rd	4
1203712046	90106	I66	Custis Memorial Pkwy - EB	west of ramp - VA 120 - Glebe	no landmark	4
1222512222	190073	I395	Shirley Memorial Hwy - SB	south of Alexandria WCL	Turkeycock Run	3
1231612312	80336	I395	Shirley Memorial Hwy - SB	south ramp - Seminary Rd	Quantrell Ave exit	3
1277712781	190057	I495	Capital Beltway - outer loop	south - VA 620 - Braddock	no landmark	5
1278412780	90138	I495	Capital Beltway - inner loop	no landmark	south - VA 620 of Braddock	5
1279612800	90275	I495	Capital Beltway - inner loop	.45 mi South of VA 738	.4 mi South of VA 193	4
1279712793	190064	I495	Capital Beltway - outer loop	.4 mi South of VA 193	.45 mi South of VA 738	4
1440214403	160009	US301	James Madison Hwy	VA 218	VA 205	2
1450214503	60148	US1	Jefferson Davis Hwy	VA 637 - Telegraph Rd (S)	VA 610 - Garrisonville Rd	2
1456714574	160001	I95	southbound	south ramp - Garrisonville	north ramp - Courthouse	3
1471114705	60164	I95	northbound	north ramp - VA 606	south of US 17 - Mills Dr	3
1474814753	160005	I95	southbound	south of US 17 - Mills Dr	north ramp - VA 606	3
1480214801	70268	US17	Marsh Rd	VA 806 - Elk Run Rd	VA 617 - Blackwells Mill Rd	4
1480414813	70144	US17	Marsh Rd	VA 28 - Catlett Rd	US 15 - James Madison Hwy	4
1481414813	70258	US29	James Madison Hwy	VA 744 - Lovers La	US 17 - Marsh Rd	4
1481514814	70016	US29	James Madison Hwy	US 17 - Shirley Ave	VA 744 - Lovers La	4
1482014868	170015	VA688	Leeds Manor Rd	US 211 - Lee Hwy	VA 647 - Crest Hill Rd	2
1482314824	70275	US29	Lee Hwy	VA 215 - Vint Hill Rd	VA 600 - Beverleys Mill Rd	4
1482814827	70265	US17	Winchester Rd	VA 245 - Old Tavern Rd	VA 628 - Blantyre Rd	4
1485214831	190046	I66	westbound	west ramp - VA 245	east ramp - US 17bus	2
1487614836	190050	I66	westbound	west ramp - VA 688	Warren Co ECL	2
1491314917	80343	US340	Lord Fairfax Hwy	Jefferson Co SCL	VA 611	4
1585415855	90089	VA7100	Fairfax County Pkwy	North Lake Ct	north of VA 7969 - Monument Dr	4
1743706832	90236	VA28	Sully Rd	Poplar Tree Rd	north ramp - VA 620 - Braddock Rd	6

Table 14 Maryland Stations with More Than 240 Hourly Weekday Counts

NDPR	STA	ROUTE_ID	NAME	FROM	TO	Lns
0346503506	P0041	I495	Capital Beltway - inner loop	east ramp - MD 193	west ramp - New Hampshire Ave	4
0356803623	P0040	I495	Capital Beltway - inner loop	Clara Barton Pkwy ramp OP	no landmark	4
0370903705	P0041	I495	Capital Beltway - outer loop	west ramp - New Hampshire Ave	east ramp - MD 193	4
0443904445	P0055	I95	Capital Beltway - inner loop	ramp to MD 295 - BW Pkwy	ramp from MD 450 - Annapolis Rd	4
0445604949	P0043	I95	Capital Beltway - inner loop	ramp to MD 214 - Central Ave	ramp from Ritchie Marlboro Rd	4
0456504544	P0055	I95	Capital Beltway - outer loop	ramp from MD 450 - Annapolis Rd	ramp to MD 295 - BW Pkwy	4
0487404149	P0061	US50	John Hanson Hwy WB	ramp to MD 202- Landover Rd	Cheverly CL	2
0491204649	P0061	US50	John Hanson Hwy EB	Cheverly CL	ramp to MD 202- Landover Rd	2
0495004605	P0043	I95	Capital Beltway - outer loop	ramp from Ritchie Marlboro Rd	ramp to MD 214 - Central Ave	4
1173204792	P0056	MD210	Indian Head Hwy	Ft Washington Rd	adjacent to end of service rd	6
1261112649	P0060	I270	Eisenhower Memorial Hwy SB	no landmark	no landmark	4
1263112639	P0004	I270	Eisenhower Memorial Hwy SB	end HOV	no landmark	3
1263612628	P0004	I270	Eisenhower Memorial Hwy NB	no landmark	end HOV	3
1264612608	P0060	I270	Eisenhower Memorial Hwy NB	no landmark	no landmark	4
1301413806	P0024	I595/US50	John Hanson Hwy WB	Prince George's Co CL	ramp from MD 424	3
1302913988	P0024	I595/US50	John Hanson Hwy EB	Prince George's Co CL	ramp to MD 424 - Davidsonville	3
1323513310	P0067	I70	Baltimore National Pike E	ramp to Patrick St	Spring Ridge Pkwy	3
1329513467	P0030	US15/MD806	Catoctin Mountain Hwy S	Old Frederick Rd	Trading Ln	4
1342213419	P0067	I70	Baltimore National Pike W	Spring Ridge Pkwy	ramp to Patrick St	3
1343213433	P0068	US15	Catoctin Mountain Hwy	Mountville Rd	MD 464 - Point of Rocks Rd	4
1346813295	P0030	US15/MD806	Catoctin Mountain Hwy N	Trading Ln	Old Frederick Rd	4
1363413636	P0029	US29	Columbia Pike	Broken Land Pkwy	MD 175 - Little Patuxent Pkwy	4
1364513648	P0014	US40	Baltimore National Pike	no feature	Marriottsville Rd	4
1377313673	P0046	I70	Baltimore National Pike E	N ramp to MD 97 - Rosbury Mills Rd	S ramp to MD 32 - Sykesville Rd	2
1377613774	P0046	I70	Baltimore National Pike W	S ramp to MD 32 - Sykesville Rd	N ramp to MD 97 - Rosbury Mills Rd	2
1393013932	P0075	I695	Baltimore Beltway	MD 170 - Camp Meade Rd	MD 295 - BW Pkwy	3 (6)
1398313859	P0042	MD2	Gov. Ritchie Hwy	Robinson Rd	College Pkwy	4
1431114263	P0005	US301	Crain Hwy	MD 227 - Pomfret Rd	Washington Ave	4
1672216720	P0006	MD4	Pennsylvania Ave	east ramp - Robert Crain Hwy	west ramp - Robert Crain Hwy	4

As explained previously, Table 12 documents the total number of program and permanent count stations with hourly counts available for the year 2007. However, a number of the listed stations cannot be used because the counts were collected during the weekends or holidays. In addition, many of the

stations do not have a node pair (from the highway network) associated with them, thus making the transfer of count data to the network impossible. The total number of program count stations that include usable data is 796, while the corresponding number of permanent count stations is 71.

In order to better understand any gaps in the hourly count coverage, the program stations were split by jurisdiction. The results are shown in Table 15. It is evident that Loudoun and Fairfax counties have relatively few counts compared to their size. One possible explanation stems from the way the Virginia Department of Transportation conducts the counts. The counts are generally completed on a three-year cycle, with each year focused on particular counties. This may have resulted in fewer counts for the Loudon and Fairfax counties for the year 2007.

Table 15 Hourly Program Count Stations by Jurisdiction, Collected in 2007

Jurisdiction Code	Jurisdiction	Program Stations
0	District of Columbia	0
1	Montgomery	108
2	Prince George's	99
3	Arlington	126
4	Alexandria	2
5	Fairfax	15
6	Loudoun	3
7	Prince William	171
9	Frederick	55
10	Howard	37
11	Anne Arundel	49
12	Charles	20
14	Carroll	16
15	Calvert	12
16	St. Mary's	16
17	King George's	17
18	Fredericksburg	1
19	Stafford	5
20	Spotsylvania	0
21	Fauquier	44
22	Clarke	0
23	Jefferson	0
	Total	796

Note: Does not include factored counts from other years; only traffic counts actually collected in 2007.

2.2.1.3 External Station Counts

Table 16 shows external stations with 2005 AAWT (a.k.a. AAWDT) counts obtained from VDOT and MDOT as well as 2001 AADT, 2005 AAWDT and 2007 AAWDT obtained from the RTDC. Since not all counts were completed in 2007, a column indicating whether the AAWDT was collected in 2007 is

shown. In addition, Table 17 includes the percent change calculated between the 2007 counts, 2005 counts, and 2001 counts. Some stations were missing counts in the RTDC database, thus counts on the closest available segment (on the same facility) were used for these stations. These counts are indicated with an asterisk in Table 16.

Table 16 External Station Counts

TAZ	Facility	RTDC AADT 2001	MDOT/VDOT AAWDT 2005	RTDC AAWDT 2005	RTDC AAWDT 2007	RTDC collected in 2007	Lanes
2145	VA 3 (East)	4982	4528	5376	5722	YES	2
2146	US 301 (South)	10571	11048	11991	11963	YES	4
2147	US 17	4395	4402	5038	5037	NO	4
2148	VA 2	5463	5997	5951	6181	NO	4
2149	I-95 (South)	83000	76766	86000*	86000*	YES	6
2150	US 1(South)	10714	12080	12818	13313	NO	4
2151	VA 208/606	3855	4320	5561	5776	NO	2
2152	VA 612	3346	3747	3375	3366	NO	2
2153	VA 3(West)	17771	17763	23957	24882	NO	4
2154	US 15/29 (South)	21344	23078	24721	27235	YES	4
2155	US 211	15804	15750	17916	16425	YES	4
2156	I-66	30000	26880	34000*	34000*	YES	6
2157	VA 55	850	1268	1054	781	YES	2
2158	US 340	6433	7359	7939	8456	NO	2
2159	US 17/50	14792	16902	13225	12460	NO	4
2160	VA 7		25112		27466*	YES	4
2161	WV 51		7972				2
2162	WV 9		19683				4
2163	WV 45		10546				2
2164	MD 34/WVA 480		7268				2
2165	Alt US 40	9375	11274	10450	10249	YES	2
2166	I-70 (West)	56120	87559	63875*	70534*	NO	4
2167	US 40	4475	4781	6350	5824	YES	2
2168	MD 77	4325	2951	5775*	5379*	NO	2
2169	MD 550	2225	2538	2075	2011	NO	2
2170	MD 140/PA16	9925	11392	9275	8644	NO	2
2171	US 15 (North)	14950	17913	15825*	19283*	NO	4
2172	MD 194 /PA194	4775	4932	5850	5346	YES	2
2173	MD 97/PA 97	9150	9096	10425*	9756*	NO	2
2174	MD 30 (North)/ PA 94	13275	13858	16850	16141	YES	2
2175	MD 86 / PA 516		2280				2
2176	MD 88	4075	5532	4550*	4234*	YES	2
2177	MD 30 (East)	20375	24863		22691	YES	2
2178	MD 140/91	40900	45307	50975	50438	NO	4
2179	MD 26	29550	20815	33625*	32822*	NO	2
2180	I-70 (East)	70450	78667	85925	84271	NO	4
2181	US 40 (East) / MD 44	40425	44310	43275	42749	NO	4
2182	I-95 (North)	196450	208027	201225*	203394*	NO	8
2183	I-195 /US 1 (North)	36486	26404	40155*	42315*	YES	4
2184	Md 295 / B/W Pkwy	84175	83563	97850	99565	YES	4
2185	MD 170	12125	13288	14275	14085	NO	2
2186	MD 648	15750	17194		18512	NO	2
2187	MD 3 / I-97	101750	113681	113725	110612	NO	6
2188	MD 2	38025	48419	38942*	38465*	NO	4
2189	MD 10	49650	54374	58525	54444	NO	4
2190	MD 710	39725	18819	28325*	27895*	NO	2
2191	US 50 (East) / 301		74376	67725*	66594*	NO	6
Total		1141826	1348682	1275386	1355321		

* - Volume for nearby segment

Table 17 Changes in the External Station Counts, Percent Change Compared to 2007 RTDC

TAZ	Facility	%change from 2001 RTDC counts	%change from 2005 MDOT/VDOT counts	%change from 2005 RTDC counts
2145	VA 3 (East)	14.85%	26.37%	6.44%
2146	US 301 (South)	13.17%	14.70%	-0.23%
2147	US 17	14.61%	14.43%	-0.02%
2148	VA 2	13.14%	3.07%	3.86%
2149	I-95 (South)	3.61%	12.03%	0.00%
2150	US 1(South)	24.26%	10.21%	3.86%
2151	VA 208/606	49.83%	33.70%	3.87%
2152	VA 612	0.60%	-10.17%	-0.27%
2153	VA 3(West)	40.01%	40.08%	3.86%
2154	US 15/29 (South)	27.60%	18.01%	10.17%
2155	US 211	3.93%	4.29%	-8.32%
2156	I-66	13.33%	26.49%	0.00%
2157	VA 55	-8.12%	-38.41%	-25.90%
2158	US 340	31.45%	14.91%	6.51%
2159	US 17/50	-15.77%	-26.28%	-5.78%
2160	VA 7	NA	9.37%	NA
2161	WV 51			
2162	WV 9			
2163	WV 45			
2164	MD 34/WVA 480			
2165	Alt US 40	9.32%	-9.09%	-1.92%
2166	I-70 (West)	25.68%	-19.44%	10.43%
2167	US 40	30.15%	21.82%	-8.28%
2168	MD 77	24.37%	82.28%	-6.86%
2169	MD 550	-9.62%	-26.64%	-3.08%
2170	MD 140/PA16	-12.91%	-24.12%	-6.80%
2171	US 15 (North)	28.98%	7.65%	21.85%
2172	MD 194 /PA194	11.96%	8.39%	-8.62%
2173	MD 97/PA 97	6.62%	7.26%	-6.42%
2174	MD 30 (North)/ PA 94	21.59%	16.47%	-4.21%
2175	MD 86 / PA 516			
2176	MD 88	3.90%	-23.46%	-6.95%
2177	MD 30 (East)	11.37%	-8.74%	NA
2178	MD 140/91	23.32%	11.32%	-1.05%
2179	MD 26	11.07%	57.68%	-2.39%
2180	I-70 (East)	19.62%	1.06%	-1.92%
2181	US 40 (East) / MD 44	5.75%	-3.52%	-1.22%
2182	I-95 (North)	3.53%	-2.23%	1.08%
2183	I-195 /US 1 (North)	15.98%	60.26%	5.38%
2184	Md 295 / B/W Pkwy	18.28%	19.15%	1.75%
2185	MD 170	16.16%	6.00%	-1.33%
2186	MD 648	17.54%	7.67%	NA
2187	MD 3 / I-97	8.71%	-2.70%	-2.74%
2188	MD 2	1.16%	-20.56%	-1.22%
2189	MD 10	9.66%	0.13%	-6.97%
2190	MD 710	-29.78%	48.23%	-1.52%
2191	US 50 (East) / 301	NA	-10.46%	-1.67%
Total		12.47%	8.50%	-0.94%

2.2.2 Peak-Hour Factors

Peak-hour factors are important in travel demand modeling because they provide information on traffic spreading during a given time of day. These factors are determined separately for each modeled time of day, including the AM peak period, PM peak period, and the off-peak period. The peak-hour factor is calculated by dividing the highest hourly volume by the total volume during the specified time-of-day period.

In the past, peak-hour factors were determined based on the Household Travel Survey. Based on the 1994 HTS, the factors were estimated to be:

- 40% for the AM peak period (1/3 = 33% would indicate complete saturation of the period)
- 37% for the PM peak period (1/3 = 33% would indicate complete saturation of the period)
- 12% for the off-peak period (1/18 = 6% would indicate complete saturation of the period)

Since the Regional Transportation Data Clearinghouse includes hourly counts, they can be used to validate the previously used peak-hour factors. Data is available for both permanent and program count stations, thus both types of stations were analyzed.

Prior to summarizing the data by peak period, the errors in the database needed to be eliminated. The first step was checking that the information was encoded correctly. Values of the variable "month" should be between 1 and 12, the variable "day" should not exceed 31 and the variable "direction" should range from 1 to 4. Thus, any counts that violated these conditions were excluded. Since average weekday traffic is desired, weekend days and holidays were also omitted from the dataset.

Counts were then extracted for each time of day, including the AM peak period (6 AM to 9 AM), PM peak period (4 PM to 7 PM) and off-peak period (all other times of day) by station and direction. The highest hourly volume, the total period volume and the peak hour factor were then calculated for each station in each direction. Lastly, the peak-hour factors were aggregated by state and type of station (permanent or program). The resulting peak hour factors by state are described in Table 18. The overall peak hour factors are shown in Table 19.

Table 18 Peak-Hour Factors by State and Type of Station

Virginia						Maryland					
Permanent			Program			Permanent			Program		
AM	PM	OFF	AM	PM	OFF	AM	PM	OFF	AM	PM	OFF
0.4156	0.3679	0.1268	0.4199	0.3824	0.1437	0.4064	0.3619	0.1235	0.4107	0.3673	0.1252

Note: For the year 2007
Source: Regional Transportation Data Clearinghouse

Table 19 Overall Average Maximum, and Minimum Peak Hour Factors

	Overall								
	Permanent			Program			Total		
	AM	**PM**	**OFF**	**AM**	**PM**	**OFF**	**AM**	**PM**	**OFF**
Average	0.4124	0.3658	0.1256	0.4152	0.3746	0.1343	0.4131	0.3682	0.1280
Maximum	0.481	0.442	0.18	1	0.679	0.75	1	0.679	0.75
Minimum	0.34	0.346	0.095	0.34	0.334	0.091	0.34	0.334	0.091
Saturation	0.333	0.333	0.056	0.333	0.333	0.056	0.333	0.333	0.056

From the results, it is evident that the peak-hour factors are consistent across the two states and types of stations. Furthermore, the factors estimated from the hourly counts are similar to the previously used peak-hour factors obtained from the Household Travel Survey.

A minimum peak-hour factor in Table 19 indicates that the traffic on that link is spread evenly throughout the period, often a sign that link is heavily congested. By contrast, a maximum peak-hour factor in Table 19 indicates that the traffic on that link has a peaking phenomenon within the designated peak period, which could be a sign that the link is not as heavily congested as others. For example, a peak-hour factor of 33.3% during the three hour AM and PM peak periods indicate the link that is uniformly congested during this period. Count stations with AM and PM peak hour factors of less than or equal to 34% are shown in Table 20 and Table 21 respectively.

Table 20 Stations with AM Peak Hour Factor of Less than or Equal to 34%

NDPR	ROUTE_ID	NAME	FROM	TO	AAWDT2007	Peak Hour Factor
0487704873	US50	John Hanson Hwy WB	ramp to MD 410 - Veterans Pkwy	ramp from MD 202- Landover Rd	80633	0.34

Table 21 Station with PM Peak Hour Factor of Less than or Equal to 34%

NDPR	ROUTE_ID	NAME	FROM	TO	AAWDT2007	Peak Hour Factor
0377103770	I270	Eisenhower Memorial Hwy NB	east ramp - Great Falls Rd	west ramp - Great Falls Rd	268837	0.336
1157310428	I95	southbound	VA 629 - Mine Rd	no feature	157000	0.337
1258612590	I270	Eisenhower Memorial Hwy NB	no landmark	no landmark	220575	0.338
1256212566	I270	Eisenhower Memorial Hwy NB	no landmark	no landmark	249778	0.338
0360503182	MD97	Georgia Ave	Forest Glen Rd	Dexter Ave	62489	0.34

In order to gain a better understanding of the volume peaking behavior, the volumes observed during the peak hour of each period in the direction with higher volume are shown in Table 22, Table 23, and Table 24. In addition, the number of stations that have the specified hour as the peak hour during each period are counted.

Table 22 Permanent Count Stations Summary

	Hour	Peak Hour Count	Peak Hour Volume	Total Volume	Peak Period %
	6:00-6:59	11	34,864	99,900	
AM Peak	7:00-7:59	29	68,968	189,988	
	8:00-8:59	33	78,018	206,735	
	Subtotal	73	181,849	496,624	36.6%
	16:00-16:59	50	172,804	489,498	
PM Peak	17:00-17:59	23	42,430	121,195	
	18:00-18:59				
	Subtotal	73	215,234	610,693	35.2%
	9:00-9:59	6	19,265	186,642	
	10:00-10:59	1	5,529	61,060	
Off Peak	12:00-13:00	1	2,180	22,487	
	14:00-14:59	5	22,427	231,278	
	15:00-15:59	60	163,536	1,489,847	
	Subtotal	73	212,937	1,991,314	10.7%
Total		73	1,220,039	6,197,261	

Table 23 Program Count Stations Summary

	Hour	Peak Hour Count	Peak Hour Volume	Total Volume	Peak Period %
	6:00-6:59	246	376,594	1,016,901	
AM Peak	7:00-7:59	798	1,058,450	2,810,093	
	8:00-8:59	476	584,170	1,432,031	
	Subtotal	1,520	2,019,214	5,259,026	38.4%
	16:00-16:59	381	525,778	1,447,545	
PM Peak	17:00-17:59	996	1,414,706	3,903,075	
	18:00-18:59	137	142,456	400,733	
	Subtotal	1,514	2,082,940	5,751,353	36.2%
	5:00-5:59	87	155,062	1,243,041	
	9:00-9:59	191	299,314	2,344,481	
	10:00-10:59	5	338	2,731	
	11:00-11:59	11	3,249	20,470	
	12:00-12:59	41	37,529	357,756	
Off Peak	13:00-13:59	23	12,214	109,143	
	14:00-14:59	35	25,422	246,503	
	15:00-15:59	949	1,147,210	9,564,468	
	19:00-19:59	162	142,211	1,288,191	
	20:00-20:59	13	6,454	63,857	
	21:00-21:59	1	6	33	
	Subtotal	1,518	1,829,008	15,240,673	12.0%
Total		1,487	11,862,324	52,502,104	

Table 24 Permanent and Program Stations Summary

	Hour	Peak Hour Count	Peak Hour Volume	Total Volume	Peak Period %
AM Peak	6:00-6:59	257	411,458	1,116,802	
	7:00-7:59	827	1,127,418	3,000,081	
	8:00-8:59	509	662,187	1,638,767	
	Subtotal	1,593	2,201,063	5,755,649	38.2%
PM Peak	16:00-16:59	431	698,581	1,937,043	
	17:00-17:59	1,019	1,457,136	4,024,270	
	18:00-18:59	137	142,456	400,733	
	Subtotal	1,587	2,298,174	6,362,046	36.1%
Off Peak	5:00-5:59	87	155,062	1,243,041	
	9:00-9:59	197	318,579	2,531,123	
	10:00-10:59	5	338	2,731	
	11:00-11:59	11	3,249	20,470	
	12:00-12:59	42	39,708	380,243	
	13:00-13:59	23	12,214	109,143	
	14:00-14:59	40	47,849	477,781	
	15:00-15:59	1,009	1,310,746	11,054,315	
	19:00-19:59	162	142,211	1,288,191	
	20:00-20:59	13	6,454	63,857	
	21:00-21:59	1	6	33	
	Subtotal	1,590	2,036,416	17,170,927	11.9%
Total		1,593	13,071,305	58,577,245	

The results indicate that for permanent stations, the peak hour during the AM period lasts from 8:00 through 9:00, while for program stations the peak hour is 7:00 to 8:00. The data from the permanent stations shows the peak shifting to the later time of day than previously believed. For the PM period, the peak hour occurs from 16:00 through 17:00 for the permanent stations and from 17:00 through 18:00 for the program stations. The permanent station results suggest that the congestion begins earlier than expected. In the off peak period, both permanent and program station experience the heaviest traffic from 15:00 through 16:00 as anticipated.

In addition to observing the variation in volumes during peak hours by calculating the peak hour factors, it may be of interest to study the distribution of daily volumes over the three periods (AM peak period, PM peak period, and Off peak period). Vehicle counts were obtained for each period of the day and compared to the total daily volumes. The results are shown in Table 25 and Table 26.

Table 25 Virginia and Maryland Volumes by Period of Day

Virginia					
Permanent			Program		
AM	PM	OFF	AM	PM	OFF
99,928,276	129,082,266	421,908,808	23,281,824	26,122,295	82,544,026
15.4%	19.8%	64.8%	17.6%	19.8%	62.6%
Maryland					
Permanent			Program		
AM	PM	OFF	AM	PM	OFF
108,053,521	133,800,870	431,589,467	33,005,971	41,390,167	124,206,238
16.0%	19.9%	64.1%	16.6%	20.8%	62.5%

Table 26 Overall Volumes by Period of Day

Overall								
Permanent			Program			Total		
AM	PM	OFF	AM	PM	OFF	AM	PM	OFF
207,981,797	262,883,136	853,498,275	56,287,795	67,512,462	206,750,264	264,269,592	330,395,598	1,060,248,539
15.7%	19.8%	64.4%	17.0%	20.4%	62.5%	16.0%	20.0%	64.1%

The data indicate that the AM peak period, PM peak period and off peak period, on average, contribute 16%, 20%, and 64% of the daily volumes, respectively. The percentages of vehicles that are observed during the peak hours are lower than the percentages ascertained from 1994 Household Travel Survey. According to a prior study, the AM peak period, PM peak period and off peak period carry 18%, 27%, and 55% of the daily traffic, respectively. One source of the discrepancy may be the changing travel patterns, where people modify their trip departure times in order to avoid the heavy congestion during the peak hours, resulting in peak spreading.

2.2.3 Seasonal and Weekday Variability

In addition to deriving peak-hour factors, traffic counts can be used in order to assess the seasonal and weekday variability in traffic volumes. This assessment is important in selection of the optimal month and weekday for model calibration, in cases where one is using or is limited to a subset of data.

Similar to the peak-hour analysis, before aggregating the counts, they were first processed to remove weekends, holidays and otherwise inconsistent data (incorrectly coded month or day). In addition, days of counts that are significantly different from the rest should be omitted. Before setting the confidence intervals, the variation in Average Weekday Traffic (AWT) was observed at each station. Figure 5 shows the mean and standard deviation of AWT for each station in Virginia. One station was selected at random to show a more detailed plot of variability (Figure 6).

The counts that fall outside the normal range can be omitted by determining the average and standard deviation for each station and excluding days outside the confidence interval. Since some seasonal variation is observed, a seasonal average and standard deviation, instead of an overall average and standard deviation, were calculated. Then, counts that lie outside of three standard deviations of the seasonal average were eliminated from the dataset. An example of confidence intervals for each season is shown in Figure 6.
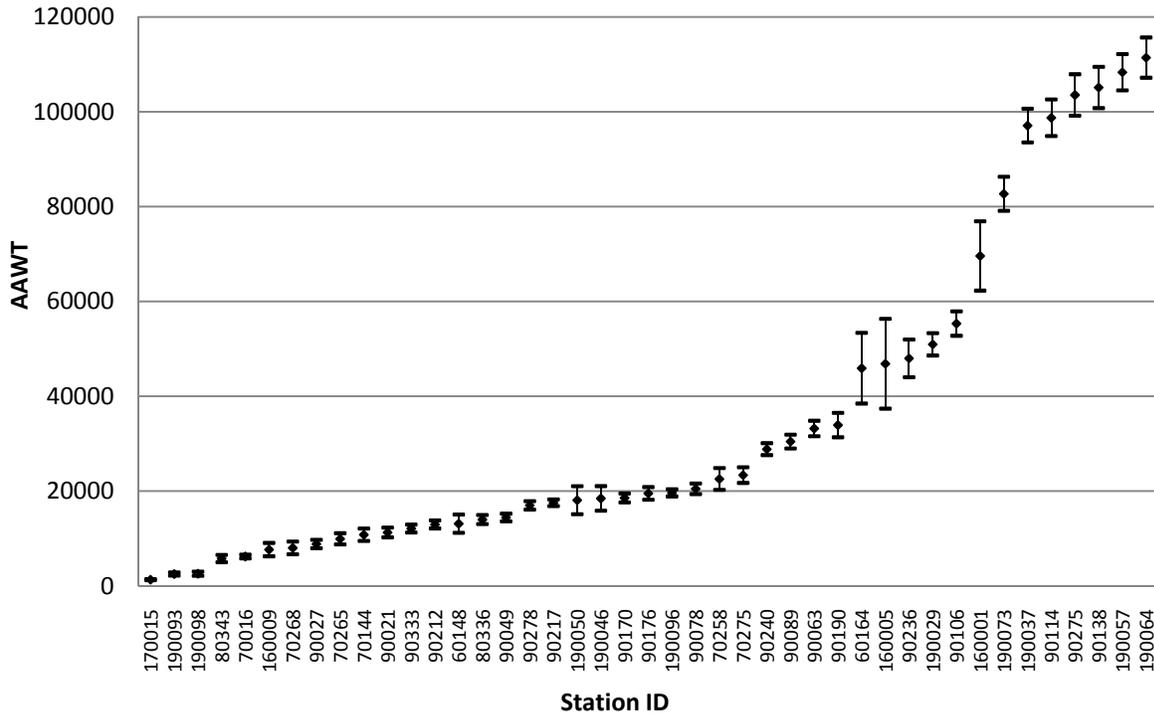
Figure 5 AAWT and Standard Deviation of AAWT for Stations in Virginia for 2007
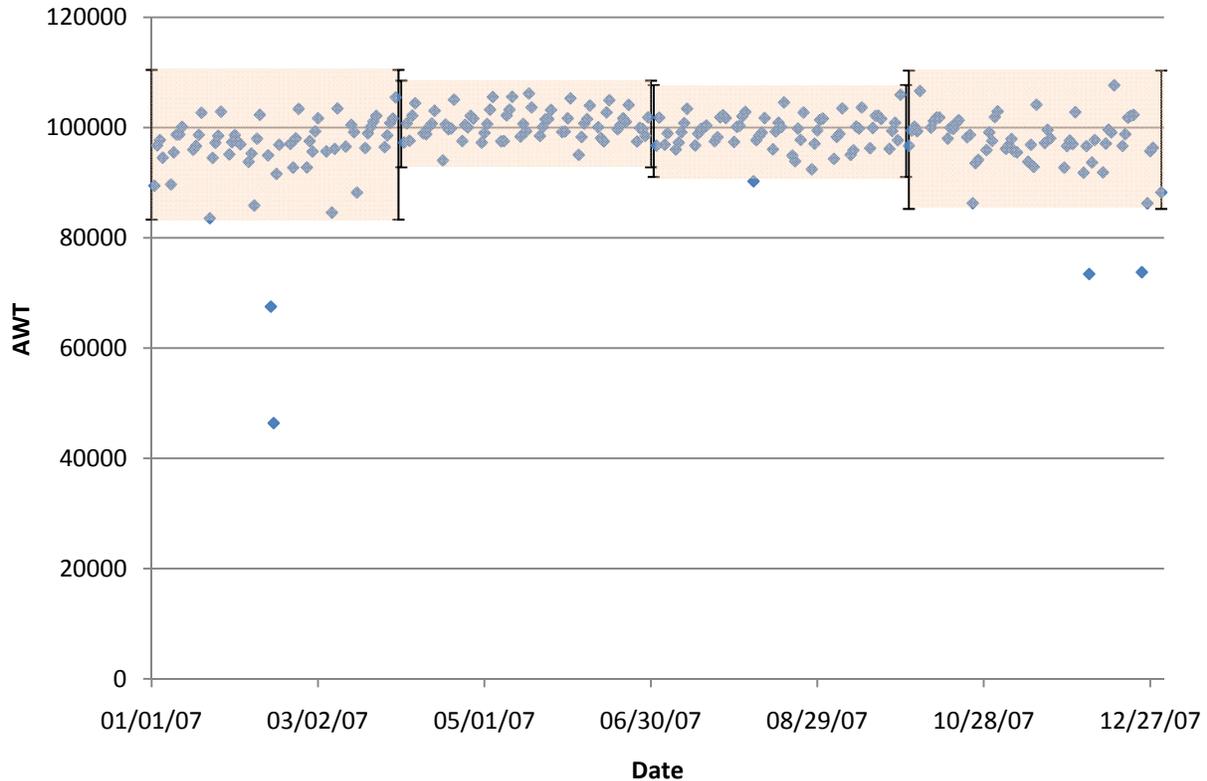
Figure 6 AWT for Station 90114 for 2007

The resulting counts were aggregated by day of the week to observe any weekly trends that occurred. Table 27 shows the ratio of specific weekday AWT to the average weekday AWT for Maryland and Virginia. Figure 7 displays the same information in graphical format. Based on this analysis, Tuesday, Wednesday, and Thursday appear to be the most representative of average weekday conditions, which was our *a priori* expectation. However, the results also indicate that the highest AWT value is seen on Friday. This observation is contrary to the common belief that the peak AWT would be seen in the middle of the week. However, it can be explained by people taking additional leisure trips at the end of the week. This finding is consistent with prior analysis of data from permanent stations completed in May 2005.[18] Another study that supports the observed results was conducted for FHWA.[19] In this study, the researchers determined that the highest volume of cars in urban settings is observed on Fridays. In addition, the City of Calgary Transportation Department has found similar AWT trends based on the analysis of data from permanent count stations.[20]

---

[18] Michael Clifford and Daivamani Sivasailam. "Variation in Average Annual Weekday vs. Average Annual Traffic, and Seasonal Traffic", Memorandum, 2005

[19] FHWA, "Understanding Traffic Variations by Vehicle Classifications", 1998, FHWA-RD-98-117, http://www.tfhrc.gov/pavement/ltpp/pdf/98117.pdf.

[20] City of Calgary Transportation Planning, Mobility Monitor Issue #6, December, 2003, http://www.calgary.ca/docgallery/bu/trans_planning%5Cdata%5C mobility_monitor_archives%5Cmobility_monitor_6.pdf

Table 27 AWT by day of the week

	MD		VA		Total
	AWT	Ratio	AWT	Ratio	Ratio
Monday	51872	0.97	26621	0.96	0.96
Tuesday	52787	0.98	27100	0.98	0.98
Wednesday	53053	0.99	27277	0.99	0.99
Thursday	54125	1.01	27938	1.01	1.01
Friday	56527	1.05	29297	1.06	1.06
Average	53673		27646		
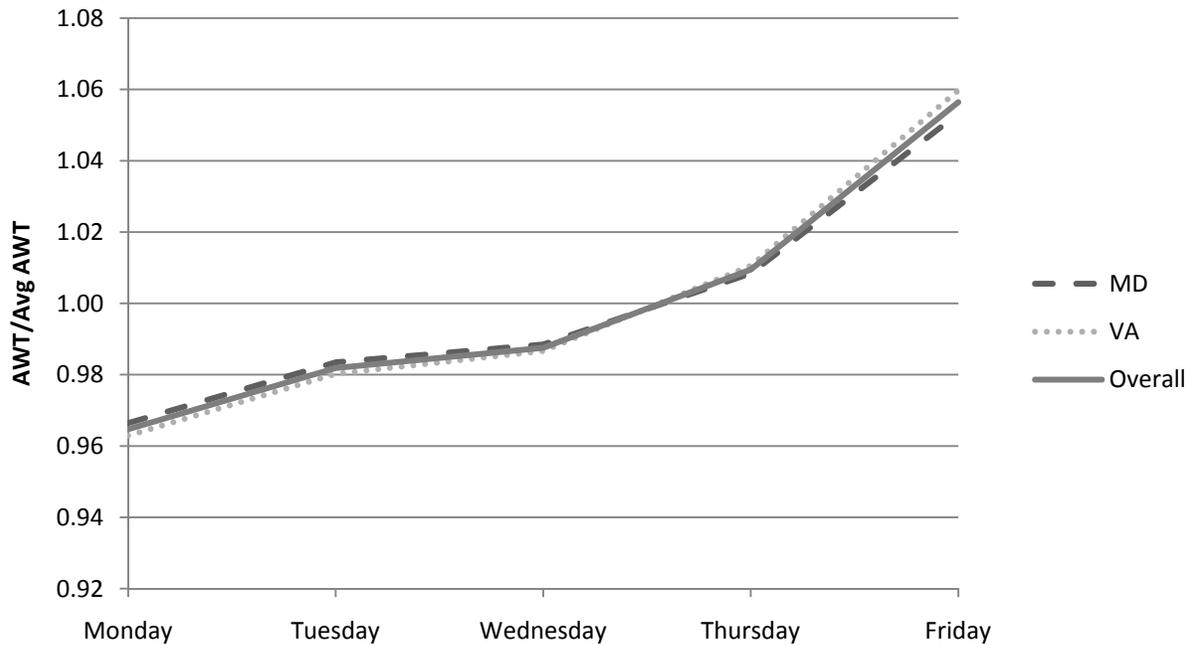
Figure 7 AWT by day of the week

In addition to grouping AWDT data by weekday, it was aggregated by month. Table 28 and Figure 8 describe the monthly trends in the data. The lowest AWT occurs in the winter months of January and February, while the peak AWT is seen in the summer month of June. This can be attributed to more tourists visiting the city during the summer months. This finding is also consistent with findings by City of Calgary Transportation Department. Based on this data, the most representative month of the year is October, which is in agreement with prior study.[21]

---

[21] Michael Clifford and Daivamani Sivasailam, "Variation in Average Annual Weekday vs. Average Annual Traffic, and Seasonal Traffic", Memorandum, 2005.

Table 28 AWT by month

	MD		VA		Overall
	AWDT	Ratio	AWDT	Ratio	Ratio
January	51184	0.95	26221	0.95	0.95
February	51218	0.95	26150	0.95	0.95
March	52895	0.99	27428	0.99	0.99
April	54409	1.01	28114	1.02	1.02
May	55244	1.03	28644	1.04	1.03
June	55497	1.03	28796	1.04	1.04
July	55138	1.03	28276	1.02	1.03
August	55070	1.03	28161	1.02	1.02
September	54502	1.02	27864	1.01	1.01
October	53540	1.00	27623	1.00	1.00
November	53278	0.99	27494	0.99	0.99
December	51934	0.97	26878	0.97	0.97
Average	53659		27638		
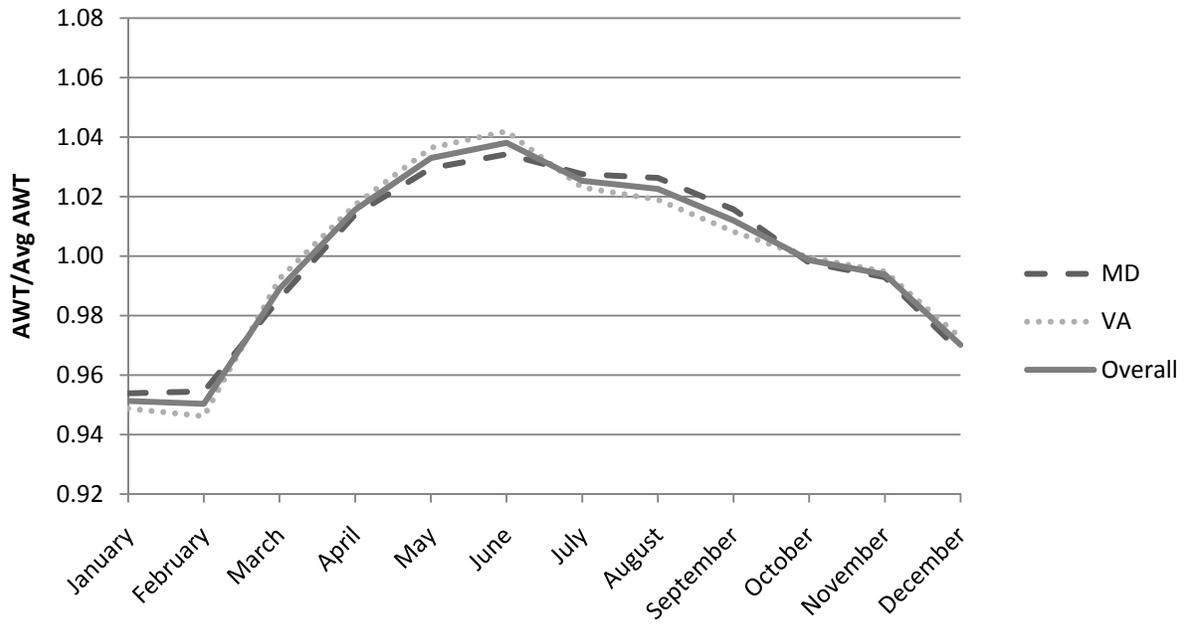
Figure 8 AWT by month

2.3 2007 Air Passenger Survey

The 2007 Air Passenger Survey (APS) was conducted as a part of an ongoing survey program over a period of two weeks in the fall of 2007.[22] The survey covered departing passengers from three airports: Ronald Regan Washington National Airport (DCA), Washington Dulles International Airport (IAD) and Baltimore Washington International Airport (BWI). [23] The survey frame consisted of enplaning passengers on 685 flights, including 607 domestic and 78 international. The destinations were grouped into seven regional clusters containing a total of 114 destinations (32 international and 82 domestic). Out of 55,524 revenue passengers, about 27,300 completed the survey questionnaire representing a 49% response rate. [24] The survey instrument contained questions concerning the flight, the ground trip to the airport, the passenger's choice of airport, and the passenger's socio-economic characteristics.

2.3.1 The use of the airport data for Version 2.3 Travel Model

Airport passenger trips are considered within the category of "special generators" which have special trip making characteristics different from other trips represented in the standard trip production/ attraction models. In the Version 2.3 Model, airport auto driver trips are included within the group of exogenous or "residual" auto driver trip tables. [25] These trip tables are added into the model stream following the mode choice model, and are only considered in the traffic assignment step.

In the APS, the factored number of passengers (for the region and for each airport) is provided in terms of an "annualized", not an average weekday number. For instance, the 2007 weighted survey total is the number of <u>annual </u>passengers departing the three airports during the year 2007. To explain how these annualized trips are converted to standard weekday trips, this section provides several summary tables of observed data prepared in a "top-down" fashion. That is, the first table provides overall control totals of the 2007 APS and each subsequent table provides more detail. Annual total enplanements for the region's three airports are shown in Table 29. Approximately 16 million passengers flew out of the regional airports during 2007. Of these, 72% were local origination passengers arriving by ground transportation while the remaining 28% were passengers from connecting domestic and international flights. As shown in Table 30, the average daily originations are estimated by dividing the absolute numbers in Table 29 by 260. Resident status for local originations in 2007 is shown in Table 31. The table indicates that 53% of the local originations were non-residents of the Washington region while 33% were residents. Ronald Reagan National Airport is shown to have the highest proportion of non-resident travel (62%) while BWI has the highest resident share (54%). Table 32 and Table 33, provide information about ground access modal shares for home-based and non-home-based trips. Finally, in Table 34, a comparison is made between the existing forecast (based on the 2000 APS) and the updated forecast (based on the 2007 APS). The comparison indicates a flat

---

[22] The 2007 Regional Air Passenger Survey was the eighth in a series of regional air passenger surveys conducted since 1981. Prior surveys were conducted in 1981/82, 1987, 1992, 1998, 2000, 2002 and 2005.

[23] MWCOG, *2007 Washington-Baltimore Regional Air Passenger Survey*, September, 2008.

[24] Ibid, page 2.

[25] Other residual vehicle trips include external auto person and trucks, through auto driver and trucks, and miscellaneous auto driver purposes (School, taxi, and visitor/tourist).

growth for BWI and decreased growth rates for DCI and IAD.   This might be attributed to changes in the economy, airline operations and policies, or changes in the FAA forecasting methods.

2.3.2 Summary of Procedures and Conclusions

The airport passenger forecasts are developed as an exogenous input to the TPB travel model. The forecasts are not explicitly modeled as such, but they are continuously updated with the best possible information available. Current and anticipated developments of the airport model include:

- Moving the base year from 2000 to 2007, based on the 2007 APS, which corresponds to the base year of the Version 2.3 Model calibration.
- The use of the forthcoming Round 8.0 Cooperative Forecast.
- Processing of the new airport forecasts on the new 3,722 TAZ system.

The forecast procedure starts by using the 2007 APS to develop a set of one-way base- year auto driver trip tables by purpose. The trips are then factored at the AAZ level using a Fratar-type extrapolation technique. At the airport end, the trips are expanded to the passenger enplanement forecasts specific to each airport.[26] Growth at the non-airport-end is based on the Round 8.0 Cooperative Forecast[27] and differs based on the trip type. Non-home-based travel is expanded to employment growth, while home-based travel is expanded to household growth. The resulting one-way trips are ultimately converted into daily format assuming directional symmetry (implying that, for each trip to the airport, there is a corresponding trip from the airport). Finally, the trip tables are subsequently disaggregated from the AAZ level to the 3,722 TAZ level based on household- and employment– based pro-ration.

Table 29 2007 Weighted Annual Enplanement by Airport (Weekdays Only)

Enplanement Type	B.W.I.	National	Dulles	Total
Local Origination	4,153,000	6,406,000	5,005,000	15,564,000
Column Percent	79%	90%	55%	72%
Domestic+ International Flight Connections	1,106,000	740,000	4,115,000	5,961,000
Column Percent	21%	10%	45%	28%
Total	5,259,000	7,146,000	9,120,000	21,525,000
Total Column Percent	100%	100%	100%	100%

---

[26] Growth at the airport end is based on Maryland Aviation Administration (MAA) and the Metropolitan Washington Airport (MWAA) enplanement forecasts.
[27] The use of Round 8.0 Cooperative Forecast in model calibration is still under evaluation at this time.

Table 30 2007 Weighted Average Daily Originations by Airport (Weekdays Only)

Enplanement Type		B.W.I.	National	Dulles	Total
Local Originations		15,973	24,638	19,250	59,862
	Column Percent	64%	98%	96%	85%
Externals (Outside MWCOG Area)		9,090	437	723	10,250
	Column Percent	36%	2%	4%	15%
Total		25,063	25,075	19,973	70,112
	Total Column Percent	100%	100%	100%	100%

Table 31 2007 Weighted Average Daily of Local Originations by Airport and Residency Status (Weekdays Only)

Local Originations by Resident/Non-Resident		B.W.I.	National	Dulles	Total
Resident		8,551	9,474	10,262	28,287
	Column Percent	54%	38%	53%	47%
Non-Resident		7,423	15,149	8,965	31,537
	Column Percent	46%	62%	47%	53%
Total		15,974	24,623	19,227	59,824
	Total Column Percent	100%	100%	100%	100%

Table 32 2007 Weighted Average Home-Based Daily Originations by Airport (Weekdays Only)

Home Based	B.W.I.	National	Dulles	Total
Auto Driver	5,752	5,927	7,021	18,700
Auto Passenger	4,134	2,878	4,469	11,481
Transit	281	1,685	77	2,043
Airport Transit	689	250	565	1,504
Other Modes	15	33	9	57
Total	10,871	10,773	12,141	33,785

Table 33 2007 Weighted Average Non-Home-Based Daily Originations by Airport (Weekdays Only)

Non-Home Based	B.W.I.	National	Dulles	Total
Auto Driver	2,225	5,894	3,621	11,740
Auto Passenger	1,230	3,110	1,935	6,275
Transit	280	2,229	71	2,580
Airport Transit	1,369	2,606	1,462	5,437
Other Modes	6	28	14	48
Total	5,110	13,867	7,103	26,080

Table 34 Total Weekday Auto driver to/from Airports: Existing vs. Updated Forecast

Airport	Existing Forecasts Based on 2000 AP Survey			Updated Forecasts Based on 2007 AP Survey		
	2007	2030	Ratio ('30/07')	2007	2030	Ratio ('30/07')
BWI	18,559	33,905	1.83	15,954	29,160	1.83
DCI	17,687	23,086	1.31	23,642	28,004	1.18
IAD	20,181	52,958	2.62	21,284	54,282	2.55
Total	56,427	109,949	1.95	60,880	111,446	1.83

These are two-way auto driver trips to/from the airports including both HB & NHB

2.4 2007/2008 Household Travel Survey

2.4.1 Overview of Survey Files

The 2007/08 Household Travel Survey (HTS) is a one-day activity and travel survey conducted during a period of 15 months, from February 5, 2007 to May 12, 2008. The sample design is a stratified random sample drawn from an address-based frame. The stratification is done across jurisdictions, activity centers and area types.[28] The sample frame consists of the current list of all deliverable residential postal addresses (city and rural routes) within the TPB modeled area.

The survey data was delivered in four files as follows:

File	Un-Weighted Records	Weighted Records
• Household	11,436	2,339,595
• Trip	87,926	20,306,341
• Person	25,179	5,861,992
• Vehicle	20,177	4,418,160

Calibration of the Version 2.3 travel demand model requires information about household characteristics, such as household size and income, contained in the household file as well as trip characteristics, such as number of trips, and trip purpose, contained in the trip file. Thus, the trip and household files needed to be merged. When merging the two files, it should be noted that the household file contains 699 more household records than the trip file because the former file includes information about all households, irrespective of whether they made a trip on the assigned survey day. The trip file, however, does not include any records for households that did not make a trip. As shown in Table 35, the merged file includes 699 records with zero trip weight.

As shown in Table 35, the initial check of the household file revealed that there are 337 households, representing 65,510 weighted households that were surveyed during federal holidays. These records were excluded from the model calibration files because trips on holidays and weekends are not

---

[28] The 2000 CTPP was used to classify zones into low and high mixed use density areas, based on commuters' modal shares and the rate of non-single occupant vehicles.

modeled. Adjustment factors were applied to the expansion factors of both household and trip records. The adjustment factors are used to eliminate the impact of deleting the records corresponding to federal holidays while maintaining the original control totals of weighted households and trips. This was done by setting the trip expansion factors to zero for all (337) holiday records and by applying a compensating upward adjustment to the other survey records. As shown in Table 35, the deleted records (337 households and 2,071 trips) amounts to 65,510 weighted households and 441,969 weighted trip records. The refactoring of the survey was applied by survey stratum (defined in Table 51, p. 58) for both the household and the trip files. [29] More details about this issue are discussed in section 2.4.4.

Table 35 2007 HTS Weighted/Un-Weighted Records – Federal Holidays & No Trip made on Survey day

Household File	**UN-Weighted Households**			**Weighted Households**		
	Made Trip	Made No Trip	Total	Made Trip	Made No Trip	Total
Surveyed on Federal Holidays	282	55	337	55,751	9,760	65,510
Surveyed on Other Days	10,455	644	11,099	2,168,797	105,288	2,274,085
Total	10,737	699	11,436	2,224,548	115,048	2,339,595

Merged Household & Trip File	**UN-Weighted Trip Records**			**Weighted Trip Records**		
	Made Trip	Made No Trip	Total	Made Trip	Made No Trip	Total
Surveyed on Federal Holidays	2,016	55	2,071	441,969	0	441,969
Surveyed on Other Days	85,910	644	86,554	19,864,373	0	19,864,373
Total	87,926	699	88,625	20,306,342	0	20,306,341

2.4.2 Relationship of Purposes and Activities

A typical four-step travel demand model estimates linked trips by trip purpose. A linked trip is one where all the intermediate transfers between the final origin and destination are combined into a single record. For example, a set of unlinked trips that includes a walk from the person's home to the Metrorail station, a Metrorail ride, and a walk to the person's work would be combined into a single trip record where the origin is home and destination is work. Trip purposes used in the model are related to the activity performed and typically include Home-Based Work (HBW), Home-Based Shop (HBS), Home-Based Other, Non-Home-Based (NHB), as well as others.

Unfortunately, the data used to estimate the various components of a travel demand model is obtained from household travel surveys, such as one that was conducted by MWCOG/TPB in 2007/2008. Travel

---

[29] In one of the 50 survey strata, there was only one household that had been surveyed during a federal holiday. To maintain the original control totals, the trip weight for this one stratum (312.45) was redistributed among other strata according to their relative weight.

information derived from the survey is in unlinked format and does not directly include the trip purposes used in the travel demand model. The process of linking trips based on the HTS travel diary will be discussed in detail in the forthcoming final HTS documentation. Trip purposes used in the model are derived from the respondent's activity at the origin or destination place and the type of place. In the 2007/2008 HTS the types of origin or destination place included [30]:

- My Home
- My Primary Workplace
- My School
- Bus Stop/ Train Station or Car/ Vanpool Meeting Place

The possible activities at the origin and destination included:

- Sleep/ Rest
- Eat/ Prepare a meal at home
- Eat a meal at work
- Eat a meal outside home or work
- Care for children
- Change mode of transportation
- Pick up/ Drop off someone or something
- Work (Regular Place)
- Work at home or telecommute
- Work at other location
- Work related
- Education/ School-related activity
- Study/ Do homework
- Childcare/ Preschool
- Shop in store
- Shop by phone/ Internet/ TV
- Quick stop/ Drive thru
- Personal business at establishment
- Personal business by phone/ Internet
- Visit/ Socialize
- Entertainment
- Recreation/ Exercise
- Civic or religious activity
- Mail package or letter or other postal
- Other household activity
- Other

---

[30] NuStats, *2007/2008 COG/TPB Household Travel Survey: Draft Report of Methods*, July 15, 2008.

Before summarizing activities and types of places into the general trip purposes used in the model, they combined into detailed purposes, which include:

- Home
- Work
- Shop
- Daycare
- School
- Other
- Drop Off/Pick Up Someone
- Parking Point
- Inter-City Rail Terminal
- Inter-City Bus Terminal
- Airport
- Gas Station
- External Point

The details regarding the derivation of the detailed purposes are provided in the final HTS documentation.

The next step involves combining the detailed purposes into general purposes used for model calibration. In Version 2.3 of the travel demand model, the general purposes include Home-Based Work (HBW), Home-Based Shop (HBS), Home-Based Other (HBO), Non-Home-Based Work (NHW), and Non-Home-Based Other (NHO). The mapping of the detailed purposes to the 5 general purposes in shown in Table 36.

Table 36 Mapping of 2007/2008 HTS Detailed Purpose to General Purpose

FROM PURPOSE	TO PURPOSE										
	Home	Work	Shop	Daycare	School	Other	Drop Off/Pick-up	Parking Point	Inter-City Rail Terminal	Inter-City Bus Terminal	Airport
01 Home		HBW	HBS	HBO							
02 Work	HBW		NHW								
04 Shop	HBS	NHW	NHO								
07 Daycare	HBO										
08 School											
09 Other											
11 Drop Off/Pick-up											
13 Parking Point											
16 Inter-City Rail Terminal											
17 Inter-City Bus Terminal											
18 Airport											

Purposes: HBW= Home-Based Work
          HBS= Home-Based Shop
          HBO= Home-Based Other
          NHW= Non-Home Based Work
          NHO= Non-Home-Based Other
Source: 2007/2008 HTS Survey

2.4.3 Logic Checking of Survey Files

Prior to using the Household Travel Survey to calibrate the Version 2.3 model, the finalized files were checked for logic, consistency, and analysis errors. The checks described in sections 2.4.3.1 through 2.4.3.3 were performed based on the HTS household, person, trip, and vehicle files.

2.4.3.1 Logic Checks

The first set of checks tests whether the survey results are logical. The first three checks are based on the household file, while the last two use the person and trip files. This set of checks ensures that:

- Number of students per household does not exceed the household size
- Number of licensed drivers per household does not exceed the household size
- Number of vehicles relative to the household size is reasonable
- Non-employed persons are not making work trips
- No children (persons under the age of 16) are employed

The values in these tables are unweighted records (e.g., households, trips).
Table 37 indicates that the number of students per household is always the same or smaller than the number of persons per household as anticipated (Cells highlighted in yellow indicate cells that would correspond to inconsistencies). The term "student" includes college students and adults, so there is no problem with cells where the number of students is equal to the number of persons in the household.

Table 38 shows that the number of licensed drivers per household never exceeds the number of persons in the household. From Table 39, it is evident that the majority of the households own fewer than 3 cars (81% or 9,279 out of 11,436). Only a few households (1.5%) own more than 4 cars.

Table 37 Household Size vs. Number of Students

	HHSTU							
HHSIZ	0	1	2	3	4	5	6	Total
1	3548	233	0	0	0	0	0	3781
2	3587	563	83	0	0	0	0	4233
3	520	815	199	20	0	0	0	1554
4	144	236	765	111	7	0	0	1263
5	33	60	111	226	26	5	0	461
6	4	10	18	32	37	6	0	107
7	0	2	1	2	7	12	1	25
8	1	0	1	1	4	0	5	12
Total	7837	1919	1178	392	81	23	6	11436

Table 38 Household Size vs. Number of Licensed Drivers

	HHLIC							
HHSIZ	0	1	2	3	4	5	6	Total
1	292	3489	0	0	0	0	0	3781
2	70	475	3688	0	0	0	0	4233
3	20	162	921	451	0	0	0	1554
4	12	66	868	214	103	0	0	1263
5	4	9	307	89	38	14	0	461
6	2	4	65	19	12	4	1	107
7	0	0	11	7	4	3	0	25
8	1	0	6	2	3	0	0	12
Total	401	4205	5866	782	160	21	1	11436

Table 39 Household Size vs. Number of Vehicles

					HHVEH							
HHSIZ	0	1	2	3	4	5	6	7	8	9	10	Total
1	599	2668	416	82	10	3	1	0	2	0	0	3781
2	172	950	2324	578	153	39	12	3	1	1	0	4233
3	29	274	671	436	98	35	10	0	1	0	0	1554
4	17	148	646	296	116	26	8	3	1	1	1	1263
5	6	30	248	102	55	14	5	1	0	0	0	461
6	4	9	52	26	12	3	0	1	0	0	0	107
7	0	1	9	6	6	2	0	1	0	0	0	25
8	1	0	5	5	0	1	0	0	0	0	0	12
Total	828	4080	4371	1531	450	123	36	9	5	2	1	11436

Table 40 contains a cross-classification between the trip destination purpose and the person's work status. It is evident from the table that most work trips are conducted by employed people. However, there are instances where an unemployed person made a work trip (shown in yellow on the table). It is possible that the respondent stated the purpose as going to work when they were going to an interview or when they had not left their last place of work yet, but were going to do so soon. These cases could also be response and coding errors. Note that the cell at the intersection of the "sleep/rest" row and the "Employed" column (18,274 trips) does not necessarily mean that people were sleeping on the job. It means that there were 18,274 trips made by employed persons where the destination purpose was "sleep/rest" (probably occurring at their home). The last table for logic checks, Table 41, verifies that no children under the age of 16 were employed. This table also shows us that there are people over the age of 65 who are still working (WKSTAT = Employed), which makes sense. It also shows that there are two people aged 25-34 who are "retired". This is possibly a data coding error. By contrast, since a person in the military can retire at age 38, the 6 observations in the group of retired, aged 35-44 is plausible.

Table 40 Destination Purpose vs. Work Status

WKSTAT

DPURP	NA	Employed	Retired	Disabled	Homemaker	Unemployed, looking for a job	Unemployed, not looking for a job	Student	Total
SLEEP/REST	5386	18274	4345	334	1637	364	99	1017	31456
EAT A MEAL AT HOME	6	13459	100	8	22	3	0	7	13605
EAT A MEAL OUTSIDE HOME	1654	8800	3413	221	1013	247	55	317	15720
PICK UP/DROP OFF	810	618	16	1	92	7	0	4	1548
LOOP TRIP	2262	365	20	6	6	5	1	581	3246
WORK (REGULAR PLACE)	2904	10190	4313	328	1186	366	109	530	19926
WORK AT OTHER LOCATION	194	768	131	9	304	27	3	24	1460
EDUCATION/ SCHOOL	55	500	76	0	12	4	2	13	662
SHOP IN STORE	1	16	0	0	1	0	0	2	20
SHOP BY PHONE/INTERNET	0	3	2	0	0	0	0	0	5
QUICK STOP/DRIVE THRU	11	113	20	1	6	1	1	1	154
OTHER HOUSEHOLD ACTIVITY	7	33	7	1	4	3	0	3	58
OTHER	11	33	17	0	3	0	0	2	66
Total	13301	53172	12460	909	4286	1027	270	2501	87926

Table 41 Work Status vs. Age Group

WKSTAT	0-4	5-15	16-18	19-24	25-34	35-44	45-54	55-64	65-74	75+	Grand Total
NA	1447	3135	0	0	0	0	0	0	0	0	4582
Employed	0	0	210	673	2442	3190	3759	2902	572	99	13847
Retired	0	0	0	0	2	6	98	946	1510	1386	3948
Disabled	0	0	1	17	28	48	144	118	33	37	426
Homemaker	0	0	0	28	214	341	243	163	68	54	1111
Unemployed, looking for a job	0	0	15	59	60	72	78	42	12	2	340
Unemployed, not looking for a job	0	0	8	10	8	21	18	22	3	4	94
Student	0	0	577	158	68	13	11	3	1	0	831
Total	1447	3135	811	945	2822	3691	4351	4196	2199	1582	25179

AGEG

2.4.3.2 Consistency Checks

The second set of checks performed on the 2007 HTS tests the consistency between the household, trip, person, and vehicle files. There were a set of eights checks that were conducted that ensured:

- Household IDs in the household file are consistent with household IDs in the person file
- Household IDs in the household file are consistent with household IDs in the vehicle file
- Household IDs in the household file are consistent with household IDs in the trip file
- Person IDs in the person file are consistent with person IDs in the trip file
- Number of persons per household is the same for the household and person files
- Number of vehicles per household is the same for the household and vehicle files
- Number of licensed drivers per household is the same for the household and person files
- Number of workers per household is the same for the household and person files

None of these checks yielded any errors and thus the HTS files appear to be consistent.

2.4.3.3 Analysis Checks

The last set of checks performed on the 2007 HTS tests whether the results are reasonable by looking at households and persons that do not travel. These households and persons should be uncommon and it is important to check if there are reporting errors that have resulted in these households and persons producing no trips. For households that make no trips, the following are examined:
- Number of vehicles per household versus the number of employed persons per household
- Household income versus presence of a person with a disability in the household
- Household size versus number of persons in the household in possession of a driver's license

There were a total of 699 households out of 11,436 that made no trips, which is about 6% of households. Each household was assigned a travel day for recording trips. Weekends were not included as available travel days – only weekdays – but the travel day could have been a holiday occurring on a weekday. A person might be less likely to travel on a holiday. The files analyzed in this memo include holidays on weekdays. Work has been done to remove federal holidays from the survey files, but that work is not included in this assessment. Table 42 indicates that, for households that did not travel, there are few employed persons and few household vehicles. This is an intuitive finding because these people may have fewer reasons to travel and have more limitations on traveling due to the unavailability of a car. Table 43 shows that 40% (= 281/699) of these no-travel households have a person with a disability, which is likely a higher share than the population at large. In addition, Table 43 indicates that these no-travel households tend to skew toward the lower income categories. Lastly, Table 44 shows that households that do not travel are typically smaller in size and have fewer licensed drivers (larger households tend to travel more).

Table 42 Households with No Trips- Household Vehicles vs. Household Workers

HHVEH	HHWRK 0	1	2	3	Total
0	125	10	2	0	137
1	250	68	3	0	321
2	93	56	31	0	180
3	17	15	14	2	48
4	2	3	5	0	10
5	0	0	1	0	1
6	1	0	1	0	2
Total	488	152	57	2	699

Table 43 Households with No Trips- Household Income vs. Personal Disability

HHINC	HHDIS YES	NO	Total
Less than $10,000	33	24	57
$10,000 - $14,999	40	14	54
$15,000 - $29,999	52	53	105
$30,000 - $39,999	41	43	84
$40,000 - $49,999	34	38	72
$50,000 - $59,999	21	50	71
$60,000 - $74,999	17	39	56
$75,000 - $99,999	17	45	62
$100,000 - $124,999	11	50	61
$125,000 - $149,999	5	25	30
$150,000 - $199,999	4	24	28
$200,000 or more	6	13	19
Total	281	418	699

Table 44 Households with No Trips- Household Size by Household Licensed Drivers

HHSIZ	HHLIC 0	1	2	3	4	Total
1	84	339	0	0	0	423
2	8	36	165	0	0	209
3	2	3	19	16	0	40
4	0	5	11	3	1	20
5	0	0	4	1	0	5
6	0	1	1	0	0	2
Total	94	384	200	20	1	699

There were 3,163 persons out of 25,179 (about 13%) who made no trips during the survey day. For persons who made no trips, two summaries were produced:
- Person's work status versus whether the person possesses a driver's license
- Person's disability versus the person's age

Table 45 indicates that persons who made no trips are likely to be retired and many of them do not have driver's licenses. Table 46 shows the prevalence of personal disability (PEDIS) among different age groups for persons who did not travel. It is difficult to draw conclusions from this table, so Table 47 is provided to enable comparison between the likelihood of not making any trips for persons of different ages. It is evident from this table that young children (under the age of 4) and older adults (over the age of 65) are more likely not to make any trips. Table 48 allows one to assess the likelihood of a person making no trips depending on his or her disability status. From this table it is evident that persons with disabilities are more likely to make no trips. Both of these findings follow expectations.

Table 45 Persons with No Trips- Work Status vs. Licensed Drivers

	LIC			
WKSTAT	N/A	YES	NO	Total
Employed	0	784	48	832
Retired	0	838	235	1073
Disabled	0	100	76	176
Homemaker	0	203	61	264
Unemployed, looking for a job	0	78	29	107
Unemployed, not looking for a job	0	26	9	35
Student	0	63	54	117
N/A	559	0	0	559
Total	559	2092	512	3163

Table 46 Persons with No Trips- Personal Disability vs. Age Group

	AGEG									
PEDIS	0-4	5-15	16-18	19-24	25-34	35-44	45-54	55-64	65-75	75+	Total
YES	0	0	7	20	16	29	80	134	166	354	806
NO	0	0	92	94	207	241	309	368	282	181	1774
Not Reported	0	0	0	4	1	5	6	4	3	1	24
NA	282	277	0	0	0	0	0	0	0	0	559
Total	282	277	99	118	224	275	395	506	451	536	3163

Table 47 Probability of No Trips by Age Group

Age Group	0-4	5-15	16-18	19-24	25-34	35-44	45-54	55-64	65-74	75+	Total
Persons Surveyed	282	277	99	118	224	275	395	506	451	536	3163
Persons with No Trips	1447	3135	811	945	2822	3691	4351	4196	2199	1582	25179
% Persons with No Trips	19%	9%	12%	12%	8%	7%	9%	12%	21%	34%	13%

Table 48 Probability of No Trips by Personal Disability

PEDIS	Persons with No Trips	Persons Surveyed	% of Persons with No Trips
Yes	806	2254	36%
No	1774	18218	10%
NA	24	125	19%
Not Reported	559	4582	12%
Total	3163	25179	13%

2.4.4 Development of Calibration Files

TPB staff began constructing calibration files supporting the Version 2.3 model after quality control and logic checking activities on the HTS household-level and trip-level files were completed. The calibration files will be used to statistically estimate basic coefficients and parameters used throughout the Version 2.3 modeling process. The last such estimation work was undertaken by TPB staff over ten years ago, using the 1994 Household Travel Survey. Estimation work using 2007/08 HTS is important not only because it is more recent, but also because the 2007/08 HTS survey area comprised the entire (22-jurisdiction) modeled study area. The 1994 survey focused on only 13 of the region's "core" jurisdictions.

This section describes the process undertaken to formulate calibration files, which will be used to estimate demographic and trip generation submodels. It also includes basic household and trip summaries of for the modeled area. The calibration files do not include network impedances as the 3,722 TAZ-based network building and skimming procedures were not yet fully completed by the end of FY-2010. The files were formulated using the most recent HTS-based household-level and trip-level files released on 3/26/10. Table 49 details the calibration files developed, a description of the file, and the name of the associated model step. The files were developed using a series of Cube Voyager processing steps which are detailed on flowcharts included in Appendix G of this report and are described below.

Table 49 Listing of Version 2.3 Estimation Files Prepared

Filename	Description	Model Step Addressed
HTS0708_HH_NoHol.dbf	Household survey level file with adjusted weighting factor (ffactor)	(source household level file)
Trip_Production_Calib.dbf	Household level attributes joined with trip productions by purpose	Trip production model estimation
HTS200708Trips.dbf	Linked O-D survey trip level file with adjusted weights (ffactor)	(source trip level file)
HTS200708PATrips.dbf	Linked survey trip level file with standard purpose/mode codes defined	
HTS_PsnNmtr_Ps_00mi.dbf	Zonal Person and Nonmotorized Trip Productions	Non-motorized production model estimation
HTS_PsnNmtr_Ps_05mi.dbf	Zonal Person and Nonmotorized Trip Productions w/in 0.5 miles	
HTS_PsnNmtr_Ps_10mi.dbf	Zonal Person and Nonmotorized Trip Productions w/in 1.0 miles	
HTS_PsnNmtr_Ps_15mi.dbf	Zonal Person and Nonmotorized Trip Productions w/in 1.5 miles	
HTS_PsnNmtr_As_00mi.dbf	Zonal Person and Nonmotorized Trip Attractions	Non-motorized attraction model estimation
HTS_PsnNmtr_As_05mi.dbf	Zonal Person and Nonmotorized Trip Attractions w/in 0.5 miles	
HTS_PsnNmtr_As_10mi.dbf	Zonal Person and Nonmotorized Trip Attractions w/in 1.0 miles	
HTS_PsnNmtr_As_15mi.dbf	Zonal Person and Nonmotorized Trip Attractions w/in 1.5 miles	
HTS_HBW_II_PsByIncMode3722.dbf	Zonal HBW Productions by Income, Mode	Trip production model aggregate validation
HTS_HBS_II_PsByIncMode3722.dbf	Zonal HBS Productions by Income, Mode	
HTS_HBO_II_PsByIncMode3722.dbf	Zonal HBO Productions by Income, Mode	
HTS_NHW_II_PsByIncMode3722.dbf	Zonal NHW Productions by Income, Mode	
HTS_NHO_II_PsByIncMode3722.dbf	Zonal NHO Productions by Income, Mode	
HTS_HBW_II_AsByIncMode3722.dbf	Zonal HBW Attractions by Income, Mode	Trip attraction model estimation
HTS_HBS_II_AsByIncMode3722.dbf	Zonal HBS Attractions by Income, Mode	
HTS_HBO_II_AsByIncMode3722.dbf	Zonal HBO Attractions by Income, Mode	
HTS_NHW_II_AsByIncMode3722.dbf	Zonal NHW Attractions by Income, Mode	
HTS_NHO_II_AsByIncMode3722.dbf	Zonal NHO Attractions by Income, Mode	
II_IX_Productions_File.dbf	Zonal Trip productions by purpose, mode, & distance to nearest extl.	External trip estimation estimation
GIS_Float_00mi.dbf	Zonal GIS-developed bike/ped. variables	Non-motorized prod./attr. model estimation
GIS_Float_05mi.dbf	Zonal GIS-developed bike/ped. Variables w/in 0.5 miles	
GIS_Float_10mi.dbf	Zonal GIS-developed bike/ped. Variables w/in 1.0 miles	
GIS_Float_15mi.dbf	Zonal GIS-developed bike/ped. Variables w/in 1.5 miles	
Zone.dbf	Standard 'Pseudo' 3722 zone 2007 land activity file	Trip attraction, nonmotorized estimation models
TAZ_2007AreaType_CalibFile.dbf	Zone file containing area type codes, per the Version 2.3 model	Trip attraction, nonmotorized estimation models

The 2007/08 HTS data collection effort occurred over a 15 month period, from February 2007 to May 2008. Households were recruited on a rotating basis during the period and asked to report their travel activity on a predetermined weekday from 3:00 AM to 2:59 AM on the following day. This type of collection effort is unlike typical household travel surveys where travel data is collected over a one- to two-week period during mid-spring or mid-fall, when average weekday travel conditions are assumed to be most representative. A review of the HTS indicated that some of the surveyed households were asked to report on their travel during federal holidays. This presented a problem for the purposes of model development in that holiday travel is not representative of average weekday conditions. Staff addressed the problem by removing all household and travel data that was reported on holidays. Subsequently, the expansion weights of the remaining household and trip records were adjusted to preserve the original expanded control totals. While the decision to remove survey data has the negative impact of reducing the overall sample size of the survey, staff deemed the benefits of removing unrepresentative travel data from the calibration files outweighed the costs of a slightly reduced household sample. A list of federal holidays occurring during the HTS period is shown in Table 50.

Table 50 Federal Holidays Occurring During the 2007/08 HTS Data Collection Period

Holiday	Date
Washington's Birthday	Monday, February 19, 2007
Memorial Day	Monday, May 28, 2007
Independence Day	Wednesday, July 4, 2007
Labor Day	Monday, September 3, 2007
Columbus Day	Monday, October 8, 2007
Veterans Day	Monday, November 12, 2007
Thanksgiving Day	Thursday, November 22, 2007
Christmas Day	Tuesday, December 25, 2007
New Year's Day	Tuesday, January 1, 2008
Martin Luther King's Birthday	Monday, January 21, 2008
Washington's Birthday	Monday, February 18, 2008
Memorial Day	Monday, May 26, 2008

The program *Remove_holidays.s* was used to read the HTS household-level file and to remove household records associated with any of the federal holidays listed above. A summary of the weighted and unweighted households reporting on holidays, by stratum, is shown in Table 51. The table indicates that 337 households out of a total household sample of 11,436 traveled on holidays, about 3% of the households. The program also addressed the adjustment of expansion factors so that the remaining household records would reasonably match the expanded control totals established in the original HTS file. The expansion variable in the household file that was adjusted is named "factor" and is based on a geographic indicator (stratum) which is the basis of the HTS's cluster sampling scheme. Another program, *tripSum_1a.s,* was next applied to remove all trip records associated with those households reporting on holidays, and to apply the updated expansion factors developed for the household file (the expansion factor used in the trip files is also named "factor"). The regional household and trip file totals, both before and after the file manipulations, are shown on Table 52.

Table 51 HTS Weighted/ Unweighted Households Reporting on Federal Holidays by Stratum

Stratum Code	Stratum Location	All HTS Household Records		Holiday-Related HTS Records	
		Record Count	Weighted HHs	Record Count	Weighted HHs
1	District of Columbia	1,658	252,124	34	4,952
2	Montgomery County - Out	508	168,779	8	2,204
3	Montgomery County - In	1,077	171,703	27	4,059
4	Prince George's County - Out	417	120,187	15	4,717
5	Prince George's County - In	1,065	175,431	39	5,838
6	Arlington County	532	76,432	11	1,350
7	Alexandria City	414	62,004	9	1,293
8	Fairfax County/Cities - Out	739	246,109	18	5,475
9	Fairfax County/Cities - In	788	133,772	17	2,578
10	Loudoun County - Out	329	85,513	11	3,138
11	Loudoun County - In	54	6,840	0	0
12	Prince William County/Cities - Out	341	113,235	9	3,346
13	Prince William County/Cities - In	167	25,854	10	1,542
14	Frederick County/City - Out	222	55,980	3	588
15	Frederick County/City - In	146	28,238	7	1,081
16	Howard County	540	99,519	21	3,883
17	Anne Arundel County - Out	598	173,136	29	8,210
18	Anne Arundel County - In	166	17,665	9	1,016
19	Charles County - Out	182	41,057	6	1,187
20	Charles County - In	49	8,566	2	463
21	Carroll County	412	59,241	24	2,887
22	Calvert County	104	29,255	2	497
23	St Mary's County	109	37,002	2	530
24	King George County	56	8,228	0	0
25	Fredericksburg City	46	9,028	1	290
26	Stafford County	160	39,398	9	1,787
27	Spotsylvania County	85	33,420	3	1,188
28	Faquier County	86	22,936	1	166
29	Clarke County	53	4,894	0	0
30	Jefferson County	113	18,693	2	389
31	Baltimore County	1	312	1	312
32	Baltimore City	0	0	0	0
33	Harford County	0	0	0	0
40	Arl+ - Columbia Pike	152	10,531	5	310
41	Arl+ - Rosslyn-Ballston	50	2,963	0	0
42	Arl+ - Shirlington	15	1,274	1	98
50	Other	2	277	1	139
Total:		11,436	2,339,595	337	65,510

Table 52 Household and Trip File Totals – Before & After Holiday-Related Records Removed

		Unweighted Observations	Weighted Observations
HHs	Initial File	11,436	2,339,595
	Final/ Adjusted File	11,099	2,339,281
Trips	Initial File	87,926	20,306,341
	Final/ Adjusted File	85,910	20,434,922

The table indicates that about 2% of the trips in the files were removed from the HTS trip file. A program named *HH_File_Summaries.s* was next used to cross-tabulate the adjusted household file by dimensions that will be used by the Version 2.3 model, the household size, vehicles available, and income groupings. The summary is shown in Table 53.

The adjusted trip file was read into a program named *Set_Purposes_Modes_Types.s*, which served to further process the HTS trip file to facilitate Version 2.3 development work, more specifically to:

1) establish standard five trip purpose codes as defined by the Version 2.3 model;
2) establish standard primary mode codes;
3) establish standard "trip movement type" codes indicating II, IX, XI, external movements, with respect to the modeled area;
4) define production and attraction TAZs on each record, and write out interchange records for subsequent trip table building; and
5) generate control total summaries

Table 54 shows a summary of weighted and unweighted trips by purpose and mode. The table reflects all trip records in the survey, including 1) trips with one or both ends outside of the modeled region and 2) trips of involving modeled and non-modeled modes. (An example of a non-modeled mode is "School Bus"). The shaded area of the table indicates trip records associated with modeled modes.   A summary of weighted trips by movement type and mode are shown on Table 55. The table accounts for the modeled modes only.   Staff did take notice of the existence of external (I-X and X-I) walking trips which is unusual on its face.

The key output files produced by the *Set_Purposes_Modes_Types.s* program include HTS200708PATrips.dbf, which contained all survey records with standard mode and purpose codes attached, as well as several interchange files (in text format) to be used for later trip table building and for county-level summary development. Specific interchange files where developed by movement (I-I and I-I, I-X) and by TAZ system (2,191 and 3,722).

Table 53 2007/08 HTS TPB Modeled Area Households by Size, Vehicles Available, and Income

HHs by Size and Vehicles Available					
	0_Veh_HH	1_Veh_HH	2_Veh_HH	3+Veh_HH	Sum
HH_Size1	95,464	467,178	78,828	19,422	660,893
HH_Size2	24,862	151,305	402,253	139,383	717,802
HH_Size3	6,931	63,791	165,876	145,973	382,571
HH_Size4+	8,905	52,751	300,413	215,946	578,015
Sum:	136,162	735,026	947,370	520,725	2,339,281
HHs by Size and Income Level					
	$ 0 - 49.999K	$50-99.999K	$100-149.999K	$ 150K+	Sum
HH_Size1	264,285	270,345	98,237	28,026	660,893
HH_Size2	126,264	235,381	216,585	139,572	717,802
HH_Size3	49,813	130,006	130,120	72,631	382,571
HH_Size4+	67,133	175,311	221,684	113,887	578,015
Sum:	507,496	811,043	666,627	354,116	2,339,281
HHs by Vehicles Available and Income Level					
	$ 0 - 49.999K	$50-99.999K	$100-149.999K	$ 150K+	Sum
HH_Veh_0	98,114	27,508	9,023	1,516	136,162
HH_Veh_1	261,280	309,248	123,517	40,981	735,026
HH_Veh_2	112,992	316,696	341,262	176,421	947,370
Veh_HH_3+	35,110	157,591	192,826	135,198	520,725
Sum:	507,496	811,043	666,627	354,116	2,339,281

Note: Survey records associated with federal holidays have been removed and weighting factors have been adjusted
Source: 2007/08 HTS

The weighted and unweighted trip totals by mode and purpose are shown in Table 54. The key output files produced by the Set_Purposes_Modes_Types.s program include HTS200708PATrips.dbf, which contained all survey records with standard mode and purpose codes attached, as well as several interchange files to be used for later trip table building and for county-level summary development. Specific interchange files where developed by movement (I-I and I-I, I-X) and by TAZ system (both the 2,191 and 3,722 zone systems).   The HTS200708PATrips.dbf file was also processed by other summary programs, including Make_II_IX_Productions.s which produced an estimation file for internal and I-X person trips for developing external travel estimation. Two programs were also used to evaluate reported trip travel time, including elapsed_time_check.s for summarizing reported trip length frequencies by purpose and TOD_V52.s which summarized trips beginning, ending, and in-motion in 30 minute increments, by purpose and mode. These summaries may be found in the Appendix of this report.

Table 54 2007/08 HTS Trips (Internal and External) by Purpose and Mode - TPB Modeled Area

Purpose	Transit	Auto Dr	Auto Pax	Walk	Bike	Other	Sum		Modeled Total
Unweighted Trip Record Summary (All geocoded and nongeocoded trip records)									
HBW:	2,900	12,249	699	488	165	142	16,643		16,501
HBS:	401	8,683	3,281	995	50	56	13,466		13,410
HBO:	1,074	16,642	8,722	2,492	160	2,446	31,536		29,090
NHW:	723	5,907	640	2,121	44	177	9,612		9,435
NHO:	326	8,861	3,614	1,463	42	347	14,653		14,306
Sum:	5,424	52,342	16,956	7,559	461	3,168	85,910		82,742
Weighted Trip Record Summary (Internal and External Trip Records)									
HBW:	574,797	2,935,221	169,539	84,275	32,514	29,236	3,825,582		3,796,346
HBS:	70,250	1,962,979	893,626	180,660	8,798	9,412	3,125,726		3,116,313
HBO:	216,783	3,910,095	2,448,717	577,710	36,399	735,629	7,925,333		7,189,704
NHW:	141,128	1,398,615	150,296	404,550	7,379	35,362	2,137,331		2,101,968
NHO:	66,241	1,982,390	980,224	296,991	6,608	88,496	3,420,951		3,332,454
Sum:	1,069,199	12,189,300	4,642,403	1,544,186	91,699	898,135	20,434,922		19,536,787

Note: Survey records associated with federal holidays have been removed and weighting factors have been adjusted;

Table 55 2007/2008 Household Travel Survey Weighted Trip Records by Mode and Movement Type

Movement	Transit	Auto Dr	Auto Pax	Walk	Bike	Sum
I-I	1,062,562	11,760,538	4,529,513	1,530,956	91,698	18,975,267
I-X	4,668	326,761	92,095	1,784	0	425,308
X-I	1,067	54,513	15,262	466	0	71,308
External	900	47,487	5,532	10,980	0	64,899
Total	1,069,197	12,189,299	4,642,402	1,544,186	91,698	19,536,782

Note: Survey records associated with federal holidays have been removed and weighting factors have been adjusted;
The table reflects modeled modes only

A program named *Prep_HH_Trip_File.s* was used to aggregate total trip production data from the trip file to the household level. The program accumulated both weighted and unweighted trip productions by modeled purpose (the trip productions are inclusive of both internal and internal-to-external travel). The household-level productions were then merged with the household data with the program named *Join_Trips_HHs*. The resulting file, *Trip_Production_Calib.dbf*, will be used to formulate trip production rates.

3,722-TAZ-based trip tables were "built" with the program *Trip_BuildHTS_HHIncome3722.s*. Trip tables were developed for internal trips only by purpose and mode. The trip tables were next summarized at the jurisdiction level using the program HTS_Juris_Summary.s. The program produced trip jurisdictional summaries for all mode and purpose combinations, including transit percentages and car occupancy (66 tables in all). The summaries have been included in this report, in Appendix A.   The program also writes out zonal productions and attractions for non-motorized and person trips, to be used for the non-motorized model estimation work. The zonal files produced are further refined with the Accum_WalkBikeProductions.s and Accum_WalkBikeAttractions.s programs which produce "floating"

trip-ends or all Ps/As within 0.5, 1.0, and 1.5 miles of each zone. Model estimation work may consider this type of data.

Since the trip distribution process will be calibrated by income, zonal trip tables stratified by income grouping were also developed. A program named Join_HH_Inc_to_Trips.s was used to merge household-level income codes to the trip records, based on the common household ID number in both files.   A summary of weighted survey trips by purpose, mode and income level are shown in Table 56.

The existing Version 2.2 model uses rather constrained peak time periods, from 6:00-9:00 AM and from 4:00-7:00 PM and an expansive off-peak period comprising all other hours of the day. Based on a review of the temporal distribution summaries, TPB is planning to modify the existing modeled time periods, specifically to 1) expand the peak period durations from 3 hours to 5 hours (from 5:00-10:00 AM and 3:00-8:00 PM) and to increase the number of modeled time periods from three to four (i.e., to add a midday period).

Expanding the AM and PM peak periods from three to five hours is desirable for several reasons. First, the overall peaking distribution is more symmetric using the five-hour duration, as opposed to the existing three-hour duration. Temporal peaking is more fairly reflected. The five-hour duration also captures a larger share of the region's work trips in motion than does the three hour period, which is desirable since the peak-period service levels are most associated and most appropriate for the work purpose. The longer peak periods will also better accommodate the longer work trip lengths and the widely varying work schedules of the region's work force.

Adding a midday time period to the existing three-period scheme is desirable because Figure 9 clearly indicates the travel activity in motion in between 10 AM and 3PM is more prevalent and more diverse than that of the remaining off-peak hours. The composition of travel by purpose is also quite different in the midday than other off-peak hours. For example, the vast majority of HBS and NHO travel occurs during the midday as opposed to the early and late hours of the day, as would be expected. Another benefit of adding a midday period is that it enables the model to more accurately depict off-peak speed conditions resulting from the traffic assignment process. The existing three-time-period scheme employed by the Version 2.2 model produces a single set of off-peak link volumes and speeds. What does an 18-hour off-peak speed mean? It's very difficult to relate to a time condition that represents early morning, midday, evening and nighttime hours all combined.   The use of an explicit midday period at least will allow the model to better differentiate between off-peak/midday volume and speed conditions as opposed to conditions of the remaining off-peak hours.
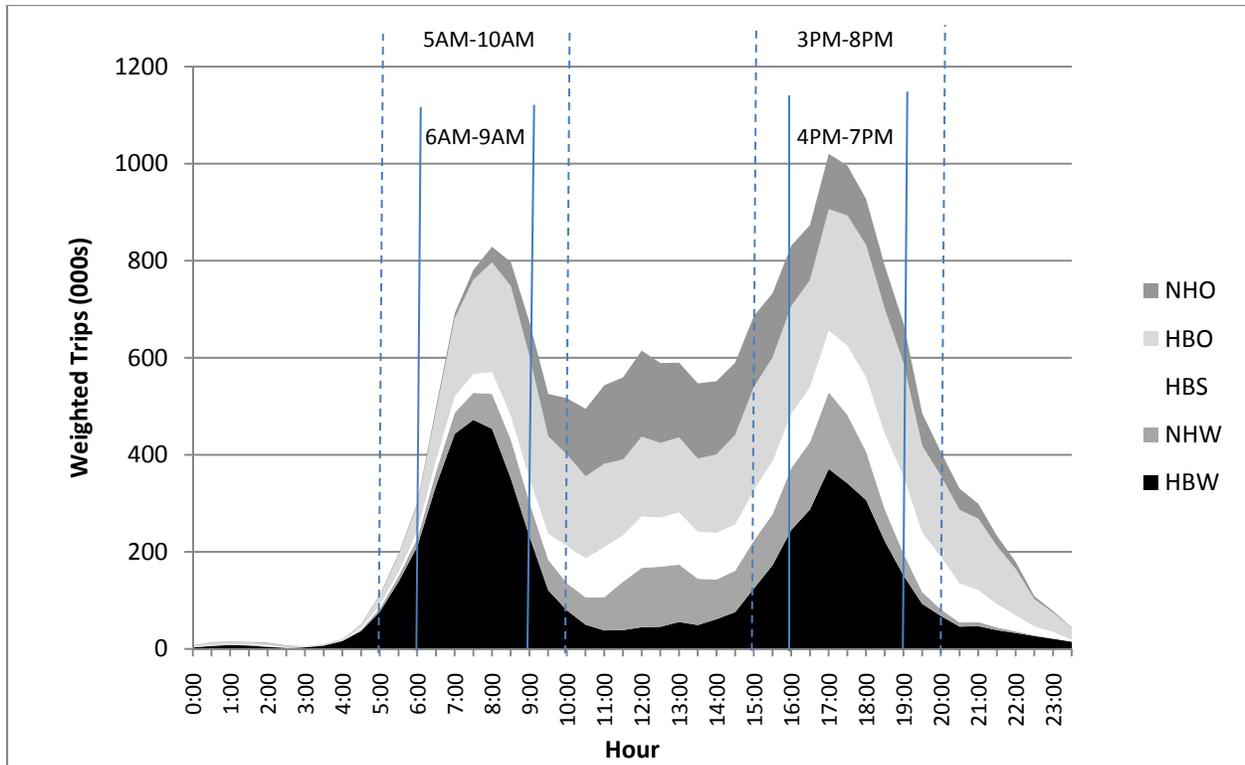
Figure 9 Auto Driver Trips in Motion by Purpose

Table 57 shows the share of auto driver travel (trips in motion) by purpose occurring in each of the four proposed time periods. Overall, 26% of the trips in motion occur during the AM period and 38% occurs during the PM period. The table indicates that approximately 85% of HBW work travel occurs in the 5-hour AM/PM peak periods. It is also notable that one-half of the NHO trips are in motion during the midday period. Table 58 indicates the percent of peak-period traffic that occurs during the peak hour, along with the specific peak hour. Since the midday and AM/PM peak periods are all based on five-hour durations, the theoretical minimum peak hour factor would be 20%. The low peaking factor for the midday period is notably low (21.5%) indicative of the steady flow of traffic throughout the period. The relatively low peaking factor of the PM period (25.2% of traffic occurs in the peak hour) is also notable.

Table 56 Trips (Internal only) by Purpose, Mode, and HH Income Level ($2007)

Purpose: HBW						
Income Level	Transit	AutoDr	AutoPx	Walk	Bike	Total
$ 0.00 - $49.99K	84,443	337,426	34,301	19,058	2,954	478,182
$ 50.00 - $ 99.99K	181,611	923,463	56,559	28,951	8,101	1,198,685
$100.00 - $149.99K	199,065	942,575	41,880	24,650	11,351	1,219,521
$ 150.00K +	106,767	583,511	29,867	11,617	10,108	741,871
Total:	571,886	2,786,976	162,607	84,275	32,514	3,638,258

Purpose: HBS						
Income Level	Transit	AutoDr	AutoPx	Walk	Bike	Total
$ 0.00 - $49.99K	35,553	285,063	120,916	61,779	1,452	504,763
$ 50.00 - $ 99.99K	18,377	676,079	305,015	58,200	2,619	1,060,289
$100.00 - $149.99K	11,572	647,862	325,507	41,556	4,015	1,030,512
$ 150.00K +	4,748	325,275	126,128	19,125	712	475,989
Total:	70,250	1,934,278	877,567	180,660	8,798	3,071,553

Purpose: HBO						
Income Level	Transit	AutoDr	AutoPx	Walk	Bike	Total
$ 0.00 - $49.99K	105,308	487,986	256,566	101,578	3,990	955,428
$ 50.00 - $ 99.99K	49,816	1,306,559	803,659	165,014	12,738	2,337,786
$100.00 - $149.99K	41,030	1,277,202	869,513	225,801	11,894	2,425,440
$ 150.00K +	19,324	737,165	466,777	84,062	7,778	1,315,106
Total:	215,477	3,808,912	2,396,515	576,456	36,399	7,033,760

Purpose: NHW						
Income Level	Transit	AutoDr	AutoPx	Walk	Bike	Total
$ 0.00 - $49.99K	20,858	142,426	20,579	39,109	104	223,076
$ 50.00 - $ 99.99K	38,214	463,732	47,643	112,364	1,303	663,256
$100.00 - $149.99K	51,402	454,349	51,460	146,320	3,842	707,373
$ 150.00K +	29,110	265,552	25,788	98,642	2,130	421,222
Total:	139,584	1,326,060	145,469	396,435	7,379	2,014,928

Purpose: NHO						
Income Level	Transit	AutoDr	AutoPx	Walk	Bike	Total
$ 0.00 - $49.99K	35,845	312,687	130,327	75,672	1,479	556,010
$ 50.00 - $ 99.99K	10,999	685,030	354,137	88,831	2,485	1,141,483
$100.00 - $149.99K	12,305	608,658	329,709	78,824	1,341	1,030,837
$ 150.00K +	6,216	297,937	133,182	49,803	1,303	488,441
Total:	65,365	1,904,312	947,355	293,130	6,608	3,216,771

Purpose: All Purposes						
Income Level	Transit	AutoDr	AutoPx	Walk	Bike	Total
$ 0.00 - $49.99K	282,007	1,565,588	562,689	297,196	9,979	2,717,459
$ 50.00 - $ 99.99K	299,017	4,054,863	1,567,013	453,360	27,246	6,401,499
$100.00 - $149.99K	315,374	3,930,646	1,618,069	517,151	32,443	6,413,683
$ 150.00K +	166,165	2,209,440	781,742	263,249	22,031	3,442,629
Total:	1,062,562	11,760,538	4,529,513	1,530,956	91,698	18,975,270

Table 57 Auto Driver Trips in Motion: Distribution (%) by Purpose and Period

Period	Trip Purpose					
	HBW	HBS	HBO	NHW	NHO	Total
AM Peak (5:00-10:00)	46.70%	11.00%	23.80%	18.60%	9.40%	25.90%
Midday (10:00-15:00)	8.90%	32.40%	26.10%	37.60%	50.20%	26.80%
PM Peak (15:00-20:00)	38.10%	43.80%	36.80%	41.70%	34.70%	38.40%
All other hours	6.40%	12.90%	13.20%	2.10%	5.70%	8.80%
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Table 58 Peak Hour Percentage by Time Period based on Total Auto Driver Trips in Motion Distribution

Period	Pct. of Travel	Hours in Period	Peak Hour in Period	Peak Hour Pct
AM Peak (5:00-10:00)	25.90%	5	8:00-9:00 AM	30.10%
Midday (10:00-15:00)	26.80%	5	12:00 Noon -1:00 PM	21.50%
PM Peak (15:00-20:00)	38.40%	5	5:00-6:00 PM	25.20%
All other hours	8.80%	9	8:00-9:00 PM	40.10%
Daily	100.00%	24	5:00-6:00 PM	9.70%

Source: 2007/08 HTS

2.4.5 Development of Parking Cost Model

Two components of the Version 2.3 model that required recalibration are the daily and hourly parking cost models for auto trips. One part of the generalized trip cost used in the mode choice step is the cost associated with parking a vehicle (in traffic assignment, the cost skims/matrices include toll, but not parking cost). Parking cost is added to the auto operating costs for all individuals whose mode of transportation is auto. This section begins with a discussion of the current parking cost model and concludes with descriptions of the proposed parking cost models.

2.4.5.1 Current Parking Cost Model

The currently adopted Version 2.2 travel demand model utilizes a parking cost model where the cost is a function of the employment density in the TAZ. The model consists of two curves: a daily parking cost curve and an hourly parking cost curve as shown in Figure 10. The non-HBW hourly parking cost is assumed to be one-third of the daily HBW rate, subject to a minimum employment density of 80,000

employees per square mile.[31] The daily parking cost is used for home-based work (HBW) trips, while the hourly cost is used for all other purposes. In addition to the two curves, one needs rules about how the parking costs are applied in the model. These rules are explained in the model documentation from the Version 2.1D travel model (see Table 59),[32] but were not included in the documentation for the Version 2.2 travel model. It is important to note that the current mode choice model application program (cogmc.exe) uses the daily parking cost and divides it by two to apply it on a per-trip basis. However, the Version 2.3 travel model will use a new mode choice application program (aems.exe). It is also important to note that non-HBW parking rates invoke the issue of parking duration. The assumptions in the Version 2.2 travel model regarding parking duration are shown in Table 59.
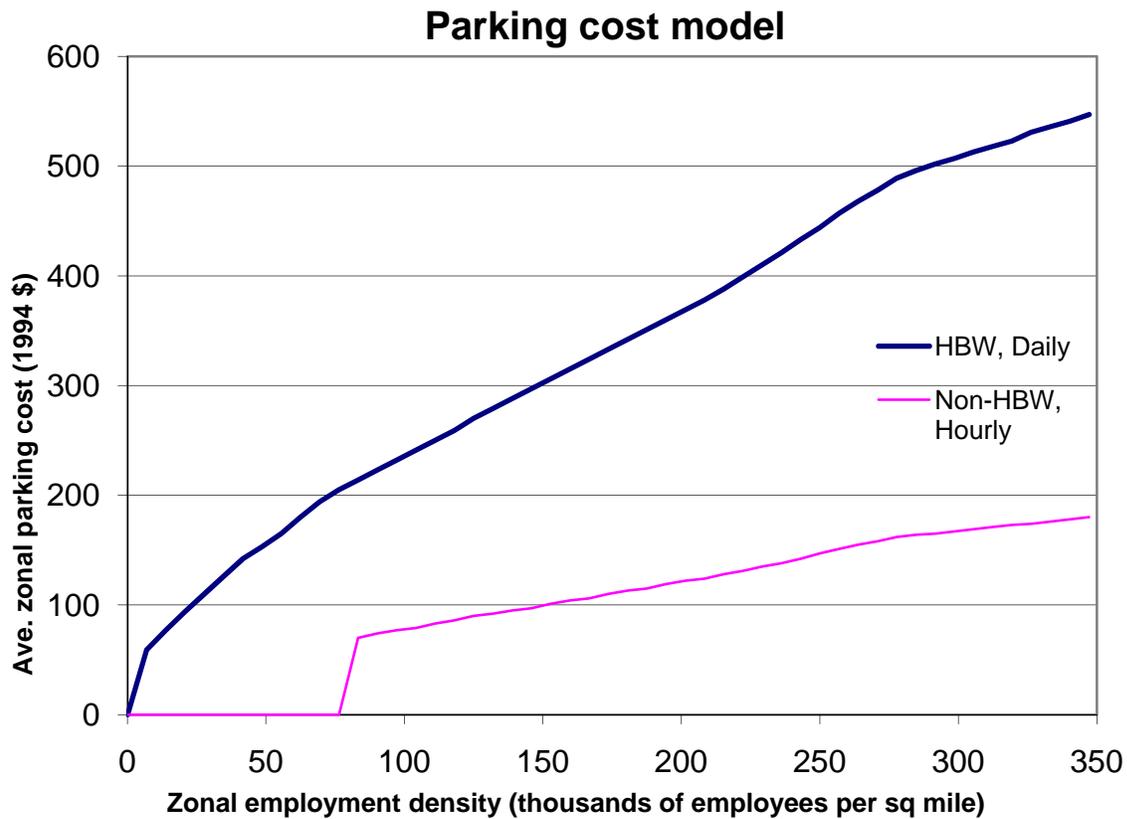
Figure 10 Version 2.2 Parking Cost Model for Auto Modes

---

[31] Ronald Milone et al., TPB Travel Forecasting Model, Version 2.2: Specification, Validation, and User's Guide (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, March 1, 2008), page 6-3.
[32] Ronald Milone et al., COG/TPB Travel Forecasting Model, Version 2.1 D #50: Calibration Report (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board (COG/TPB), November 17, 2004), page 6-7.

Table 59 Assumptions about how parking costs are applied in the Version 2.2 travel model

Trip Purpose	Parking Rate Unit	Directional Trip Factor	Assumed Duration	Parking Cost Term per Modeled Trip		Parking Cost Input (A1 deck) Unit
HBW	Daily Cost	0.5	N/A	½ Daily Cost	(= Daily Cost * 0.5)	Daily Cost
HBS	Hourly Cost	0.5	1 Hour	½ Hourly Cost	(= Hrly Cost * 0.5 * 1.0 Hr)	Hourly Cost
HBO	Hourly Cost	0.5	2 Hours	Hourly Cost	(= Hrly Cost * 0.5 * 2.0 Hrs)	Hourly Cost * 2.0
NHB	Hourly Cost	1.0	1 Hour	Hourly Cost	(= Hrly Cost * 1.0 Hr)	Hourly Cost * 2.0

The assumptions about how parking costs are applied in the Version 2.3 travel model (2,191-TAZ) are shown in Table 60. Parking costs for home-based trip purposes are divided by two since the conversion from origin-destination format to production-attraction format means that the parking cost is shared by two trips. For NHB, the parking cost is not shared by two trips. It is assumed that the average duration for HBS trips is one hour. It is assumed that the average duration for HBO and NHB trips is two hours (hence, the factor of 2.0).

Table 60 Assumptions about how parking costs are applied in the Version 2.3 travel model on the 2,191 TAZ area system

Trip Purpose	Mode Choice Control File	Rule in MC Control File	Rule in prefarV23.s	Cumulative Result
HBW	HBW_NL_MC.CTL	Divide value in input skims by 2	No change	Divided by 2
HBS	HBS_NL_MC.CTL	Divide value in input skims by 2	No change	Divided by 2
HBO	HBO_NL_MC.CTL	Divide value in input skims by 2	Multiply by 2	Same as input skim value
NHB	NHB_NL_MC.CTL	No change	Multiply by 2	Same as input skim value

The current parking cost model was developed a long time ago. Although it was based on observed data, given the age of the model, it is desirable to review and possibly adjust this model as part of calibration of the Version 2.3 model. One possible source of observed parking cost data is the Household Travel Survey collected in 2007 (HTS). In this survey, respondents were asked whether there was a parking cost imposed in the location where they parked, how much the cost was and who incurred the cost (driver, passenger, employer, etc.).[33]

2.4.5.2 New Parking Cost Model

In the first step of the analysis, all responses where the survey taker stated that there was a parking cost imposed were extracted from the trip file. These comprised 1,200 responses. The responses were then split based on the primary trip mode, because the parking cost model considers parking costs for only

---

[33] NuStats, *2007/2008 COG/TPB Household Travel Survey: Draft Report of Methods* (Metropolitan Washington Council of Governments, July 15, 2008), 62.

individuals who drove to their destination, not those who drove to transit and parked at a PNR lot (PNR costs are added to the cost of taking transit for transit submodes). There were 1,000 auto trips that incurred a parking cost in the HTS.

The next step of the analysis involved splitting trips into work trips, which include home-based work (HBW) and non-home-based work (NHBW), and non-work trips (all other purposes). Work-based trips were then used to determine daily costs, while the non-work trips were used to establish hourly costs. Next, since the survey respondents reported costs in different units including trip, hour, day, month, semester, and year, the costs had to be converted to common units. For work trips, costs reported per day and per trip were used as is, while costs per month were divided by 22 (average number of work days per month). For non-work trips, costs per hour were used as stated by the respondent. Costs reported in all other units could not be consistently converted to the desired units and thus were omitted from the dataset.

Proposed Daily Parking Cost Model

The daily costs were plotted against area employment and examined for any outliers. A few outliers were investigated using other information regarding the trip and person making it. Outliers were omitted if it was clear that there was an error or a problem with the observation. For example, one individual reported a parking cost for a HBW trip of $28, which he or she paid at BWI Airport before boarding a plane. The plot of daily costs versus employment density is shown in Figure 11. A linear trend line was fitted through the points to better understand how the parking cost varies with employment density. While the R^2 of the model is somewhat low (0.16), it is not unexpected for observed data which typically has a lot of scatter. For comparison purposes, the Version 2.2 parking cost model, inflated to 2007 dollars by using the consumer price index (CPI), was also added to Figure 11. It appears that the current Version 2.2 parking cost model underestimates parking costs. One possible explanation for this difference could be the fact that, over the last decade, property prices have risen faster than other consumer good prices (as reflected in the CPI).

The chart shows a trend line with equation:

$$y = 2\text{E-}05x + 4.9478$$
$$R^2 = 0.1646$$
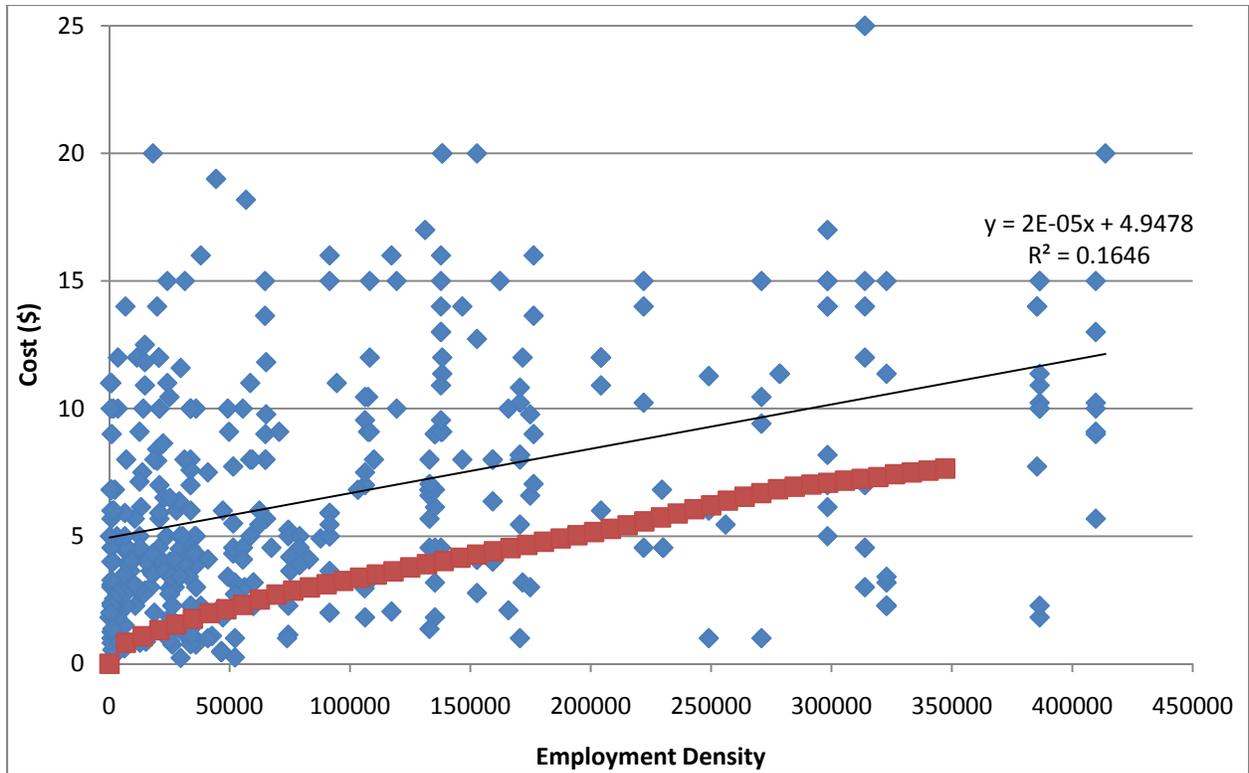
Figure 11 Daily Observed and Modeled Parking Costs vs. Employment Density (2007 Dollars)

One possible way to improve model fit is to use "floating" employment density (also known as geographic centroid aggregation), as opposed to the direct TAZ employment density. Using floating density would accomplish a "smoothing effect" on the employment density, making neighboring zones similar in employment density. A plot of parking cost versus the one-mile floating density is shown in Figure 12. It is evident from the plot that the trend line fit improved dramatically to an R^2 value of 0.25. This is an indication that floating density should be used to predict parking costs.

The chart shows a scatter plot with the trend line labeled:
$$y = 6E\text{-}05x + 4.0423$$
$$R^2 = 0.249$$
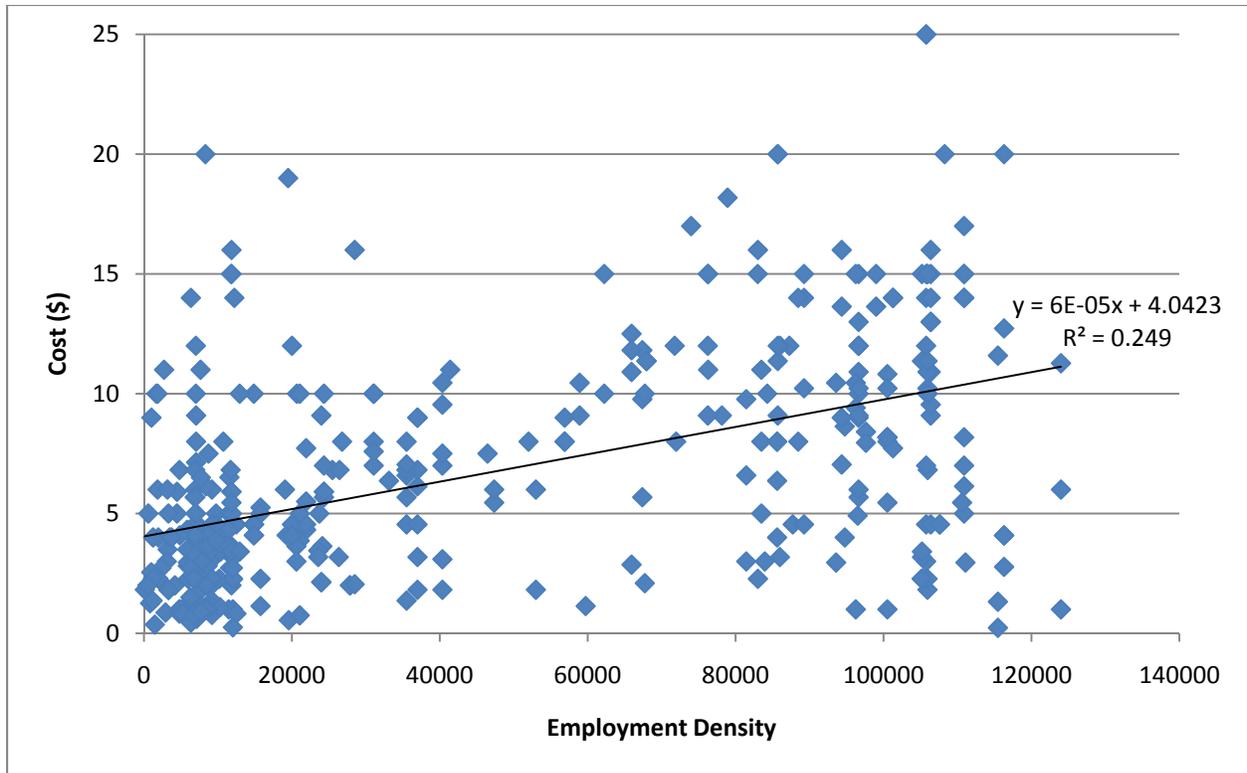
Figure 12 Daily Parking Costs vs. One-Mile Floating Employment Density

Another issue to consider in the estimation of the daily parking cost model is the fact that the plot above does not include individuals who parked and did not pay for it (only observations where the respondent stated that a parking fee was imposed). It is expected that in zones that have high employment or population density, there are few free parking spots and thus not many points are omitted. Meanwhile for areas with low employment density, there are more free parking locations and the plot above does not represent all the people who drove and parked. Thus, it may be helpful to split the parking cost points by area type based on their employment and population density. Figure 13 shows the distribution of points by area type. Note that newly developed area types are used as described in a recent memo.[34] For convenience, the proposed area types can also be found in Table 61.

---

[34] Mary Martchouk to Mark S. Moran, "Area Type Definitions for Version 2.3 Travel Demand Model," Memorandum, June 16, 2010.

Table 61 Area types proposed for the Version 2.3 travel model

One-Mile "Floating" Population Density (Pop/Sqmi)	One- mile "Floating" Employment Density (Emp/Sqmi)						
	0-100	101-350	351-1,500	1,501-3,550	3,551-13,750	13,751-15,000	15,001+
0-750	6	6	5	3	3	3	2
751-1,500	6	5	5	3	3	3	2
1,501-3,500	6	5	5	3	3	2	2
3,501-6,000	6	4	4	3	2	2	1
6,001-10,000	4	4	4	2	2	2	1
10,000-15,000	4	4	4	2	2	2	1
15,001+	2	2	2	2	2	1	1
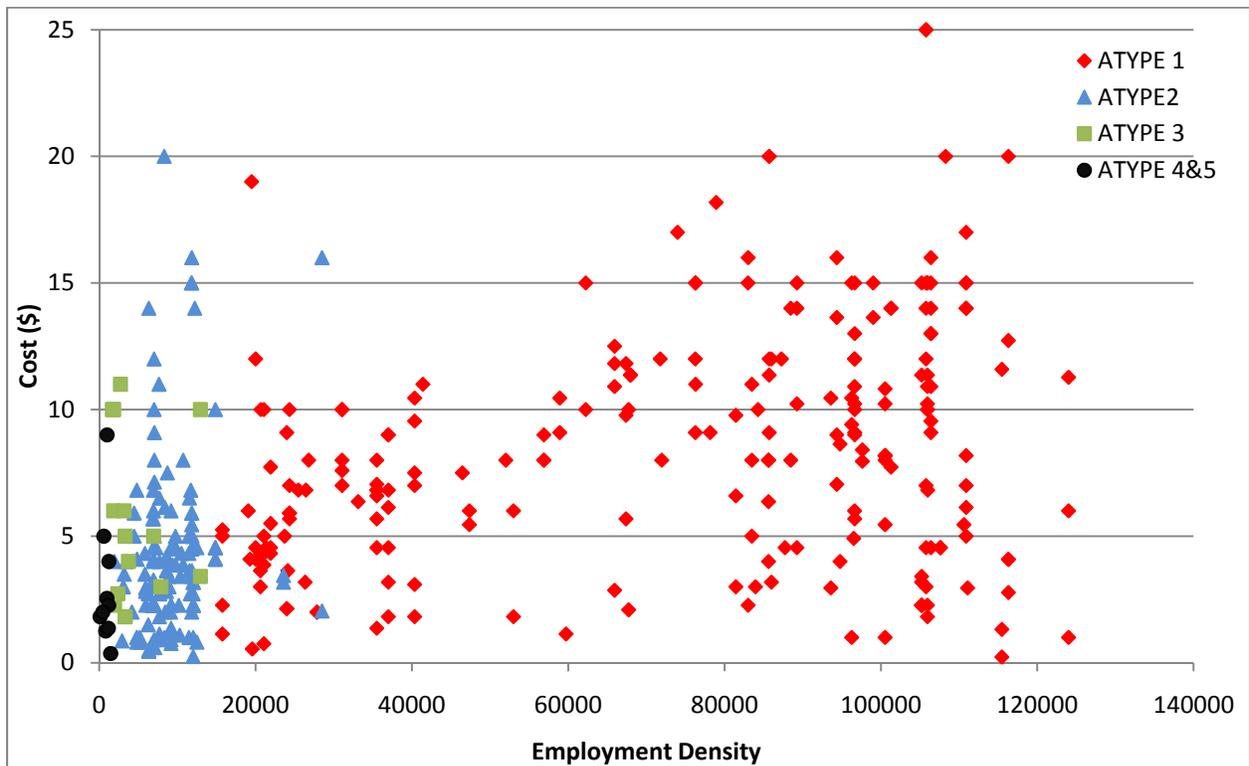
Figure 13 Daily Parking Costs by Area Type

The plot indicates that most of the parking cost data is obtained from area types 1 and 2. This finding was anticipated because other area types have fewer locations where individuals have to pay to park. Since there are very few observations available from area types 3 and higher, it may be desirable to

consider only area types 1 and 2 for model estimation. A plot of parking costs for area types 1 and 2 with a linear trend line is shown in Figure 14.
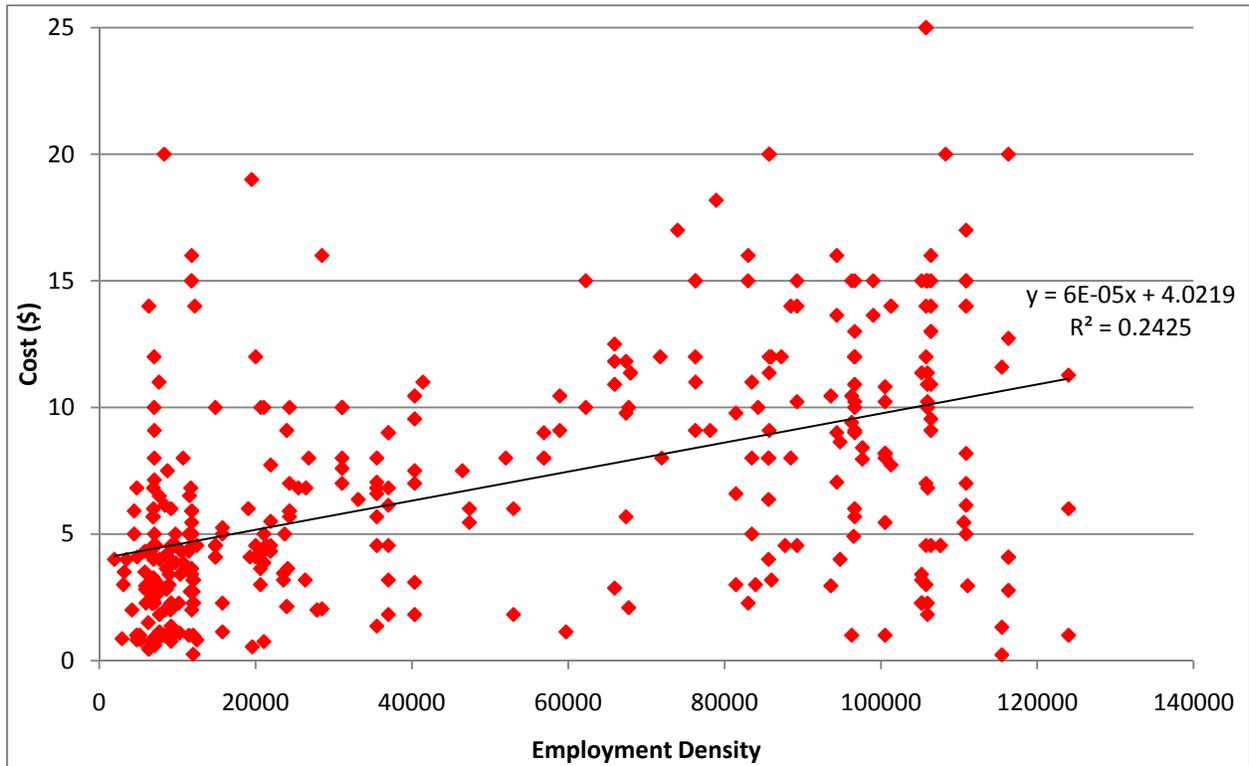
Figure 14 Daily Parking Costs for Area Types 1 and 2 with Linear Trend Line

The resulting trend line appears to fit the points reasonably well and is similar to that with all parking cost observations. However, since there are many low cost parking observations at low employment densities, a logarithmic trend line may be more suitable. This is shown in Figure 15.
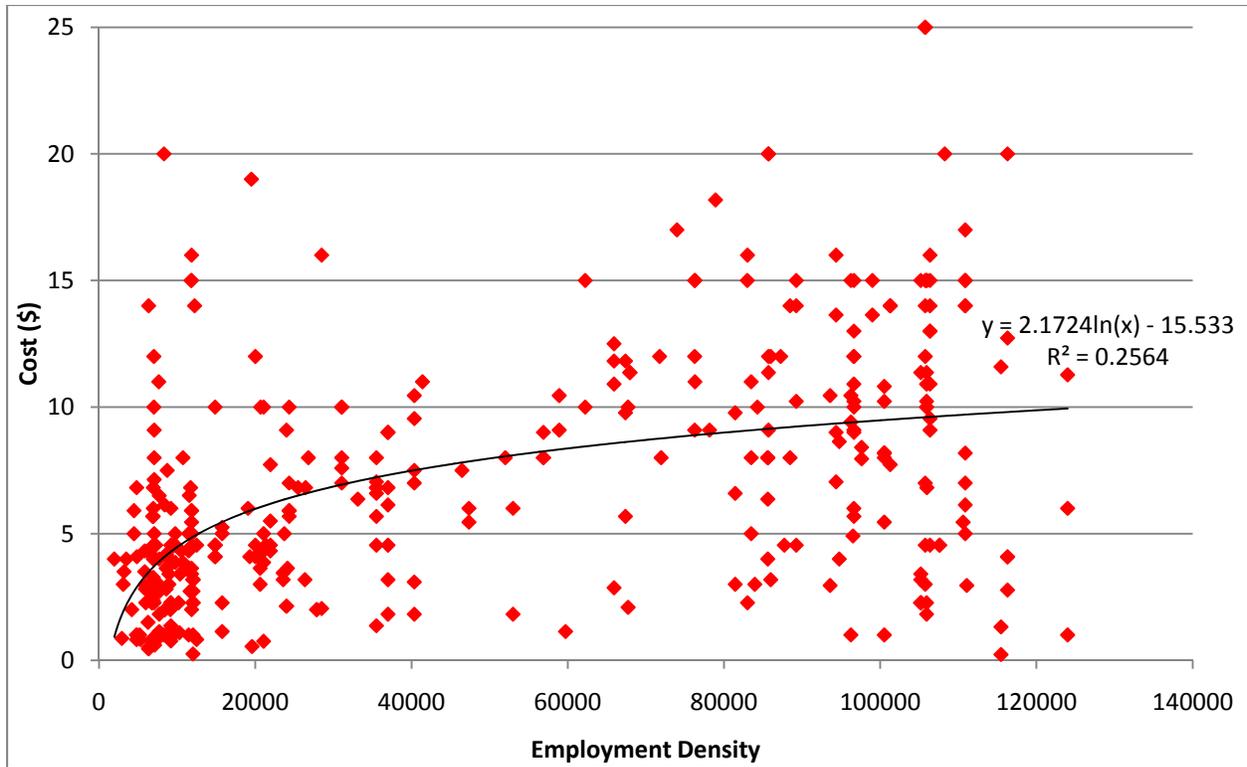
Figure 15 Daily Parking Costs for Area Types 1 and 2 with Logarithmic Trend line

A logarithmic trend line improves the fit slightly, as indicated by the R^2, however, more importantly, it appears to better model the low-cost points at low employment densities. It also does not continue to increase as dramatically when the employment densities get higher, which is more intuitive.

Overall, the logarithmic function models the observed parking cost data well, so it is proposed that this function be used as a new parking cost model for area types 1 and 2. In addition, since there is insufficient data for area type 3, this model could also be used for TAZs that fall into this category. This model shows a significant drop in cost as the employment density gets lower. Thus, it is believed to be suitable for area type 3 where most parking is free, but some parking is priced. Although this function could theoretically produce negative parking cost estimates for areas with very low densities, the lowest possible employment density for area type 3 of 1,501 persons was tested in the model and yielded a positive cost of $0.40 per day.

For the remaining area types 4 through 6, it is uncommon for parking locations to have costs associated with them and thus, it is recommended that they be assumed to be free.

Proposed Hourly Parking Cost Model

Hourly parking costs were obtained for home-based-shop (HBS), home-based-other (HBO), and non-home-based other (NHBO) trip purposes. These are plotted in Figure 16. Also included in the chart is the hourly parking cost model used in Version 2.2 as well as linear trend line through the observed points.
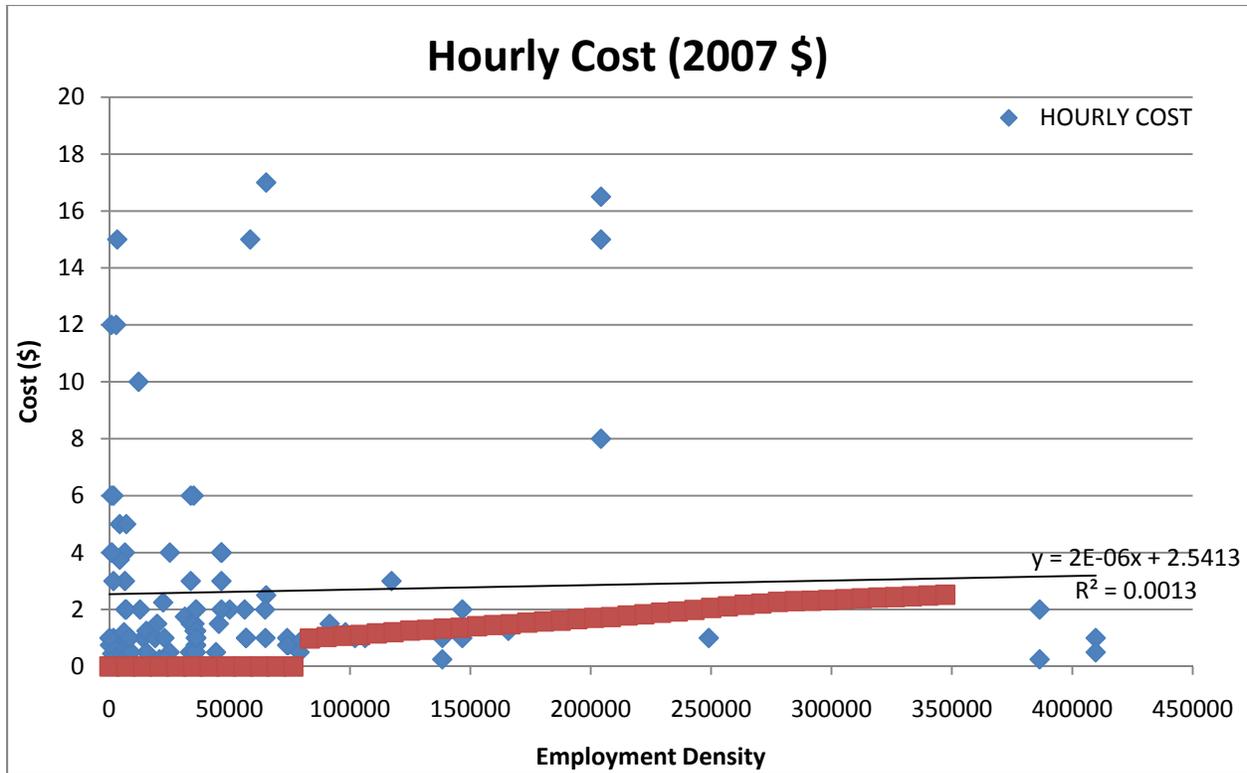
Figure 16 Hourly Observed and Modeled Costs vs. Employment Density

The first observation made is that the sample size is not very large, especially in higher employment density locations. In lower density locations, meanwhile, there appears to be a lot of scatter, resulting in a low R^2 value of 0.0013. Thus, it was concluded that the observed data is not very useful in estimating a new hourly parking cost model. Instead, based on local knowledge, it was decided that a flat hourly rate was going to be assigned based on the area type. For area type 1, the most prevalent metered rate of parking is $2.00 and thus that value was selected. For area type 2, the average hourly parking cost is anticipated to be $1.00. For area type 3, the value of $0.25 per hour was selected. For area types 4 and higher, no parking cost is anticipated. Once again, it is important to note that these rates were not obtained based on the observed parking cost data from the HTS but rather assumed based on the local knowledge of the areas.

2.5 Development of Mode Choice Targets from On-board Transit Surveys

Calibration of the Version 2.3 travel demand model includes many steps, one of which is calibrating the nested logit mode choice model. The mode choice model includes 15 submodes, which are a combination of the trip mode and access mode (Figure 17). It is estimated/calibrated for each purpose including home-based-work (HBW), home-based-shop (HBS), home-based-other (HBO), and non-home-based (NHB). We have also been considering subdividing NHB into two subcategories:

- Non-home-based work (abbreviated as either NHBW or NHW)
- Non-home-based other (abbreviated as either NHBO or NHO)

Furthermore, the model is split into 20 geographic market segments based on production and attraction areas as described in Table 62. The 20 market segments are based on seven superdistricts, which are shown in Figure 18 and whose zonal definitions can be found in other documentation.[35]
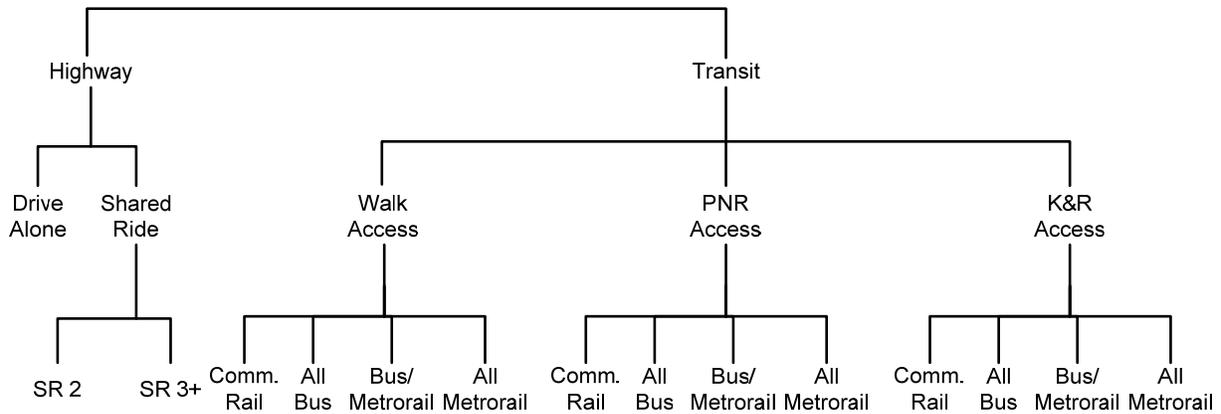
Figure 17 Nested Logit Mode Choice Model

[35] AECOM Consult, Inc., Post MWCOG – AECOM Transit Component of Washington Regional Demand Forecasting Model: User's Guide (AECOM Consult, Inc., March 2005); Mark S. Moran to Files, "Calibrating the nested logit mode choice model as part of the Version 2.3 travel model," Memorandum, September 3, 2008; Ronald Milone et al., TPB Travel Forecasting Model, Version 2.3: Specification, Validation, and User's Guide, Draft report (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, June 30, 2008).

Table 62 Market Segment Definitions

Market Segment	Production Area	Attraction Area
1	DC	DC core
2	DC	VA core
3	DC	Urban DC, MD, VA
4	DC	Suburban MD, VA
5	MD urban	DC core
6	MD urban	VA core
7	MD urban	Urban DC, MD, VA
8	MD urban	Suburban MD, VA
9	VA core/urban	DC core
10	VA core/urban	VA core
11	VA core/urban	Urban DC, MD, VA
12	VA core/urban	Suburban MD, VA
13	MD suburban	DC core
14	MD suburban	VA core
15	MD suburban	Urban DC, MD, VA
16	MD suburban	Suburban MD, VA
17	VA suburban	DC core
18	VA suburban	VA core
19	VA suburban	Urban DC, MD, VA
20	VA suburban	Suburban MD, VA

Thus, in order to calibrate the mode choice model, a target trip number needs to be established for each submode, trip purpose and market segment. The total number of targets is 1200 (15 modes, 20 market segments, 4 trip purposes). The calibration targets are split into transit targets obtained from transit surveys and auto targets that are calculated based on the assignment of the Household Travel Survey trips to the highway network.

Transit targets include commuter rail trips, Metrorail only trips, Metrorail/bus trips, and bus only trips. Each of these targets can be obtained from one or more transit surveys. For example, as indicated in Table 63, a Metrorail survey can have trip records relating to three of the four transit submodes. Transit targets discussed in this section of the report are obtained from the transit surveys indicated by a circled "y" in Table 63, with the exception of the bus trip targets, which will be discussed in a separate document, since the 2008 Regional Bus Survey and the 2008 Fairfax Bus Survey are still being processed.
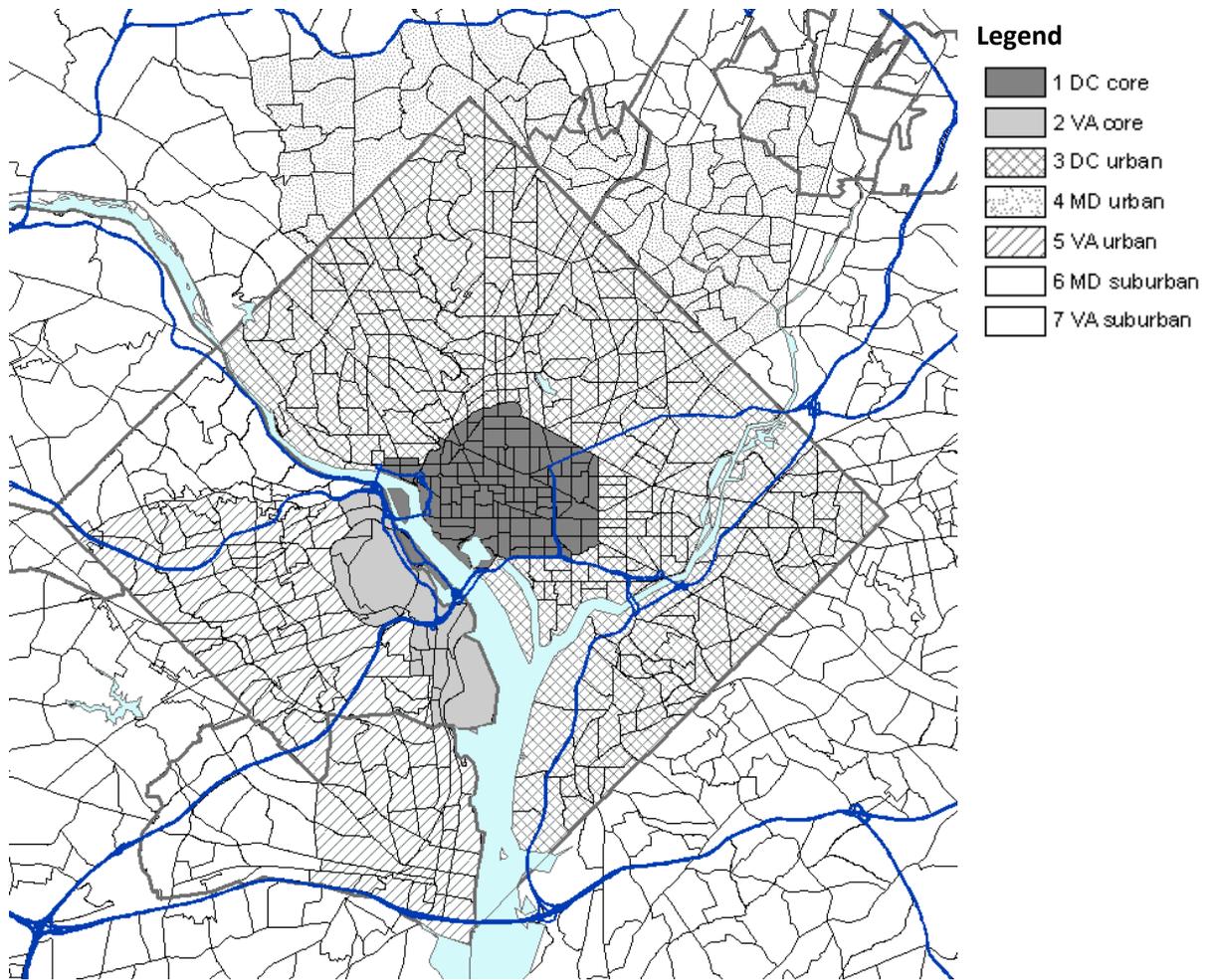
Figure 18 Map of Superdistricts Used for the Nested Logit Mode Choice Model

Table 63 On-board transit surveys and their potential for developing calibration targets

	Transit submode			
Survey	**Comm. rail**	**All Bus**	**Bus/Metrorail**	**All Metrorail**
Metrorail	y		y	y
Commuter rail	y			
Bus		y	y	

A transit trip (or any trip) can be composed of multiple legs. For example, a typical transit trip could contain the following legs, starting from the origin, going to the final destination:

- Starting from the origin: Walk to a bus stop (mode of access: walk)
- Take the bus to a Metrorail station (bus)
- Take the Metrorail to a commuter rail station (Metrorail)
- Take the commuter rail to the destination station (commuter rail)
- Walk from the destination station to one's destination (mode of egress: walk)

The above example represents a series of unlinked trips (or legs). Typically, for travel demand modeling work, these unlinked trips or legs are combined into one linked transit trip. In order to perform the trip linking, one must have a series of hierarchy rules. The following rules are what we have used:

- Commuter rail: If any portion of the trip occurs on commuter rail, the linked trip is a commuter rail trip. Consequently, commuter rail is at the top of the hierarchy.
- All bus: The only transit mode used is bus.
- All Metrorail: The only transit mode used is Metrorail.
- Bus/Metrorail: A combination of bus and Metrorail is used (not necessarily in that order). No commuter rail is used.

Using the above rules, our previous example becomes one linked trip:

- Commuter rail from station A to station B, with the access mode being walk

2.5.1 Metrorail Targets

Metrorail trip targets were developed based on the 2008 Metrorail survey, which was collected by WB&A, geocoded by RKK, and cleaned by PB. The final survey included 35,966 records, which were expanded to 786,813 daily Metrorail trips (the average number of trips in September 2008).

It was then used to calculate targets for 6 submodes in the mode choice model, including:

- Walk access Metrorail
- Park and ride (PNR) access Metrorail
- Kiss and ride (KNR) access Metrorail
- Walk access Metrorail/Bus
- PNR access Metrorail/Bus

- KNR access Metrorail/Bus

Trip records relating to commuter rail were excluded, since these would be picked up in the two commuter rail surveys (VRE and MARC).

The first step in calculating the Metrorail targets consisted of determining the mode of access to the first transit vehicle (which may or may not be Metrorail), as well as the mode of access to the Metrorail station and mode of egress from the Metrorail station for each trip. Before proceeding with analysis, it is important to note that the access mode information available in the Metrorail survey is in Origin/Destination format. Since mode choice and transit assignment are performed in Production/Attraction format, the mode of access to the first transit vehicle needs to be determined for the production end of the trip. Modes of access and egress from the Metrorail station meanwhile are used to split the trips into Metrorail only and Metrorail/Bus modes and thus do not need to be in Production/Attraction format. The survey provided by PB included production-end mode of access to the first transit vehicle for every observation, thus only the mode of access to Metrorail and mode of egress from Metrorail needed to be established. Mode of access to Metrorail was calculated based on the following three-step process.

1. Origin zone, origin Metrorail station, access to first transit vehicle, and time of day information were obtained from records with missing access to Metrorail information. Then, all records with a matching origin zone, origin Metrorail station, access to first transit vehicle, and time of day that included the mode of access to Metro were identified. The prevalent mode of access to Metro was then determined based on these records and assigned to records with missing information.
2. Any records that did not have a "match" based on the above-mentioned criteria were found a match based on only origin zone, origin Metrorail station and mode of access to first transit vehicle. Once again the prevalent mode of the "match" was assigned to records with missing information.
3. For the remaining records that still did not have a "match," distance from the origin to the origin Metrorail station, as well as mode of access to first transit vehicle, were used to determine the mode of access to Metro according to the rules described in Table 64.

Table 64 Access Mode to Metrorail Station

	Distance		
Access to First Transit	**<1 mile**	**1-10 miles**	**>10 miles**
Walk	No transfer	Bus	Commuter Rail
PNR	No Transfer	No Transfer	No Transfer
KNR	No Transfer	No Transfer	No Transfer

Once all the Metrorail survey records were assigned a mode of access to the Metrorail station, they were split into Metrorail only, Metrorail/Bus, and Metrorail/Other modes. Metrorail only and Metrorail/Bus trips were then assigned to a market segment corresponding to their production and

attraction zones. The weighted records were then summarized by trip purpose and mode of access to the first transit vehicle. Metrorail only trip summaries by market segment and access mode are shown in Table 65 and Table 66, respectively, while the Metrorail/Bus trip summaries are shown in Table 67 and Table 68.

Table 65 2008 Metrorail Only Trips by Market Segment and Trip Purpose

Market Segment	Production Area	Attraction Area	HBW	HBS	HBO	NHB	Total
1	DC	DC core	62,611	735	12,610	27,386	103,341
2	DC	VA core	7,914	145	2,007	5,205	15,272
3	DC	Urban DC, MD, VA	32,600	2,506	9,622	19,498	64,226
4	DC	Suburban MD, VA	8,719	255	1,195	5,876	16,045
5	MD urban	DC core	15,151	99	1,566	1,979	18,796
6	MD urban	VA core	1,416	32	68	185	1,701
7	MD urban	Urban DC, MD, VA	6,263	92	1,879	1,176	9,410
8	MD urban	Suburban MD, VA	1,440	25	280	407	2,151
9	VA core/urban	DC core	34,357	169	5,141	7,075	46,742
10	VA core/urban	VA core	4,206	0	704	3,043	7,952
11	VA core/urban	Urban DC, MD, VA	11,778	544	1,833	4,335	18,490
12	VA core/urban	Suburban MD, VA	1,857	0	510	1,006	3,373
13	MD suburban	DC core	81,668	161	4,218	3,792	89,839
14	MD suburban	VA core	10,330	0	1,032	474	11,836
15	MD suburban	Urban DC, MD, VA	30,361	340	2,503	1,542	34,746
16	MD suburban	Suburban MD, VA	3,948	33	421	321	4,723
17	VA suburban	DC core	45,918	154	3,136	2,789	51,997
18	VA suburban	VA core	10,079	0	727	539	11,345
19	VA suburban	Urban DC, MD, VA	18,030	158	1,955	1,257	21,401
20	VA suburban	Suburban MD, VA	1,709	19	178	160	2,066
Total			390,353	5,468	51,586	88,047	535,454

Table 66 2008 Metrorail Only Trips by Access Mode to Transit and Trip Purpose

Access Mode	HBW	HBS	HBO	NHB	Total
Walk	202,659	4,854	38,409	73,006	318,928
PNR	143,897	469	9,745	8,832	162,943
KNR	43,797	145	3,431	6,209	53,582
Total	390,353	5,468	51,586	88,047	535,454

Table 67 2008 Metrorail/Bus Trips by Market Segment and Trip Purpose

Market Segment	Production Area	Attraction Area	HBW	HBS	HBO	NHB	Total
1	DC	DC core	18,509	279	3,011	3,702	25,502
2	DC	VA core	2,660	0	476	944	4,080
3	DC	Urban DC, MD, VA	16,451	1,266	4,383	4,395	26,494
4	DC	Suburban MD, VA	9,031	280	1,678	2,154	13,142
5	MD urban	DC core	4,585	78	680	391	5,734
6	MD urban	VA core	397	0	0	42	439
7	MD urban	Urban DC, MD, VA	3,258	118	483	462	4,321
8	MD urban	Suburban MD, VA	1,528	0	202	217	1,946
9	VA core/urban	DC core	10,462	28	911	851	12,252
10	VA core/urban	VA core	658	0	34	203	894
11	VA core/urban	Urban DC, MD, VA	3,935	59	969	878	5,841
12	VA core/urban	Suburban MD, VA	1,804	0	283	328	2,414
13	MD suburban	DC core	26,127	135	1,241	1,334	28,837
14	MD suburban	VA core	3,220	27	158	229	3,634
15	MD suburban	Urban DC, MD, VA	17,442	170	2,563	1,523	21,698
16	MD suburban	Suburban MD, VA	7,867	72	1,482	451	9,873
17	VA suburban	DC core	24,320	44	1,061	1,101	26,526
18	VA suburban	VA core	4,536	0	147	194	4,878
19	VA suburban	Urban DC, MD, VA	14,453	157	1,501	832	16,943
20	VA suburban	Suburban MD, VA	4,038	21	498	403	4,960
Total			175,279	2,733	21,762	20,634	220,408

Table 68 2008 Metrorail/Bus Trips by Access Mode to Transit and Trip Purpose

Access Mode	HBW	HBS	HBO	NHB	Total
Walk	137,198	2,486	18,639	16,378	174,701
PNR	28,465	112	1,760	2,042	32,379
KNR	9,615	136	1,363	2,214	13,329
Total	175,279	2,733	21,762	20,634	220,408

2.5.2 MARC Commuter Rail Targets

MARC survey records were extracted from a larger survey (MTA Baltimore Transit Survey), collected by NuStats and provided to MWCOG by PB. The total number of MARC survey records after it was cleaned and geocoded by PB was 1,915, which were then expanded to 26,451 trips.

Similar to the Metrorail targets, the first step in processing the MARC survey responses involved ensuring that each record has the production-end mode of access to the first transit vehicle, which was necessary for assigning a submode. Since the majority of survey records (24,353) included access mode

to transit, the records that did not include this information were deleted. The remaining records were expanded to the total number of trips by using a global expansion factor.

Next, the survey records were assigned a production and attraction TAZ based on geographic coordinates provided in the survey file. The production and attraction zones were then used to assign the trips to geographic segments described in Table 62. The resulting trip targets by market segment are shown in Table 69. Trip targets summarized by access mode are shown in Table 70. It is evident from the results that external trips comprise a large portion of the trips (44%) because many MARC stations are located outside the modeled area (See Figure 19).

Table 69 MARC Trips by Market Segment

Market Segment	Production Area	Attraction Area	HBW	HBS	HBO	NHB	Trips	% Trips
1	DC	DC core	15	0	0	38	52	0.2%
4	DC	Suburban MD, VA	97	158	21	380	657	2.5%
8	MD urban	Suburban MD, VA	27	0	0	19	46	0.2%
9	VA core/urban	DC core	20	0	0	0	20	0.1%
12	VA core/urban	Suburban MD, VA	0	46	0	21	67	0.3%
13	MD suburban	DC core	9,302	260	0	233	9,794	37.0%
14	MD suburban	VA core	336	0	0	85	421	1.6%
15	MD suburban	Urban DC, MD, VA	2,405	109	0	32	2,546	9.6%
16	MD suburban	Suburban MD, VA	1,021	71	0	17	1,108	4.2%
20	VA suburban	Suburban MD, VA	65	23	0	0	88	0.3%
External			7,630	2,227	0	1,794	11,651	44.0%
Total			20,918	2,893	21	2,619	26,451	100.0%

Table 70 MARC Trips by Access Mode to Transit

Access Mode	HBW	HBS	HBO	NHB	Trips	% Trips
KNR	2,024	0	981	873	3,878	14.66%
PNR	14,977	0	982	402	16,361	61.85%
Walk	3,917	21	930	1,344	6,212	23.48%
Total	20,918	21	2,893	2,619	26,451	100.00%

*Note: The summary of access modes includes external trips

Figure 19 MARC commuter rail service in 2010

2.5.3 VRE Commuter Rail Targets

Trip targets for VRE were obtained based on the 2005 VRE survey provided to MWCOG by PB. The collected survey consisted of 4,999 responses expanded to 13,086 trips. It was then cleaned to exclude any responses that did not include home zip code, work zip code, income information, access mode or egress mode (this procedure was established by PB). The clean survey was then factored to 2005 boarding counts based on the boarding station by applying the factors shown in Table 71. These factors were established by PB. Since the survey consisted only of the AM peak train riders, all of the survey respondents were assumed to be traveling from home to work corresponding to the HBW trip purpose. This implied that in order to obtain total daily trips in production/attraction format, the morning trips were doubled.

Table 71 Expansion Factors by Boarding Station

Boarding Station	Expansion Factor
Broad Run	1.8987
Manassas	1.8257
Manassas Park	1.7864
Burke Centre	2.5752
Rolling Road	2.5752
Backlick Rd	2.5752
Fredericksburg	1.7452
Leeland Rd	1.7315
Brooke	1.5859
Quantico	2.0853
Rippon	2.5752
Woodbridge	2.5752
Lorton	2.5752
Franconia/Springfield	2.5752
Alexandria	2.5752

In the second step of assembling the VRE targets, the production-end access mode to transit was determined. Since only the access mode to the VRE train was available in the survey, the responses needed to be recoded to ensure that the access mode is "Walk", "KNR", or "PNR". If the access mode to VRE was "Bus" or "Other", the access mode to the first transit vehicle was assumed to be "Walk", because most people walk to the bus as opposed to driving and parking or being dropped off. Other responses included walking to the station, driving to the station, corresponding to "PNR", and being dropped off corresponding to "KNR".

Next, the 2005 trips were factored to 2007 boarding counts by boarding station. There was a decline in ridership from 2005 to 2007 as shown in Figure 20, thus the counts were deflated. The factors were calculated based on the ratio of 2007 to 2005 boarding counts for northbound trains for the Fredericksburg and Manassas lines. Only northbound boardings were used because these correspond to the morning commute trips into Washington D.C. The expansion factors applied to 2005 trips by station are shown in Table 72 and Table 73.

Average Daily VRE Ridership
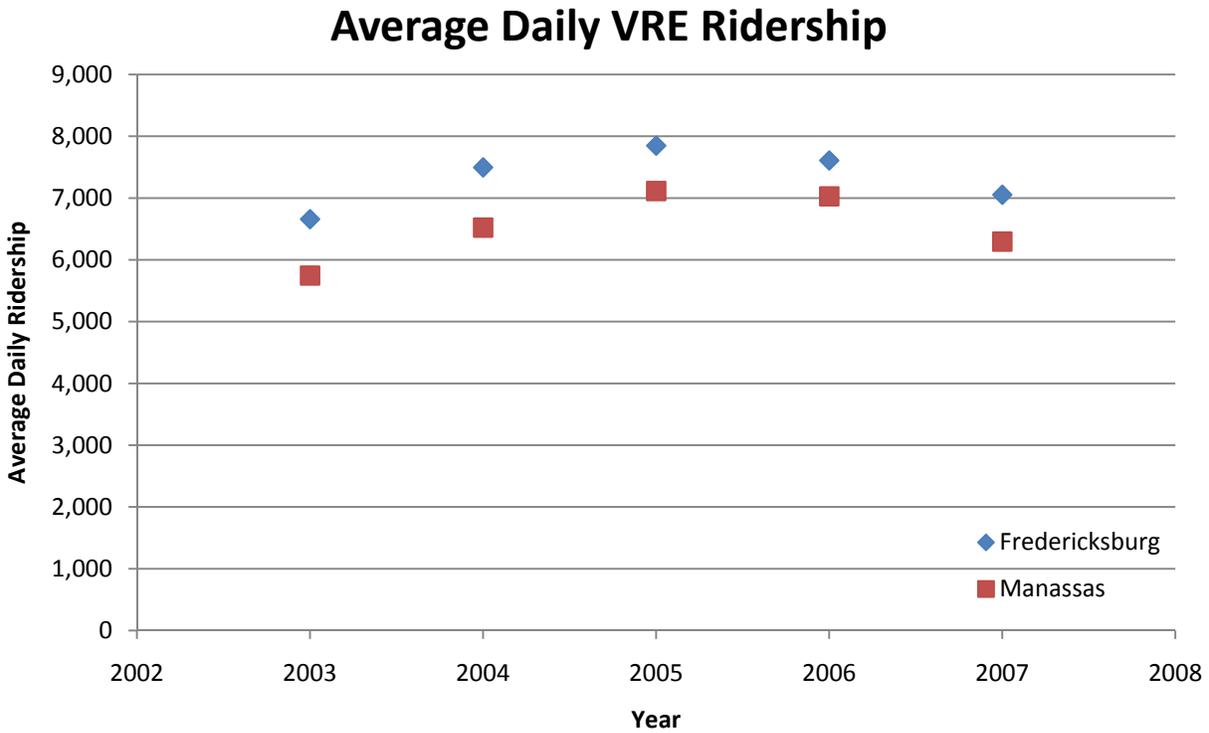
Figure 20 Average Daily VRE Ridership 2003-2007

Table 72 2005 and 2007 Boarding Counts by Station: Manassas Line

	BRU	MSS	MPV	BCV	RRV	BLR	ALX	CCV	LEF	WAS	TOTAL
2005	1023	605	698	756	467	183	9	0	0	0	3739
2007	706	675	630	763	387	145	15	0	0	0	3321
Ratio	70%	112%	90%	101%	83%	79%	175%	NA	NA	NA	89%

Table 73 2005 and 2007 Boarding Counts by Station: Fredericksburg Line

	FBG	LLR	BKV	QAN	RIP	WDB	LOR	FNC	ALX	CCV	LEF	WAS	TOTAL
2005	1073	677	353	296	457	543	248	77	13	1	0	0	3737
2007	858	604	338	372	390	657	210	79	11	1	0	0	3520
Ratio	80%	89%	96%	126%	85%	121%	85%	103%	86%	100%	100%	100%	94%

After assigning a new weight to each trip record, the survey responses had to be assigned to different market segments based on the production and attraction locations of the trip. Since only the home and work (or destination) zip codes are available, these needed to be disaggregated into TAZs. This procedure was based on area proration, whereby each zip code was split into TAZs and the area of each

small segment was calculated. Then, the percentage of area of the zip code that falls into each TAZ was determined and applied to the survey record with the specified zip code as trip origin. The same procedure was followed for the destination location. In the end, each trip record was broken down into many records with corresponding origin and destination TAZs.

The weighted trip records were then assembled into 20 market segments based on the production and attraction TAZs as described in Table 62. The resulting VRE targets by market segment are shown in Table 74. Trips by access mode to transit are shown in Table 75. Similar to MARC trips, over 40% of the trips on VRE originate externally. While all the VRE stations are located *inside* the modeled area (see Figure 21), VRE still gets many riders who come from beyond the modeled area.

Table 74 VRE Trip Targets by Market Segment

Market Segment	Production Area	Attraction Area	Trips	% Trips
11	VA core/urban	Urban DC, MD, VA	16	0.12%
17	VA suburban	DC core	1,554	11.88%
18	VA suburban	VA core	1,287	9.85%
19	VA suburban	Urban DC, MD, VA	3,003	22.97%
20	VA suburban	Suburban MD, VA	810	6.19%
External			6,405	48.99%
Total			13,074	100.00%

Table 75 VRE Trip Targets by Access Mode

Access Mode	Trips	% Trips
KNR	983	7.51%
PNR	11,466	87.62%
WALK	636	4.86%
Total	13,086	100.00%

*Note: The summary of access modes includes external trips

Figure 21 VRE commuter rail service in 2010

Chapter 3   Applications Track

3.1 Version 2.2 Travel Model

The currently adopted travel demand forecasting process is known as the Version 2.2 model.   Since the initial release of Version 2.2 travel model in March of 2008, a few enhancements have been implemented and documented. The most significant enhancements implemented since 2008 include: 1) the application of tolls to external (I-X and X-I) travel markets in addition to internal travel markets and 2) the addition of an explicit HOV assignment step to the traffic assignment process (also known as the "two-step" assignment).

TPB has also recently modified the Version 2.2 model with respect to the treatment of future auto operating costs in the mode choice model. Auto operating costs are expressed as a per-mile rate and relate to the traveler's out-of-pocket expenses associated with gas, oil, tire wear, and general maintenance (ownership costs relating to the vehicle purchase, insurance, and registration fees are not included). Version 2.2 auto cost units are 1994 cents.   For the past several years, TPB has assumed that auto operating costs would be falling with respect to inflation, from 8.3 cents/mile in 2005 to 7.8 cents/mile in 2030. This assumption has been modified following the gas price spikes experienced locally and nationally during the spring and summer of 2008. TPB currently assumes that gas prices will rise with inflation. In other words, the current assumption that 2010 auto operating cost value of 8.2 cents per mile will be maintained through time instead of declining.

The treatment of auto operating costs in forecast years is subject to a variety of factors that are constantly in flux. If one focuses only on increasingly stringent fuel economy standards, the growing presence of hybrid and alternative fuel vehicles in the overall fleet mix, and growing public embrace of fuel efficient driving habits (or "eco-driving") then it could be argued that auto operating costs should be declining in the future with respect to inflation.   On the other hand, improved fuel economy can result in increased driving distances as a behavioral response, thus offsetting the per mile cost savings. Furthermore, the price of gas itself is subject to global economic and political influences that are difficult to predict over the next six months, let alone over 30 years.

TPB will periodically monitor factors affecting auto operating costs so that an informed and reasonable assumption can be justified in travel forecasting.   The current TPB assumption, that auto costs will rise with inflation, is deemed the most reasonable assumption at the present time.

3.2 Version 2.3 Travel Model

This section discusses work done by TPB staff thus far in preparing to develop the Version 2.3 model on the 3,722 TAZ system. An overview will be first presented to describe model work to be done during FY-2011. This section also discusses the development of land activity on the new area system and the development of external and through trips. The final section discusses work done to support truck modeling on the new zone system.

3.2.1 Overview

This section provides a brief overview of the Version 2.3 model and details the various modeling components that will be updated with the newly assembled data described throughout this report. The base year for model calibration is 2007, the calendar year for which most of the HTS survey data was collected.   As stated earlier, the Version 2.3 model is an incremental refinement of the existing Version 2.2 model currently used by TPB in application. It is a trip-based, four-step model that will be recalibrated to newly collected data over a more detailed TAZ system, now known as the TPB 3722 TAZ system.

TPB has already prepared a year-2007 highway and transit networks on the new 3,722 TAZ system in a format that is compatible with the transportation software that is being used to support the calibration effort. Currently, path checking of the highway and transit networks are in progress. TPB is also working to relate average weekday traffic counts to highway network links, as the model will be calibrated to match average weekday conditions.   TPB has in recent years worked with a dearth of hourly traffic count data with which to assess highway link loads by time period. The Version 2.3 model development effort will make more intensive use of available hourly data than has been use previously.

The highway network will utilize the same facility type classification used by the Version 2.2 model. There are five facility categories: freeways, major arterials, minor arterials, collectors, expressways, and ramps. Clearly, more detailed facility designations would benefit the TPB's modeling work and this is a consideration for future network development work.

The analysis of the 2007/08 HTS has been a primary focus of the TPB's work program during FY-2010 as the survey will provide the basis for the trip generation, trip distribution, mode choice, and time of day estimation and calibration work.   The established modeled purposes used in Version 2.3 will be:

1. Home-Based Work (HBW)
2. Home-Based Shop (HBS)
3. Home-Based Other (HBO)
4. Non-Home-Based Work (NHW)
5. Non-Home-Based Other (NHO)

Demographic models used to apportion total zonal households among 64 cross-classes: 4 size groups (1, 2, 3, 4+) by 4 income levels approximating quartile groups, by 4 household vehicle availability groups (0, 1, 2, 3+).   The existing aggregate share models used to distribute households by size and income groups will be applied on the new TAZ system and compared to 2007 ACS data at the jurisdiction level. The comparison may indicate the need for minor adjustments. The vehicle availability model is a discrete "choice" (or logit) model that computes the probability of a household owning a certain number of vehicles based on income, size, area type, and transit accessibility. This vehicles available sub-model will be re-estimated using HTS data.

The Version 2.3 trip generation model is a set of trip rates, cross-classified by household size, vehicles available, and four household income levels approximating quartile ranges. The trip rates will correspond to the aforementioned 64-cross-classes, and will be developed by purpose from the HTS.

The rates of adjacent cells will be analyzed for statistical homogeneity and assessed for general reasonability. As stated previously, the trip rates generation rates will reflect both motorized travel (auto and transit) as well as non-motorized travel modes (walking and bicycling), so that the effects of development policies providing non-motorized opportunities can be assessed by the regional model. This particular policy area is of great interest to many TPB members. Past experience has shown that the VMT resulting from an assignment of HTS-based trips to the highway network is typically less than the VMT that is indicated by observed traffic counts. While there are many explanations for this, it is generally accepted that all home interview surveys are subject to trip underreporting, particularly with respect to short non-work trips. A macro adjustment factor is usually applied to the non-work trip rates to account for under-reporting. This consideration will need to be addressed prior to model application.

The trip generation process will also include two sub-models. First, an internal-to-external (I-X) model is used to split external trip productions apart from total (I-I and I-X) productions. This type of apportionment is needed because external trips are developed exogenously, or outside of the trip generation process. Therefore the external trips produced by the trip generation process must be identified and removed to avoid double counting in model application. The HTS will serve as the basis for estimating the I-X model. Second, a non-motorized trip end estimation model will be needed to identify the number and share of person trip productions that are related to non-motorized travel. Non-motorized shares will be estimated at both production and attraction ends so that walking and bicycling markets can be identified at zone level. It is not yet known whether the non-motorized model will be a regression or logit choice model, but both will be explored. TPB plans to explore models that relate HTS-based non-motorized data with development (density-type) variables as well as pedestrian environment variables as part of the estimation work.

Trip attraction models will be developed by modeled purpose, using standard regression techniques. HTS attraction-based data will be combined with zonal land use and several model forms will be evaluated. Because home interview type surveys are commonly statistically "thin" at the attraction end, models involving zonal aggregations (or "floating distances") will be considered. TPB will also need to devise a method for apportioning total trip attractions among income groups. As the trip distribution model is income-stratified, productions and attractions must be furnished at both the production and attraction ends.

The trip distribution models will be developed for each of the five modeled purposes using a standard gravity model framework. The home-based purposes will be developed by income level (separate F-factors will be formulated). It is assumed that the gravity models developed previously for external travel markets will be maintained in Version 2.3, as no recent auto external survey has been conducted. The updated truck models in TPBs earlier Version 2.3 release will also be maintained, but the adjustment (or "delta") matrix developed previously on the 2,191 TAZ system will be adapted to the new TAZ system. The existing Version 2.2 trip distribution application includes seven gravity model iterations. TPB staff will investigate increasing the number of iterations as part of the trip distribution work.

The mode choice model development will involve the development of a nested logit formulation using the AEMS application program developed previously by AECOM Consult, Inc. TPB has spent a great

amount of time during FY-2010 assembling calibration targets for 4 purposes, by 20 market segments, by 15 modal choices. TPB staff will investigate model estimation work, if time allows, to statistically estimate basic mode choice coefficient values, but many proceed with asserted coefficient values if necessary. Separate models will be developed for each purpose, with the possible exception that NHW and NHO trips may be combined into a single NHB purpose at the mode choice step.

The time-of-day model will be developed using fixed factors summarized from the 2007/08 HTS. The traffic assignment will be developed for four discrete time periods instead of three as is currently used in Version 2.2. Based on comparisons with observed traffic counts free-flow speed and capacity values may be updated and VDF curves (by facility type) may be adjusted or replaced. The peak hour percentages will be updated based on the HTS or other possible information sources. It is also likely that the current number of equilibrium iterations currently used (60) will need to be increased.

3.2.2 2007 Land Activity for the 3,722 TAZ Area System

In FY 2010, the adopted version of land activity forecasts was Round 7.2a of the Cooperative Forecasts.[36] Round 7.2a uses the 2,191-TAZ area system. In FY 2011, the Round 8.0 Cooperative Forecasts are due to be released. Round 8.0 will be the first set of land activity forecasts to make use of the 3,722-TAZ area system (a version is also to be released using the 2,191-TAZ area system for backward compatibility). However, in FY 2010, Round 8.0 was not yet available. Consequently, to use in model estimation/calibration activities in FY 2010, TPB staff decided to develop what came to be known as the "Pseudo Round 8.0" land activity forecasts, which would be used until the true Round 8.0 land activity forecasts were available in FY 2011. One of these was developed for households[37] and one for employment.[38] This section describes the effort to combine the pseudo Round 8.0 land activity data with other data sets, resulting in a new zonal land use file named *zone.dbf*, which will support the Version 2.3 model development on the 3,722-TAZ area system. The existing zone file required by the Version 2.2 model (assigned the generic name *zone.asc*) includes the following items:

- Households;
- Population by category (household and group quarters);
- Employment by category (office, retail, industrial, and other);
- Standard jurisdiction code (0-23);
- Land area;
- Household income index (ratio of median zonal income to regional median income); and
- Airline distance to the nearest external station (miles).

The newly created file contains the same information as the existing land use file, except that: 1) the file carries two additional attributes, the X and Y coordinates of the zone centroid, and 2) distance to the nearest external station is now expressed in decimal miles as opposed to whole miles. The Version 2.3

---

[36] Ronald Milone to DTP Technical Staff, "Travel Model Inputs Prepared Using Round 7.2A Cooperative Forecasts," Memorandum, December 7, 2009.

[37] Robert Griffiths to Ronald Milone, "Pseudo Newtaz Round 8.0 Household File for 2007," March 4, 2010.

[38] Clara Reschovsky and Meseret Seifu to Robert Griffiths and Ronald Milone, "Generating 2007 Employment Estimates," Memorandum, March 19, 2010.

land use file has been created in dBase format in contrast to the existing file which has been historically provided in a text/fixed-field format.

The new land activity file was created by combining zonal data generated by several TPB staff members in recent months. The source files are listed on Table 76. Additional processing of the files was necessary in some cases to further refine the source information provided. The processing was accomplished using a series of Cube Voyager scripts, graphically shown on Figure 22 at the end of this section. The operations in each script are further described below.

Adj_Employment.s – This script was used to implement CTPP-based employment adjustments that have been used for the past several years as part of the preparation of Cooperative Forecasting land use data prior to travel modeling work. The adjustments are used to address definitional differences in employment used by non-TPB-member areas. The TPB's existing practice is to apply fixed employment adjustments (shown in Table 77) to all employment categories on a jurisdictional basis. The adjustments are assumed to remain constant over time. The pre- and post-adjusted employment results are shown in Table 78.

Table 76 Source Files Used in the Construction of 2007 Zonal Land Activity

Filename	Contents	Creator	Documented
TPBTAZ_AreaEqv.dbf	Zone area and area-based equivalencies of 2,191 and 3,722 TAZ systems	Seifu	Yes
TPBTAZ_TotEmp07.DBF	2007 "pseudo" Round 8.0 employment by type (w/o CTPP adjustments) at the 3,722 TAZ level	Reschovsky	Yes
2007_Node.dbf	Highway network node XY file from the 2007 3,722 TAZ highway network	Seifu	No
TPBTAZ_HH.DBF	2007 "pseudo" Round 8.0 households and population (HH and GQ) at the 3,722 TAZ level	Griffiths	No
inc_TAZ_eqv.txt	Ratio of zonal median HH income to the regional median income (based on 2000 CTPP data) in tenths (e.g., '10' = 1.0) at the 3,722 TAZ system	Humeida	Yes

Table 77 2000 CTPP- Based Employment Adjustments

Juris	CTPP-Based Employment Factor
dc	
mtg	
pg	
arl	
alx	1.000000
ffx	
ldn	
pw	
frd	
how	0.844375
aa	0.853219
chs	1.000788
car	0.802331
cal	0.998598
stm	0.939573
kg	1.000000
fbg	1.018265
sta	1.009934
spt	1.071646
fau	1.224679
clk	1.343964
jef	1.254410

Table 78 "Pseudo" Rnd. 8.0 Jurisdictional Employment - Before/After CTPP Adjustments

Juris	Pre-Adjusted Employment					Post-Adjusted Employment Totals				
	Office	Retail	Industrial	Other	Total	Office	Retail	Industrial	Other	Total
dc	435,118	83,212	63,429	181,125	762,891	435,118	83,212	63,429	181,125	762,891
mtg	255,903	88,923	48,005	109,077	501,894	255,903	88,923	48,005	109,077	501,894
pg	82,871	82,642	54,341	131,796	351,640	82,871	82,642	54,341	131,796	351,640
arl	102,138	35,296	22,205	33,272	192,913	102,138	35,296	22,205	33,272	192,913
alx	69,553	21,539	11,259	10,964	113,314	69,553	21,539	11,259	10,964	113,314
ffx	444,508	112,779	64,218	32,807	654,342	444,508	112,779	64,218	32,807	654,342
ldn	55,176	19,285	30,550	34,668	139,696	55,176	19,285	30,550	34,668	139,696
pw	57,391	43,667	28,398	13,838	143,300	57,391	43,667	28,398	13,838	143,300
frd	38,895	21,442	17,573	49,390	127,310	38,895	21,442	17,573	49,390	127,310
how	54,544	23,815	54,546	54,544	187,446	46,056	20,109	46,057	46,056	158,275
aa	89,047	66,471	89,039	89,047	333,612	75,977	56,714	75,970	75,977	284,644
chs	23,752	20,016	9,756	7,150	60,677	23,771	20,032	9,764	7,156	60,725
car	21,858	14,779	21,851	21,858	80,335	17,537	11,858	17,532	17,537	64,455
cal	13,930	9,128	7,001	3,973	34,029	13,910	9,115	6,991	3,967	33,981
stm	26,582	12,654	10,338	10,606	60,177	24,976	11,889	9,713	9,965	56,541
kg	1,945	469	1,945	1,945	6,303	1,945	469	1,945	1,945	6,303
fbg	7,442	4,403	7,442	7,442	26,729	7,578	4,483	7,578	7,578	27,217
sta	14,446	4,075	11,699	11,699	41,918	14,590	4,115	11,815	11,815	42,334
spt	7,562	5,794	7,562	7,562	28,482	8,104	6,209	8,104	8,104	30,523
fau	8,420	4,622	4,389	2,408	19,841	10,312	5,660	5,375	2,949	24,299
clk	1,705	969	1,530	487	4,691	2,291	1,302	2,056	655	6,305
jef	5,917	3,541	3,777	1,996	15,232	7,422	4,442	4,738	2,504	19,107
Sum	1,818,703	679,521	570,853	817,654	3,886,772	1,796,021	665,184	547,616	793,144	3,802,009

SumArea.s - The file named *TPBTAZ_AreaEqv.dbf* contains the spatial relationship between the 2,191 and 3,722 TAZ systems in a tabular form. Each file record represents a discrete area unit (polygon) that results when the 3722 TAZ area system is superimposed over the 2191 system. Each record includes:

- the 2,191 TAZ number (TAZ2191)
- the 3,722 TAZ number (TPBTAZ3722) COG TAZ
- percent of 3,722 TAZ area that lies within the 2,191 TAZ (PNEWINOLD)
- percent of 2,191 TAZ area that lies within the 3,722 TAZ (POLDINNEW)
- Land area (sq.mi.) of the 3,722 TAZ in the area portion (TOTLA3722)
- Land area (sq.mi.) of the 2,191 TAZ in the area portion (TOTLA2191)
- Land area (sq.mi.) of the area polygon

The SumArea.s script was used to read this file and accumulate the land area within each TAZ in the 3,722 system. The result is a zonal area file corresponding to the 3,722 system (*TPB3722Area_sqmi.dbf*).

Accum_HHJobs.s – The script was used to generate what is commonly referred to as "floating-zone" land activity and land area for the 3,722 TAZ area system. The script reads files containing zonal land activity (population and jobs), zonal land area, and highway network node coordinates (X, Ys) and generates the number of people, jobs, and land area within varying distances of each TAZ. The zonal data is accumulated on an "all-or-nothing" basis, based purely on the airline distance between each zone centroid to all neighboring centroids (i.e., the accumulation is not developed on pro-rated area basis). The program generates floating zone data based on multiple distance tolerances (0.50 mile, 1.00 mile, and 1.50 mile). The script also created a TAZ coordinate file (TAZ_XYs.dbf).

Nearest_Extl.s – The script read the TAZ coordinate file, created above, and generated a zone file containing the minimum airline distances between each internal TAZs to its nearest external station (named TAZ_AirDist_Externals.dbf). This information will be used in a calibration file for estimating the proportion of trip productions that are bound for external locations. The portion of trip productions destined to external locations must be determined and removed, prior to the trip distribution step to avoid double counting (TPB's existing modeling practice involves the use of external trip inputs that are generated exogenously).

Land_Use_File.s - The Land_Use_File.s script combines all of the individual zonal files into a single file (*Zone.dbf)* that can be used by the travel model and for future calibration files. The script included some quality control (QC) checks that would preclude the program from writing a complete output file. The QC checks included:

- The presence of negative land use values (all land activity categories)
- The presence of negative land area values
- The presence of negative X, Y coordinate values
- Unreasonable implied average household sizes implied by the land use
- Zonal Income ratio values outside of reasonable tolerance ranges
- Jurisdiction code values outside of expected ranges

Check_Land_Use_File.s - This script was used to furnish global totals and basic statistics, and to generate jurisdictional summaries for future reference. Table 79 shows the global statistics of each data item in the file. Table 80 provides land activity totals by jurisdiction. The land use file contains 3,709 records representing 3,662 internal (or "used") TAZs and 47 external stations. In other words, 13 TAZs are not used in what we now refer to as the 3,722 TAZ system.

Table 79 Global Statistics – File: Zone.dbf

Variable	Sum	Minimum	Maximum	Average
TAZ	---	1	3,722	---
HHs	2,339,832	0	9,296	639
HHPOP	5,860,693	0	24,733	1600
GQPOP	119,669	0	7,529	33
TOTPOP	5,980,362	0	24,772	1633
TOTEMP	3,801,935	0	42,638	1038
INDEMP	547,612	0	14,111	150
RETEMP	665,172	0	4,873	182
OFFEMP	1,796,018	0	20,298	490
OTHEMP	793,133	0	18,097	217
LandArea	6,795.68	0	44.81	1.86
JURCODE	---	0	23	---
HHIncIdx	---	0	37	---
ADisttoX	---	0	38.99	---
TazXCrd	---	985255	1500309	---
TazYCrd	---	151817	748126	---

Table 80 Jurisdictional Summary of 2007 "Pseudo" Round 8.0 Land Activity

	HH	HHPOP	GQPOP	Total_POP	Total_EMP	Office	Retail	Indust	Other	Land_Area	HH_Size	JobHHRatio
DC	252,137	492,794	35,604	528,398	762,884	435,118	83,212	63,429	181,125	60.939	1.954	3.026
MTG	342,690	888,819	10,618	899,437	501,908	255,903	88,923	48,005	109,077	492.135	2.594	1.465
PG	293,982	754,574	20,122	774,696	351,650	82,871	82,642	54,341	131,796	483.245	2.567	1.196
ARL	91,109	182,346	4,155	186,501	192,911	102,138	35,296	22,205	33,272	25.949	2.001	2.117
ALX	61,430	116,043	1,901	117,944	113,315	69,553	21,539	11,259	10,964	14.941	1.889	1.845
FFX	380,539	973,245	14,321	987,566	654,312	444,508	112,779	64,218	32,807	400.155	2.558	1.719
LDN	92,185	244,966	852	245,818	139,679	55,176	19,285	30,550	34,668	517.123	2.657	1.515
PW	139,095	391,018	4,384	395,402	143,294	57,391	43,667	28,398	13,838	348.759	2.811	1.030
FRD	82,594	216,740	4,655	221,395	127,300	38,895	21,442	17,573	49,390	661.222	2.624	1.541
HOW	99,393	269,375	1,362	270,737	158,277	46,056	20,107	46,058	46,056	251.111	2.710	1.592
AA	190,389	482,134	7,528	489,662	284,632	75,975	56,711	75,971	75,975	411.573	2.532	1.495
CHS	50,065	134,563	1,429	135,992	60,700	23,766	20,027	9,757	7,150	456.671	2.688	1.212
CAR	61,096	167,594	1,596	169,190	64,455	17,534	11,857	17,530	17,534	447.820	2.743	1.055
CAL	29,255	81,870	660	82,530	34,002	13,914	9,121	6,997	3,970	213.019	2.798	1.162
STM	36,561	96,089	3,226	99,315	56,547	24,980	11,891	9,710	9,966	355.812	2.628	1.547
KG	8,228	22,741	479	23,220	6,304	1,945	469	1,945	1,945	179.650	2.764	0.766
FBG	9,029	18,475	2,583	21,058	27,220	7,579	4,483	7,579	7,579	10.425	2.046	3.015
STA	39,400	113,486	1,496	114,982	42,306	14,582	4,108	11,808	11,808	269.061	2.880	1.074
SPT	33,707	92,663	552	93,215	30,535	8,109	6,208	8,109	8,109	160.198	2.749	0.906
FAU	22,935	59,276	569	59,845	24,294	10,311	5,660	5,375	2,948	650.025	2.585	1.059
CLK	5,319	13,198	311	13,509	6,305	2,292	1,303	2,057	653	176.159	2.481	1.185
JEF	18,694	48,684	1,266	49,950	19,105	7,422	4,442	4,738	2,503	209.691	2.604	1.022
Total	2,339,832	5,860,693	119,669	5,980,362	3,801,935	1,796,018	665,172	547,612	793,133	6795.684	2.505	1.625

Table 81 shows a comparison of the 2007 "Pseudo" Round 8.0 land use totals with those of the previous Round 7.2A forecasts.   The table indicates that the Round 8.0 land activity is less than that of Round 7.2A, down by 3% for households and about 0.50% for jobs. The implied average household size for Round 8.0 is about 2.50, in contrast to that of Round 7.2A, about 2.61.   These findings are consistent with the information presented by Bob Griffiths in recent months.

Table 81 Comparison of 2007 Round 7.2A vs. "Pseudo" Round 8.0 Land Activity

	HH	HHPOP	GQPOP	Total_POP	Total_EMP	Office	Retail	Indust	Other
Round 7.2A	2,412,303	6,311,365	120,929	6,432,307	3,820,293	1,811,869	669,973	543,130	795,328
"Pseudo" Round 8.0	2,339,832	5,860,693	119,669	5,980,362	3,801,935	1,796,018	665,172	547,612	793,133
difference	-72,471	-450,672	-1,260	-451,945	-18,358	-15,851	-4,801	4,482	-2,195
Percent difference	-3.00%	-7.14%	-1.04%	-7.03%	-0.48%	-0.87%	-0.72%	0.83%	-0.28%

Note: includes CTPP-Based Employment Adjustments

Conclusions

This new 2007 land activity file is the culmination of several months work by a team by staff members finalizing the 3,722 TAZ system, generating land activity on the new TAZ system, and getting centroid numbers established in the highway network. This file will be used to support calibration work for the Version 2.3 model and ultimately as an input to the model application process. The comparison of this data against actual Round 8.0 land use (soon to be released) is another task yet to be done.

2007 Zone File Development - 3,722 TAZ System
Subdirectory: I:\ateam\mod_inputs\lu\V2.3_LandUse_taz3722

TAZ_XYs.dbf → **Nearest_Extl.s**

Node XY file from network
development work (M. Seifu)

New TAZ file containing zonal
HHs, HH pop, GQs from R. Griffiths
TPBTAZ_HH.DBF

2007_Node.dbf →

TAZ_AirDist_Externals.dbf

Zonal file containing airline distance to
nearest external station

adj_employment.txt

New TAZ file containing zonal
employment by type from C. Reschovski
(Without CTPP adjustments

TPBTAZ_TotEmp07.DBF → **adj_Employment.s** → TPBTAZ_TotEmp07Adj.dbf → **Accum_HHJobs.s** → TAZ_2007AreaType_CalibFile.dbf

Zonal emp. file w/ CTPP adjustments

Zonal file containing pop., jobs, area
within 0.5, 1.0, and 1.5 miles to each zone

TPBTAZ_AreaEqv.dbf → **SumArea.s** → TPB3722Area_sqmi.dbf → **Area_Type_V2.3.s**

Zone file containing old/new TAZ
area equivalencies from
M. Seifu

Zonal land area (sq.mi) file, new TAZs

TAZ_2007AreaType_File.dbf

Zonal area type file based on 1-mile
floating radius/ udpated specs.

Land_Use_File.s

Zone.dbf

Juris_Median Ratios 2000_2007.xlsx   (manual export) → inc_TAZ_eqv.txt

Check_Land_Use_File.s

2007 Zonal Median HH Income File (H. Humeida)
Based on 2000 CTPP Ratios

Check_Land_Use_File.txt

Figure 22 2007 Zonal File Development

3.2.3 2007 External and Through Trips

The observed 2005 external and through trips were updated using 2007 observed counts assembled from the Regional Transportation Data Clearing House (RTDC) and truck percentages at external stations. This update will be used as part of the Version 2.3 travel model calibration work which is being developed in a more detailed TAZ system. External travel refers to trips that have one end of the trip outside the modeled area. There are two types of external trips: external- internal (X-I trip ends) or internal-external (I-X trip ends). Through trips (X-X) are trips that pass through the modeled region between any two external points of the highway network. The 2191-TAZ system supporting the current TPB model includes 47 external stations, numbered 2145 to 2191. The Version 2.3 travel model is being developed based on a more detailed 3722-TAZ system which maintains the existing external stations used in the 2,191-TAZ system. However, the external station numbers have been renumbered from 2145- 2191 to 3676-3722 shown in Table 82. The locations of the renumbered 47 external stations in the TPB modeled area are shown in two maps, Figure 23, and Figure 24

3.2.3.1 2007 Observed Counts Adjustments

The Version 2.3 travel model requires external productions (X-I) and external attractions (I-X) as an input to the trip generation model. The automobile and light-duty truck trip-ends are specified by five purposes, HBW, HBS, HBO, NHB and Commercial Vehicle (CV). The truck trip-ends are specified by two types, Medium trucks and Heavy trucks. Through trips are distinguished among two subgroups: automobile drivers and trucks.

The 2007 external count data staff obtained from the state DOTs was found to have gaps, specifically for West Virginia and other external stations in Maryland, and truck percentages on the Baltimore Washington Parkway that should not be there on a truck-free facility. The following methods were used to account for the gaps/missing data:

- For the external stations with missing counts, the existing 2005 external station's count was grown by 1 percent: $(2005\ Count\ \times 1.01)$. This adjustment was applied because the existing 2007 counts showed a 1% change from the 2005 counts.
- For the missing truck percentages at West Virginia external stations, 2 percent medium truck and 1 percent heavy truck was assumed. This adjustment was made based on professional judgment by considering available truck percentages.
- For some Maryland external stations, the adjacent station's truck percentages were assumed.
- Truck percentages for Baltimore Washington Parkway were assumed to be zero.

After 2007 counts were established at all stations, staff developed external and through trips by applying existing 2005 distributions to the counts. More specifically:
1. Internal percentages applied to remove double crossers from the auto totals
2. Observed 2007 truck percentages by type (medium and heavy) were applied, – Total Auto/CV and Truck volumes were established
3. Auto/CV were apportioned by external-internal (X-I, I-X) and through trips (X-X), based on existing 2005 proportions
4. Medium and heavy trucks were apportioned by movement type (I-X, X-I, X-X), based on existing 2005 proportions

A summary of the year-2007 external and through traffic count data at the 47 external stations is shown in Table 83.

Table 82 External Station Old/New TAZ equivalence

State	Old STA NUM	New Sta. Num	Facility
Virginia	2145	3676	VA 3 (East)
	2146	3677	US 301 (South)
	2147	3678	US 17
	2148	3679	VA 2
	2149	3680	I-95 (South)
	2150	3681	US 1(South)
	2151	3682	VA 208/606
	2152	3683	VA 612
	2153	3684	VA 3(West)
	2154	3685	US 15/29 (South)
	2155	3686	US 211
	2156	3687	I-66
	2157	3688	VA 55
	2158	3689	US 340
	2159	3690	US 17/50
	2160	3691	VA 7
West Virginia	2161	3692	WV 51
	2162	3693	WV 9
	2163	3694	WV 45
	2164	3695	MD 34/WVA 480
Maryland	2165	3696	Alt US 40
	2166	3697	I-70 (West)
	2167	3698	US 40
	2168	3699	MD 77
	2169	3700	MD 550
	2170	3701	MD 140/PA16
	2171	3702	US 15 (North)
	2172	3703	MD 194 /PA194
	2173	3704	MD 97/PA 97
	2174	3705	MD 30 (North)/ PA 94
	2175	3706	MD 86 / PA 516
	2176	3707	MD 88
	2177	3708	MD 30 (East)
	2178	3709	MD 140/91
	2179	3710	MD 26
	2180	3711	I-70 (East)
	2181	3712	US 40 (East) / MD 144
	2182	3713	I-95 (North)
	2183	3714	I-195 /US 1 (North)
	2184	3715	Md 295 / B/W Pkwy
	2185	3716	MD 170
	2186	3717	MD 648
	2187	3718	MD 3 / I-97
	2188	3719	MD 2
	2189	3720	MD 10
	2190	3721	MD 710
	2191	3722	US 50 (East) / 301
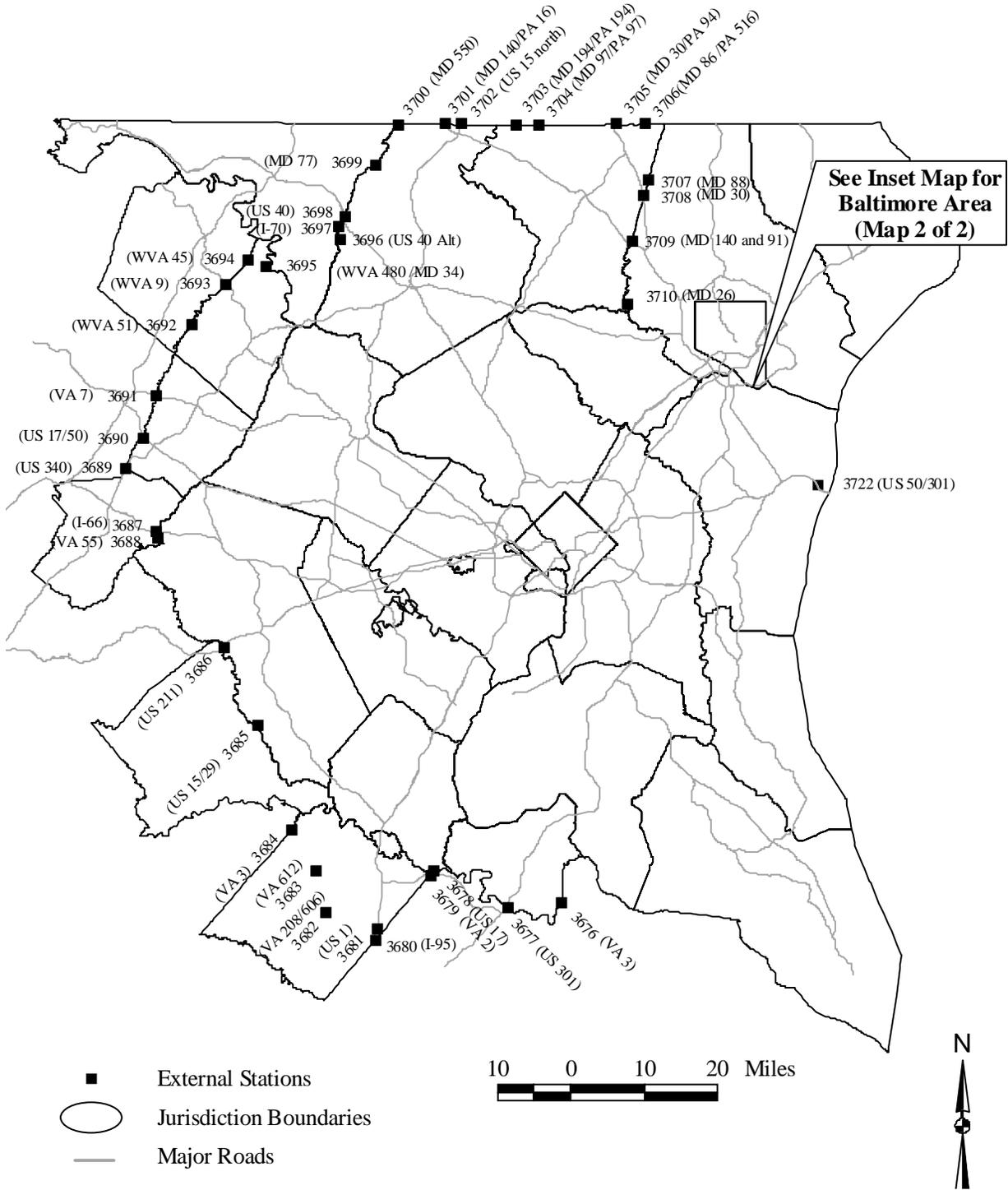
Figure 23 Location of External Stations on the 3,722 - Zone System Map 1 of 2
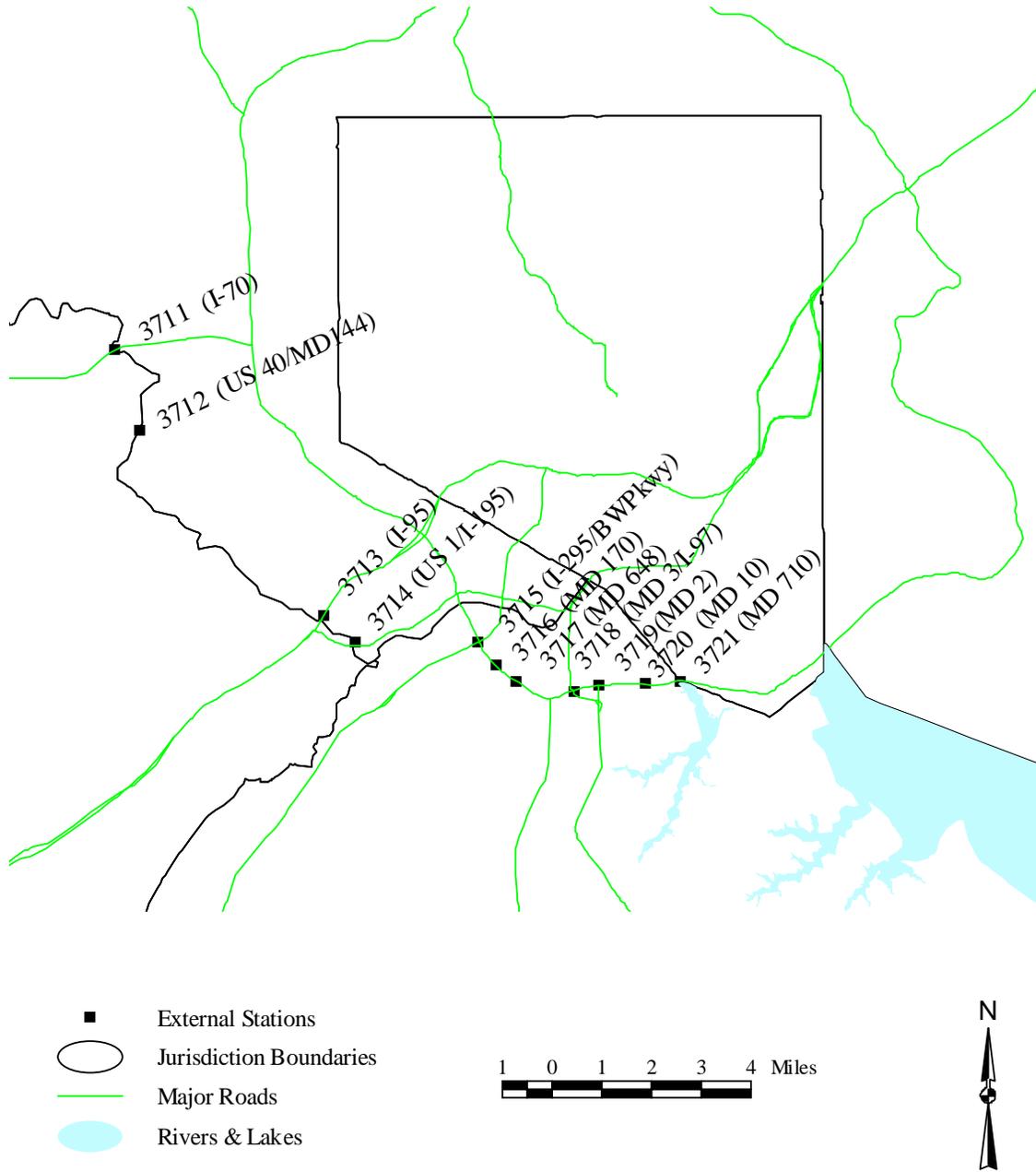
Figure 24 Location of External Stations on the 3722 – Zone (Inset Map for Baltimore Area) Map 2 of 2

Table 83 Year 2007 Traffic Count Data at External Stations

TAZ	Facility	Observed Count	AUTO_XI	AUTO_IX	AUTO_XX	Comm. Veh_XX	Comm. Veh_XI	Comm. Veh_IX	TRUCK_XX	TRUCK_XI	TRUCK_IX
3676	VA 3 (East)	5,722	2,673	2,098	551	0	157	155	220	91	91
3677	US 301 (South)	11,963	4,100	4,356	1,672	35	338	337	911	163	163
3678	US 17	5,037	2,792	1,893	0	0	240	240	226	63	63
3679	VA 2	6,181	3,522	2,412	0	0	333	333	124	62	62
3680	I-95 (South)	86,000	21,789	35,767	15,556	848	2,601	2,604	10,237	902	902
3681	US 1(South)	13,313	7,774	4,379	0	0	574	573	417	248	248
3682	VA 208/606	5,776	3,386	1,887	0	0	281	285	178	109	109
3683	VA 612	3,366	2,117	1,154	0	0	88	85	8	13	13
3684	VA 3(West)	24,882	14,169	7,894	1,135	0	1,261	1,265	710	255	255
3685	US 15/29 (South)	27,235	12,334	10,012	2,035	129	1,226	1,227	1,895	414	414
3686	US 211	16,425	10,290	5,358	298	0	840	839	34	64	64
3687	I-66	34,000	15,929	10,228	1,096	288	881	882	5,336	562	562
3688	VA 55	781	479	259	6	0	25	25	11	10	10
3689	US 340	8,456	4,537	2,811	285	0	356	356	545	104	104
3690	US 17/50	12,460	6,714	4,050	1,044	57	541	540	247	123	123
3691	VA 7	27,466	13,130	12,002	1,118	116	1,097	1,100	736	181	181
3692	WV 51	8,052	4,188	3,493	132	0	298	297	90	76	76
3693	WV 9	19,880	7,692	10,741	589	79	749	750	214	188	188
3694	WV 45	10,651	5,179	4,402	604	47	443	443	124	96	96
3695	MD 34/WVA 480	7,341	3,402	2,884	764	0	283	282	81	69	69
3696	Alt US 40	10,249	6,036	3,000	112	50	475	474	91	96	96
3697	I-70 (West)	70,534	30,060	19,712	7,533	603	1,852	1,849	7,247	2,689	2,689
3698	US 40	5,824	3,222	1,607	129	0	259	259	142	143	143
3699	MD 77	5,379	2,396	1,943	627	0	200	200	162	126	126
3700	MD 550	2,011	977	790	45	0	85	84	95	52	52
3701	MD 140/PA16	8,644	3,894	3,166	1,280	43	406	408	112	73	73
3702	US 15 (North)	19,283	7,601	6,979	2,088	167	968	964	1,096	677	677
3703	MD 194 /PA194	5,346	2,213	2,690	0	0	211	214	205	119	119
3704	MD 97/PA 97	9,756	3,934	4,830	18	16	152	150	416	270	270
3705	MD 30 (North)/ PA 94	16,141	5,431	6,650	2,246	23	207	207	573	609	609
3706	MD 86 / PA 516	2,303	959	1,173	0	0	39	38	78	46	46
3707	MD 88	4,234	1,847	2,260	0	0	74	75	48	40	40
3708	MD 30 (East)	22,691	7,701	9,478	3,370	32	297	296	783	663	663
3709	MD 140/91	50,438	17,388	30,917	442	218	2,072	2,078	643	435	435
3710	MD 26	32,822	10,355	18,407	117	62	597	597	1,332	958	958
3711	I-70 (East)	84,271	25,333	36,432	3,313	518	1,591	1,589	6,117	2,770	2,770
3712	US 40 (East) / MD 144	42,749	16,661	20,242	70	175	1,006	1,008	1,429	617	617
3713	I-95 (North)	203,394	74,383	73,084	11,830	1,045	3,213	3,216	8,664	4,053	4,053
3714	I-195 /US 1 (North)	42,315	17,638	13,161	92	151	1,437	1,437	310	268	268
3715	Md 295 / B/W Pkwy	99,565	59,074	29,412	651	779	2,392	2,391	0	0	0
3716	MD 170	14,085	4,235	4,785	0	0	690	689	124	259	259
3717	MD 648	18,512	5,822	6,584	0	0	554	555	82	110	110
3718	MD 3 / I-97	110,612	31,629	45,966	9,704	121	699	699	4,886	2,028	2,028
3719	MD 2	38,465	17,567	9,392	69	132	1,258	1,258	1,561	720	720
3720	MD 10	54,444	25,052	13,389	0	0	3,202	3,201	1,134	1,556	1,556
3721	MD 710	27,895	10,579	5,658	0	0	853	854	2,426	1,594	1,594
3722	US 50 (East) / 301	66,594	31,031	20,379	10,451	538	1,654	1,650	830	1,683	1,683
	Total	**1,403,542**	**569,214**	**520,167**	**81,073**	**6,272**	**39,057**	**39,057**	**62,927**	**26,448**	**26,448**

Note: Observed count includes double crossers. Auto and Trucks do not include double crossers.

3.2.4 Truck Model

The Version 2.3 model includes a revised truck model. The development of a commercial vehicle model started during FY-2007 with refinements completed during FY-2008.[39] Although the revised truck model includes components of trip generation, distribution and time-of-day that make use of transferred parameters, the models were developed solely on the basis of observed truck counts. The procedure is based on "adaptable assignment", which uses the observed trip tables for adjusting the generation and distribution models.[40]

The revised truck model was based on the 2,191 zone system while the latest Version 2.3 model is based on the new 3,722 zone system. Since a considerable amount of resources is required to re-calibrate the revised truck models on the new 3,722 zone system, an equivalency-based approach was used as an incremental solution.

Since all truck matrices or trip tables are based on the old 2,191 TAZ system, the goal of this update was to produce a one-to-one (one old TAZ to one new TAZ) equivalency table based on 2007 total employment on the new zone system. This was accomplished by applying three rules:

1. **One-to-one cases**: When the old and new TAZ boundaries are the same (i.e. the old TAZ was not split), the old TAZ number is equated to the new TAZ number (Figure 25).
2. **One-to-many cases**: When the old TAZ is split into more than one new TAZ, the procedure will allocate the new TAZ with the highest (2007) total employment to the old TAZ (Figure 26).
3. **Many-to-one cases**: If step 2 produces cases where one new TAZ is found to represent more than one old TAZ, the procedure will allocate the new TAZ with the highest employment to the old TAZ and delete all other records.
4. **Many-to-many cases**: If the old and new TAZ boundaries do not align such that an old TAZ is completely encompassed within one new TAZ or one new TAZ is encompassed within one old TAZ, the old TAZ is equated to the new TAZ with the largest employment that enclosed within the old TAZ (Figure 27, Figure 28, Figure 29, and Figure 30).

Two input files were used to develop the required equivalency file:

- The first file is an <u>area-based equivalency file</u> between the old (2,191) TAZ system and the new (3,722) TAZ system. Overall, the equivalency file consists of 3,964 records, representing combinations of 1,972 old TAZs and 3,668 new TAZs. Of the 1,972 old TAZs and the 3,722 new TAZs, there are 938 cases where the old TAZ is exactly equal to the new TAZ (i.e. there is no split of old or new TAZ). There are 2,459 records which represent one old TAZ split into many new TAZs. There are 494 records representing cases where many old TAZs are split into many new TAZs. Finally, there are few (72) cases which represent many old TAZs falling in one new TAZ. The summary of the equivalency file is shown in Table 84.

---

[39] Milone et al., *TPB Travel Forecasting Model, Version 2.3: Specification, Validation, and User's Guide*, Draft report (National Capital Region Transportation Planning Board, June 30, 2008).
[40] Complete description of the procedure is available in a report by William G. Allen entitled "Development of a model for Truck Trips", January 2008.

Table 84 Summary of Relationship in the Equivalency File

2191 TAZ To 3277 TAZ	Number	Pct
1:1	938	24%
1:M	2,459	62%
M:1	72	2%
N:M	494	12%
	3,963	100%

- The second file (TotEmp07_newTAZ_landuse.csv) includes employment information from the 2007 land use file. It was decided to use total employment as a surrogate to allocate one new TAZ to one old TAZ.

A SAS program was used to merge the two files. For each old TAZ, the SAS program computed the total 2007 employment based on the product of a) 2007 total employment of a new TAZ falling into an old TAZ and b) the percentage of the new 3,722 TAZ area falling in an old TAZ. An allocation procedure was then used to assign the new TAZ with the highest employment to the one old TAZ. (Several examples of the computation are shown at the end of this section in Table 85 and Table 86). There are some (34) cases where a new TAZ was allocated to more than one old TAZ. Since our target file is thought to contain only a one-to-one equivalency, the duplicate records were reduced to one by selecting the new TAZ with the highest employment (Figure 30). In a few cases with zero employment in the new TAZ, the allocation procedure arbitrary selected the first new TAZ (Table 86).

 The final file (Trk_TAZ_eqv.txt) consists of 1,938 records with one-to-one equivalency.

Figure 25 Case 1: An example of a one-to-one relationship: One old TAZ is equal to one new TAZ
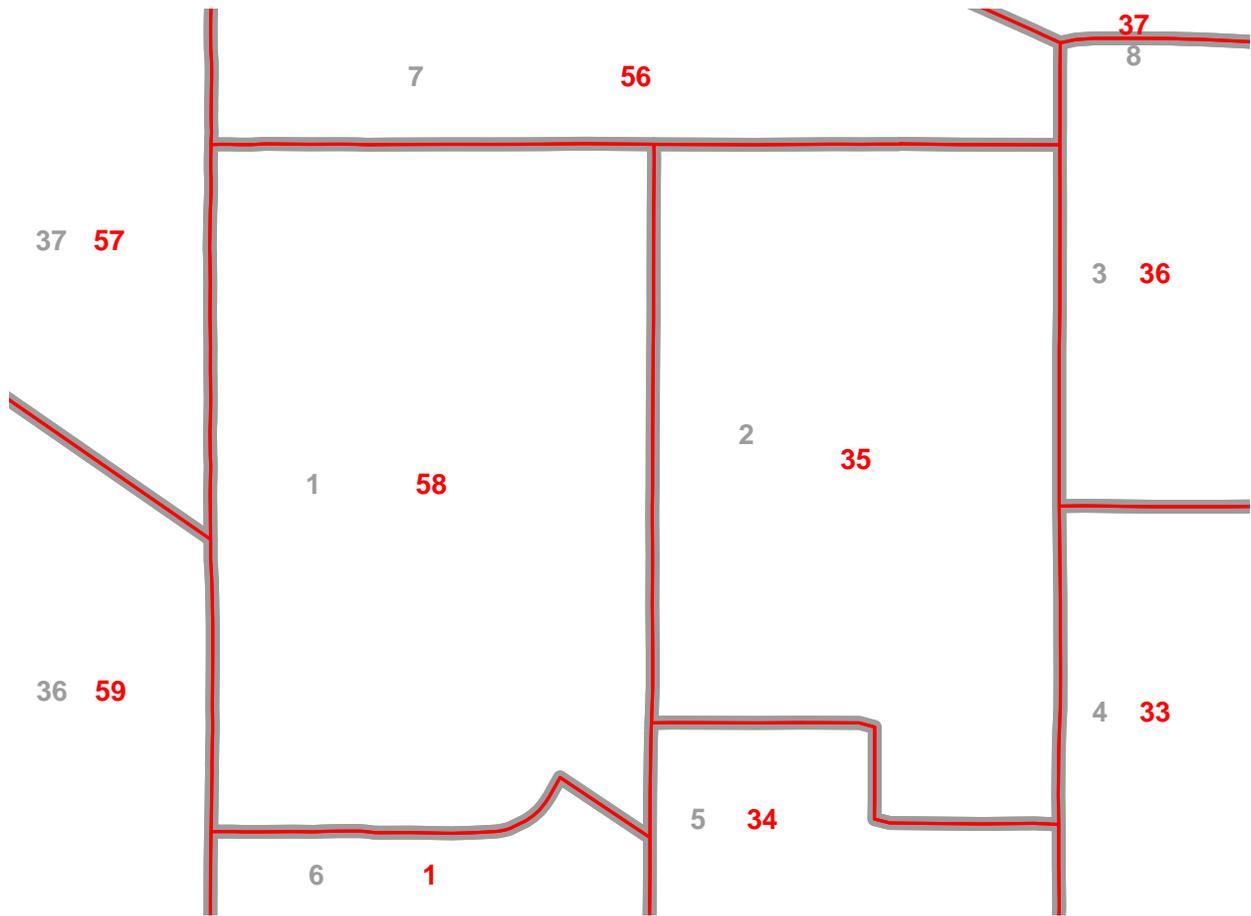
Figure 26 Case 2: An example of a one-to-many relationship: One old TAZ is equal to many new TAZs
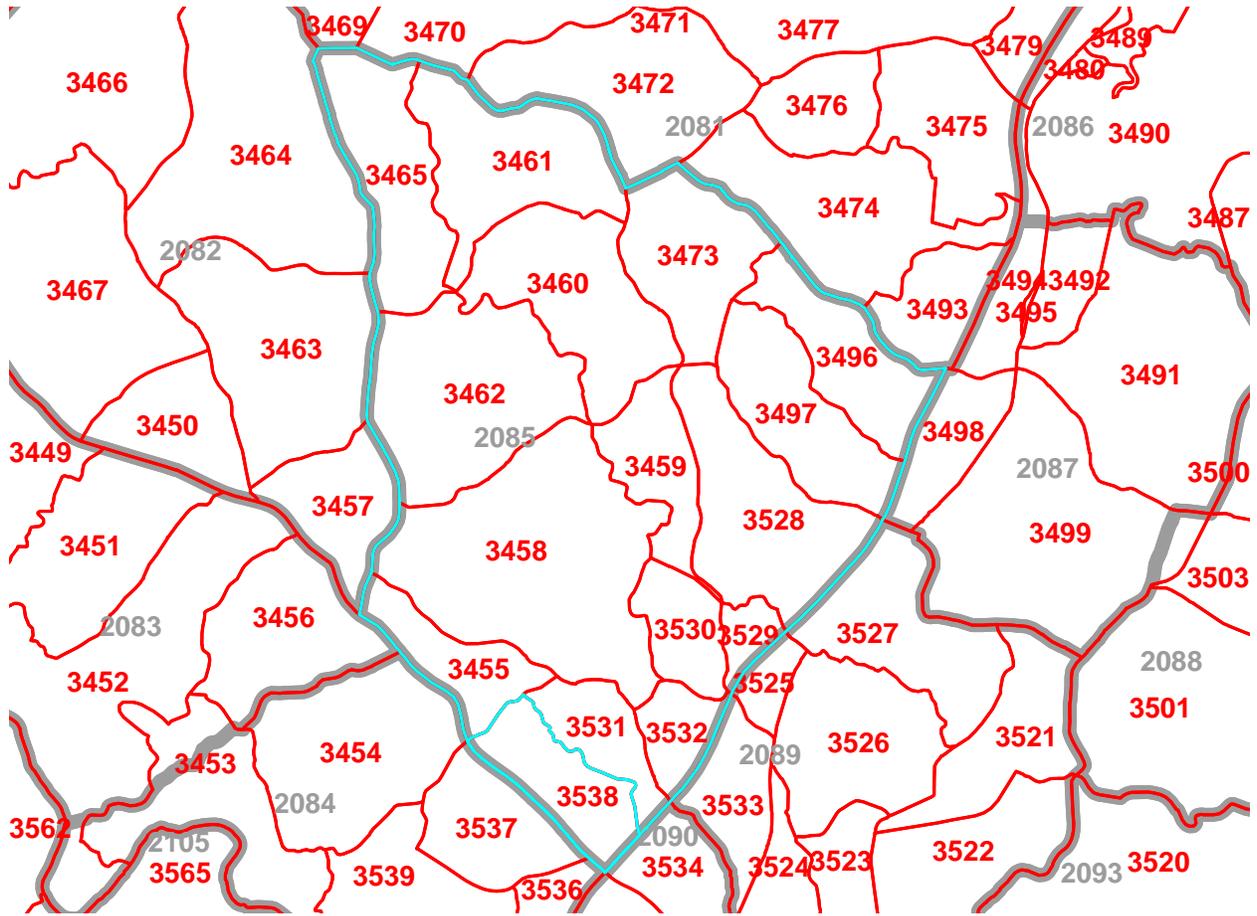
Figure 27 Case 2: An example of a many-to-many relationship: One old TAZ is equal to many new TAZs (not all of the new TAZs are 100% included in the old TAZ).
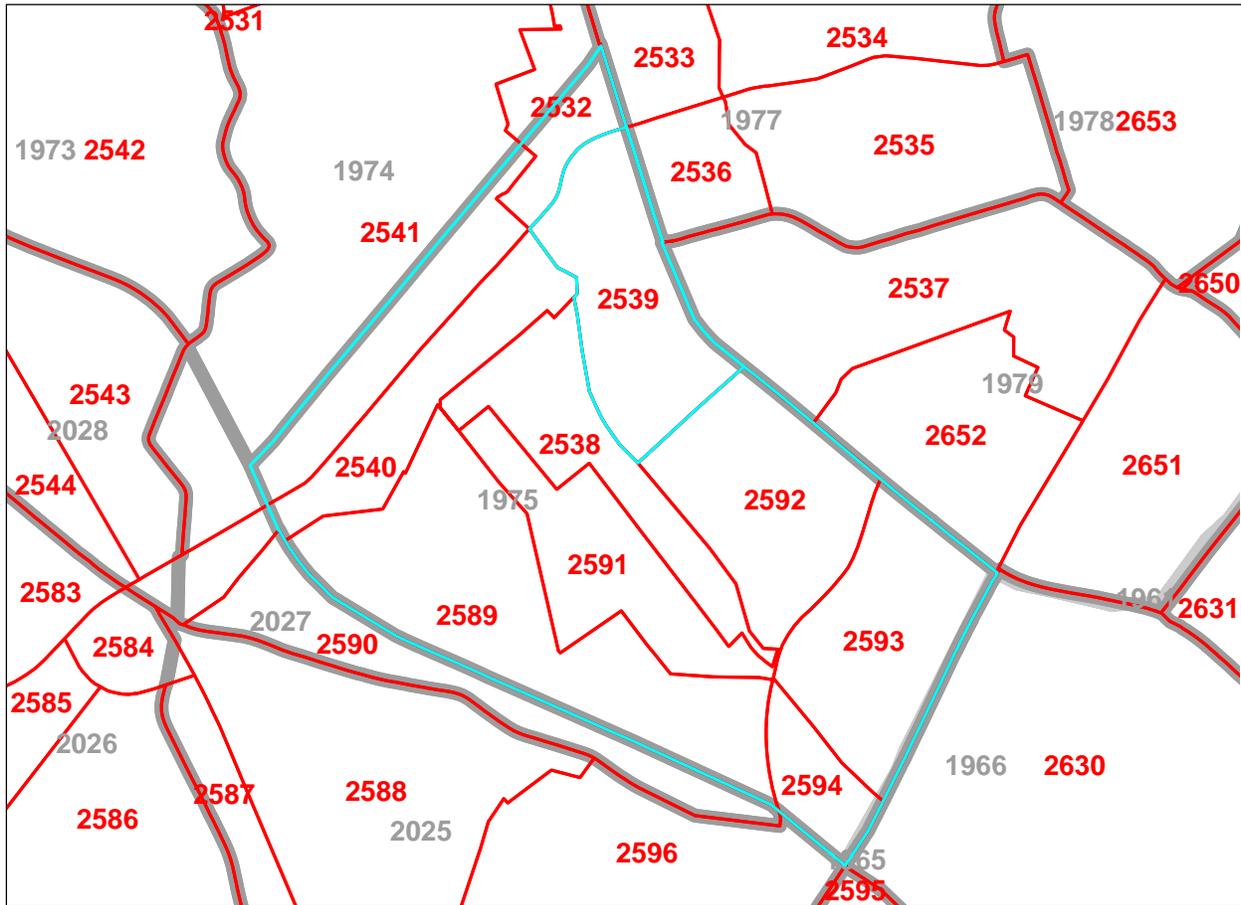
In this Case old TAZ 1975 is equated to new TAZ 2539 which has the highest level of employment.

Figure 28 Case 2: An example of a many-to-many relationship: One old TAZ is equal to many new TAZs
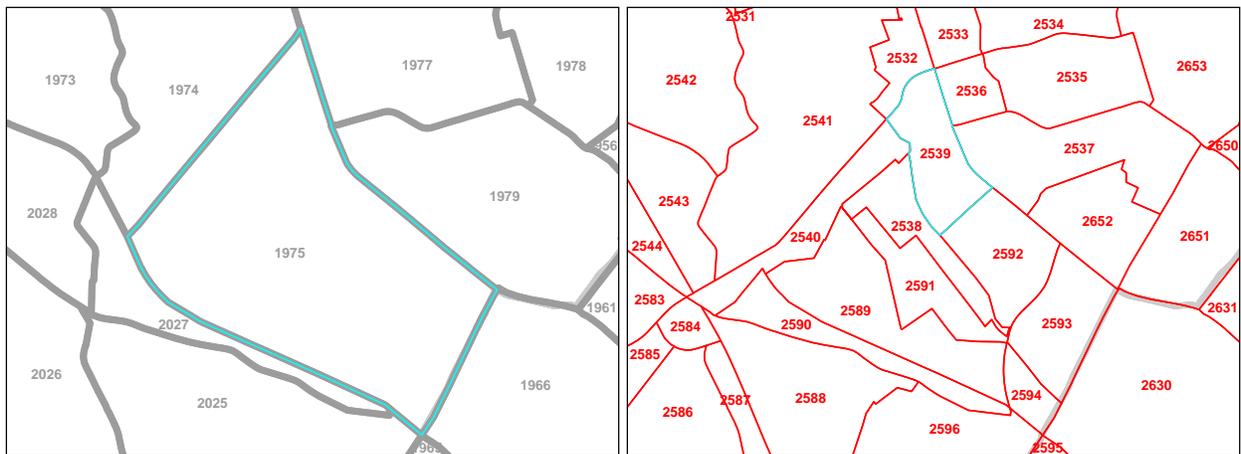
Figure 29 Case 3: An example of a one new TAZ split into many old TAZs
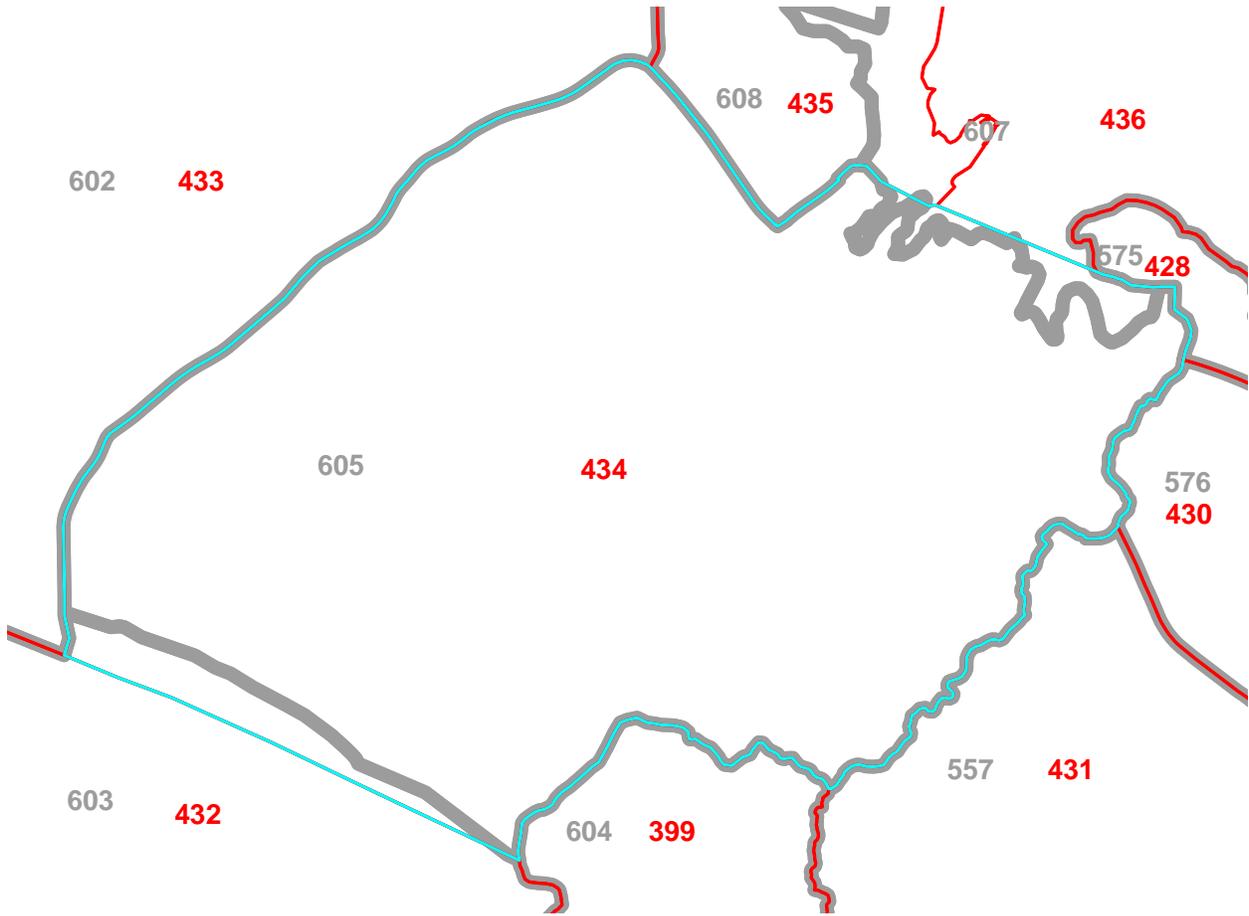
In this case the new TAZ 434 includes old TAZ 605 and portions of old TAZs 603 and 607. New TAZ 434 is equated to new TAZ 605.

Figure 30: Case 3 - An example of a one new TAZ 383 split into many old TAZs 185, 184, 186 & 190
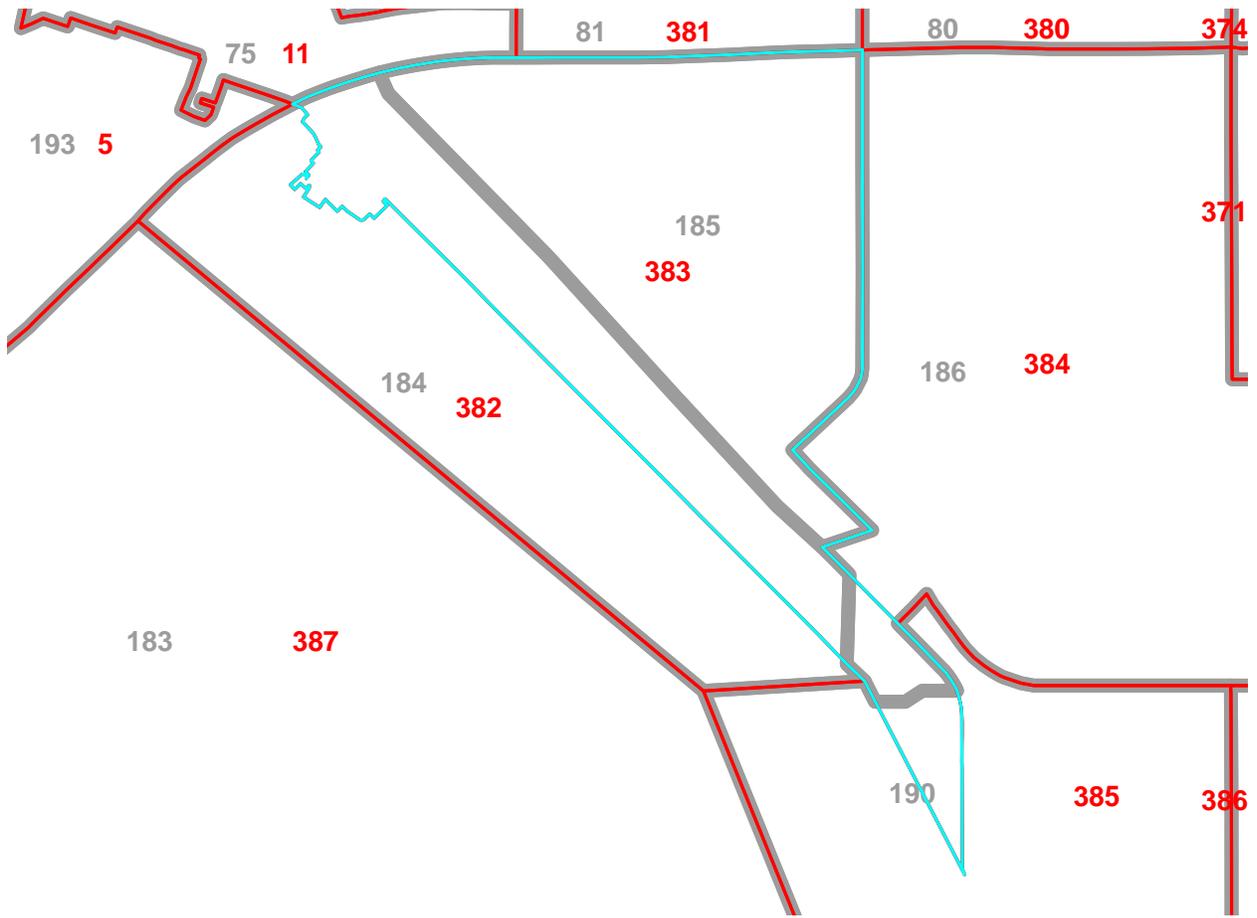
In this case TAZ 383 id assigned to old TAZ 185.

Table 85 Old TAZ to New TAZ Conversion Cases 1 and 2

Case 1: One-To-One (No Split)

Old TAZ = New TAZ

Old TAZ	New TAZ	% New	% Old	2007 Employment		Assigned
2191 Sys	3277 Sys	in Old	in New	Total in New TAZ	Proportion in Old	New TAZ
1	2	3	4	5	5 x 3	
1	**58**	100	100	3,488	3,488	**58**
2	**35**	100	100	8,984	8,984	**35**
3	**36**	100	100	15,125	15,125	**36**
4	**33**	100	100	8,306	8,306	**33**

Case 2: One Old TAZ Split into Many New TAZs

Select new TAZ with Highest Employment

Old TAZ	New TAZ	% New	% Old	2007 Employment		Assigned
2191 Sys	3277 Sys	in Old	in New	Total in New TAZ	Proportion in Old	New TAZ
1	2	3	4	5	5 x 3	
2085	**3538**	100	4.31	3,559	3,559	**3538**
2085	3531	100	3.15	428	428	Delete
2085	3532	100	2.25	397	397	Delete
2085	3496	100	5.54	304	304	Delete
2085	3473	100	6.43	197	197	Delete
2085	3455	100	3.8	179	179	Delete
2085	3459	100	3.72	172	172	Delete
2085	3461	100	8.25	171	171	Delete
2085	3458	100	16.29	119	119	Delete
2085	3460	100	8.36	96	96	Delete
2085	3462	100	11.08	86	86	Delete
2085	3465	100	7.2	71	71	Delete
2085	3528	100	8.89	35	35	Delete
2085	3529	100	1.21	16	16	Delete
2085	3497	100	6.49	5	5	Delete
2085	3530	100	3.01	3	3	Delete
			99.98			

Old TAZ	New TAZ	% New	% Old	2007 Employment		Assigned
2191 Sys	3277 Sys	in Old	in New	Total in New TAZ	Proportion in Old	New TAZ
1	2	3	4	5	5 x 3	
1975	**2539**	100	11.77	1253	1253	**2539**
1975	2592	100	12.75	835	835	Delete
1975	2532	42.43	2.67	1776	753.56	Delete
1975	2541	15.47	7.72	1284	198.63	Delete
1975	2593	100	12.71	170	170	Delete
1975	2538	100	9.01	134	134	Delete
1975	2540	75.79	8.16	122	92.46	Delete
1975	2591	100	9.58	43	43	Delete
1975	2589	100	21.84	33	33	Delete
1975	2594	100	3.8	16	16	Delete
			100.01			

Table 86 Old TAZ to New TAZ Conversion Cases 3 and 4

Case 3: One New TAZ Split into Many Old TAZs

Select new TAZ with Highest Employment

Old TAZ	New TAZ	% New	% Old	2007 Employment		Assigned	
2191 Sys	3277 Sys	in Old	in New	Total in New TAZ	Proportion in Old	New TAZ	
1	2	3	4	5	5 x 3		
603	**434**	3	3.54	84	2.52	Delete	
605	**434**	96.48	100	84	**81.04**	**434**	
607	**434**	0.52	1.17	84	0.44	Delete	
		100					

Select new TAZ with Highest Employment and delete duplicate new TAZ with Lower employment

Old TAZ	New TAZ	% New	% Old	2007 Employment		Assigned	
2191 Sys	3277 Sys	in Old	in New	Total in New TAZ	Proportion in Old	New TAZ	
1	2	3	4	5	5 x 3		
184	**383**	27.92	100	2535	707.77	383	Delete
185	**383**	64.72	100	2535	**1640.65**	**383**	
186	**383**	3.46	2.3	2535	87.71	Delete	
190	**383**	3.9	6.22	2535	98.86	Delete	

Case 4: if 2007 employment=0

Select new TAZ with Highest Employment and if no employment then the first new TAZ

Old TAZ	New TAZ	% New	% Old	2007 Employment		Assigned	
2191 Sys	3277 Sys	in Old	in New	Total in New TAZ	Proportion in Old	New TAZ	
1	2	3	4	5	5 x 3		
41	**61**	100	87.74	9	9	**61**	
41	3	10.54	12.26	0	0	Delete	
		100					

Old TAZ	New TAZ	% New	% Old	2007 Employment		Assigned	
2191 Sys	3277 Sys	in Old	in New	Total in New TAZ	Proportion in Old	New TAZ	
87	**3**	89.46	100	0	0	**3**	

Chapter 4   Methods Development and Research Track

As explained in Chapter 1, TPB's models development program can be categorized as a series of five "tracks." This chapter covers Methods Development (track 2) and Research (track 3). Methods Development track activities are those associated with longer term travel modeling improvements. Research track activities are those that allow the TPB staff to keep abreast of the latest travel modeling research and practice. The chapter has four sections:

- Scan of the Best Modeling Practices
- Conferences
- Training and Webinars
- AMPO Travel Modeling Work Group
- Modeling Air Passenger Trips to the Three Commercial Airports

4.1 Scan of Best Modeling Practices: Findings and conclusions from Tasks 7-10

In 2002, the TPB sought an independent assessment and review of its travel demand forecasting process, both current and planned. It chose to hire the TRB to conduct the review. In December of 2002, COG signed a contract with the National Academy of Sciences, which oversees the National Research Council (NRC), the parent organization for TRB,[41] to perform the model review. The NRC created a committee – Committee for Review of Travel Demand Modeling by the Metropolitan Washington Council of Governments – and appointed the members of the committee, which included both scholars and practitioners. The committee delivered two letter reports to the TPB: one in September 2003[42] and one in May 2004.[43] As a result of this review, the TPB made several changes to its travel model.[44]

In 2005, TPB staff made the decision to hire a consultant, on a task-order basis, to provide an on-going review of the travel demand forecasting process and to perform a scan of the best modeling practice in the U.S., and potentially, beyond. The first contract was with Vanasse Hangen Brustlin, Inc. (VHB) in FY 2006. The contract was renewable for up to three years and VHB was the contractor for all three years (FY 2006, 2007, and 2008). In 2008, the contract was re-bid and the winning contractor was Cambridge Systematics, Inc. (CS). CS has performed the task-order work for two fiscal years (2009 and 2010) and

---

[41] TRB is one of six major divisions of the National Research Council (NRC). NRC functions under the auspices of the National Academy of Sciences (NAS), the National Academy of Engineering (NAE), and the Institute of Medicine (IOM).

[42] David J. Forkenbrock to Peter Shapiro, "First letter report from the Transportation Research Board's (TRB's) Committee for Review of Travel Demand Modeling by the Metropolitan Washington Council of Governments (MWCOG)," Letter, September 8, 2003.

[43] David J. Forkenbrock to Christopher Zimmerman, "Second letter report from the Transportation Research Board's (TRB's) Committee for Review of Travel Demand Modeling by the Metropolitan Washington Council of Governments (MWCOG)," Letter, May 10, 2004.

[44] National Capital Region Transportation Planning Board, *Descriptions of Proposed Work Elements for the TPB Models Development Program to a) Address Concerns Raised by the TRB Committee's First Letter Report b) Advance the State of Modeling Practice in the Metropolitan Washington Region* (Washington, D.C.: National Capital Region Transportation Planning Board, December 24, 2003).

will be continuing on for FY 2011. This section of the report describes the work performed by CS for FY 2010.

In FY 2010, CS was given the following task orders to address:

- Task 7 – Further Investigation of Convergence in User Equilibrium Traffic Assignment and Speed Feedback
- Task 8 – Potential Short-Term Model Enhancements: Trip Purposes and Special Generators
- Task 9 – Potential Short-Term Model Enhancements: Time of Day Model, Queue Delay Function, and Two-Step Assignment
- Task 10 – Potential Short-Term Model Enhancements: Transit-Related Enhancements

Draft reports/report chapters on each of the four task orders were were e-mailed to TPB staff on June 28 and 30.[45] Before the draft reports were available, CS staff made presentations to the Travel Forecasting Subcommittee (TFS) on May 21, 2010 on three of the four topics (Tasks 7-9; The Task 10 presentation was deferred to the July 23 TFS meeting, due to time constraints). Now that TPB staff has received the four draft documents, TPB staff is formulating its response to the conclusions and recommendations made by CS in the four draft reports. It is expected that the TPB staff comments will be available about the same time as the July 23 TFS meeting. Additionally, the four draft CS reports will be shared with the TFS immediately following the TFS meeting on July 23, via the TFS webpage (http://www.mwcog.org/transportation/committee/committee/default.asp?COMMITTEE_ID=43).

What follows is a summary of the findings, conclusions and recommendations from the four draft CS reports. In many cases, to give context to the findings, they are preceded by a summary of what TPB staff requested of CS. Again, the TPB comments on these reports will be forthcoming, hence, they are not part of this report.

4.1.1 Task 7 – Further Investigation of Convergence in User Equilibrium Traffic Assignment and Speed Feedback

4.1.1.1 Topic: Convergence in User Equilibrium Traffic Assignment and Speed Feedback

4.1.1.1.1 TPB request of CS
The request was divided into two major areas: 1) an investigation into TransCAD's Origin User Equilibrium (OUE) and 2) other issues related to traffic assignment convergence. Regarding the first

---

[45] Cambridge Systematics, Inc., *Further Investigation of Convergence in User Equilibrium Traffic Assignment and Speed Feedback (Task 7)*, Draft report or report chapter (Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, June 30, 2010); Cambridge Systematics, Inc., *Short-Term Model Enhancements: Trip Purposes and Special Generators (Task 8)*, Draft report or report chapter (Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, June 30, 2010); Cambridge Systematics, Inc., *Short-Term Model Enhancements: Time of Day Model, Queue Delay Function, and Two-Step Assignment (Task 9)*, Draft report or report chapter (Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, June 30, 2010); Cambridge Systematics, Inc., *Short-Term Model Enhancements: Transit-Related Enhancements (Task 10)*, Draft report or report chapter (Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, June 28, 2010).

issue, in a recent paper by Slavin et al., Caliper's new OUE algorithm was compared to the more traditional, link-based Frank-Wolfe (FW) algorithm. In the conclusion of the paper, the following claim was made "In direct testing, a 10 minute OUE warm start provided better convergence than a 12 hour run of FW."[46] TPB staff felt that this was an incredible claim that warranted further investigation. Regarding the second part of the of the task order, a series of questions were asked covering a number of topics related to traffic assignment, including

- Use of hybrid traffic assignment approaches that combine user equilibrium assignment with another algorithm.
- The ability to perform select-link analyses (and other similar analyses) with newer (and existing) traffic assignement algorithms.
- Convergence metrics for the speed feedback loop, including the suitability of the metric and threshold mentioned in a 2007 presentation by Slavin: "Skim matrix root mean square error < 1%."[47]

4.1.1.1.2 User equilibrium and route flow analysis

Link flows are defined as the total volume on each link in the network. Route flows ("paths") identify volumes on a link by origin and destination. Link flows are insufficient for some common types of analyses, such as select-link, select-zone, and subarea windowing. In static user equilibrium traffic assignment, "only the uniqueness of link flows is guaranteed; there may be multiple sets of route flows associated with the optimal link flow solution."[48] CS notes that "The issue of the uniqueness of route flows appears to be more of concern with the new families of path- and origin-based assignment algorithms, but as of this writing, discussion amongst researchers and practitioners continues on the issue of the uniqueness of route flow results taken from any user equilibrium assignment algorithm, including the standard Frank-Wolfe (FW) assignment methods."[49]

4.1.1.1.3 Advanced assignment algorithms [50]

A series of new traffic assignment algorithms offer the possibility of reaching traffic assignment convergence both more quickly and to a higher degree than is the case with the traditional Frank-Wolfe (FW) algorithm. These new algorithms fall into two broad classes: path-based and origin-based. Each vendor of travel demand forecasting software (e.g., Citilabs, Caliper, INRO, and PTV) has developed at least one quick-convergence assignment method in one or both of these classes of algorithms. In addition, many vendors have also implemented various means of improving the convergence speed of the Frank-Wolfe algorithm, which is a link-based algorithm. The ability to perform select-link, select-

---

[46] Howard Slavin et al., "Application of accelerated user equilibrium traffic assignments to regional planning models," in (presented at the 12th TRB National Transportation Planning Applications Conference, May 17-21, 2009, Houston, Texas, 2009), 15.

[47] Howard Slavin, "Achieving planning model convergence" (Presentation at the 11th TRB National Transportation Planning Applications Conference presented at the 11th TRB National Transportation Planning Applications Conference, Daytona Beach, Florida, May 2007), 11.

[48] Cambridge Systematics, Inc., *Further Investigation of Convergence in User Equilibrium Traffic Assignment and Speed Feedback (Task 7)*, 1-2.

[49] Ibid., 1-3.

[50] Advanced compared to the popular link-based Frank and Wolfe technique.

zone, and subarea analyses in a reliable manner is an important capability, but there is much debate about how well the various new (and old) algorithms can perform these analyses.

Availability and capabilities of advanced assignment algorithms

The currently available advanced assignment algorithms from the major software vendors can be found in Table 87. Note, due to issues discussed above and described in more detail in the CS report, Citilabs and PTV have disabled the select-link and select zone functionality in some of their new advanced assignment algorithms. By contrast, Caliper and INRO have developed methods to counteract the concerns with proportionality and uniqueness, so they have not disabled the select-link functionality in their new routines. Bar-Gera's idea of "proportionality" is an important one and is discussed by way of an example in a recent document by Caliper.[51] According to Bar-Gera, a condition of proportionality is practically equivalent to "entropy maximization," and is a way to ensure that the assignment algorithm results in a stable route flow solution (as opposed to only achieving a stable link flow solution).

Table 87 Advanced assignment methods that are currently available from the major software vendors

Vendor	Algorithms Available	Select Link/Zone Functionality*
Caliper TransCAD 5.0 Release 3	N-Conjugate Frank-Wolfe user equilibrium assignment	Fully functional
	Origin user equilibrium (OUE) based on Algorithm B	Can be run without specification prior to assignment
	Path-based user equilibrium	Fully functional
Citilabs Cube Voyager 5.1.1	Bi-Conjugate Frank-Wolfe user equilibrium assignment	Fully functional
	Path-based assignment using gradient projection method	Disabled
INRO	Parallel standard traffic assignment	Fully functional
	Path-based traffic assignment	Fully functional
PTV VISUM 11.0	Linear user cost equilibrium (LUCE), an origin-based gradient method based on the OBA algorithm	Not available
	Equilibrium Lohse, a variant of Frank-Wolfe	Fully functional

*As described by the software vendor
Source: Cambridge Systematics, Inc., *Further Investigation of Convergence in User Equilibrium Traffic Assignment and Speed Feedback (Task 7)*, Draft report (Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, June 30, 2010).

The CS report also discusses improvements to be included in imminent releases of the software. For example, Caliper is planning to release a 64-bit version of the software (TransCAD 6, Beta release, summer 2010) that will allow the capability to use over 4 GB of memory, which is needed for large

---

[51] Caliper Corporation, "What TransCAD Users Should Know about New Static Traffic Assignment Methods," May 3, 2010, 11-13.

networks. In Citilabs' next software release, Cube Voyager 5.2 (fall 2010), Citilabs plans to add a "warm start" mode for path-based static equilibrium assignment (projected gradient).

Advanced assignment algorithms in regional planning models

CS identified and contacted a number of MPOs (and other similar planning agencies, such as the Los Angeles County Metropolitan Authority[52]) that use or have investigated the use of "advanced assignment algorithms." Five agencies responded to the CS survey and the results are summarized in Table 88.

Table 88 Agencies interviewed by CS that use or have investigated the use of advanced assignment algorithms

Caliper TransCAD	Citilabs Cube/TRANPLAN	INRO Emme	PTV VISUM
SANDAG: MMA Prince George's County, MD: OUE NCTCOG: MMA	LA Metro (TRANPLAN): Bi-Conjugate Testing	PSRC: Gradient Projection	None interviewed

Source: Cambridge Systematics, Inc., *Further Investigation of Convergence in User Equilibrium Traffic Assignment and Speed Feedback (Task 7)*, Draft report (Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, June 30, 2010).

In summary, the methods being used, by associated agency are:

- Link-based: Frank-Wolfe or variant (3 cases)
  - SANDAG, NCTCOG: TransCAD multi-mode, multi-class assignment (MMA)[53]
  - LA Metro: Citilabs bi-conjugate FW (just testing)
- Path-based (1 case)
  - PSRC: INRO Emme gradient projection
- Origin-based (1-2 cases)
  - Prince George's County, MD: TransCAD OUE
  - SCAG: Caliper has done some testing of SCAG's network on OUE

Only one agency, Prince George's County, is using Caliper's OUE. Nonetheless, it provides an especially valid comparison to TPB's current process, since it is modeling the same urban area, includes 2,500 zones, five assignment classes, and three time-of-day periods. "According to Prince George's County staff, the current model reaches convergence of 10^{-5} in 10-12 hours requiring approximately 150 iterations."[54] Test results, also for the Prince George's Co. travel model, shown in Figure 31 confirm the convergence benefits of OUE compared to Frank-Wolfe. At a relative gap (RG) of 10^{-3} to 10^{-4}, FW is

---

[52] The regional transportation planning agency and public transportation operating agency for the County of Los Angeles.

[53] MMA is Caliper's term for its implementation of Frank and Wolfe for multi-class assignment.

[54] Cambridge Systematics, Inc., *Further Investigation of Convergence in User Equilibrium Traffic Assignment and Speed Feedback (Task 7)*, 1-15.

actually faster or about the same speed as the OUE. At a RG of 10^{-5}, however, OUE is much faster than FW, which tends to level off (tail off) in its closure.

Figure 31 Model run time comparisons for Prince George's County travel model
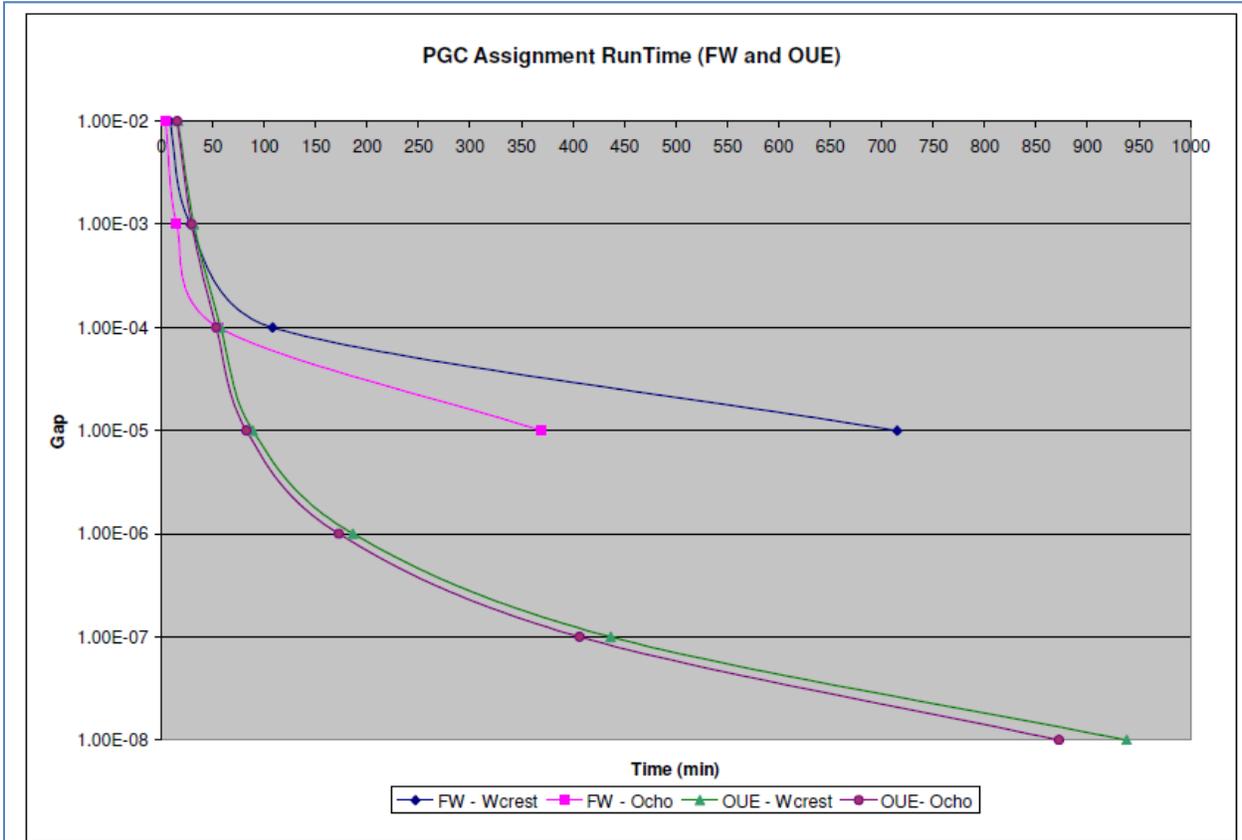
Figure 1 Cold Start Convergence Rates PM Assignment

Gap	FW – 4 core Woodcrest	FW -8 core Ocho	OUE – 4 core Woodcrest	OUE – 8 core Ocho
1.00E-02	8.3	4.3	16.4	15.5
1.00E-03	28.5	15	33.7	29.6
1.00E-04	108.1	56.1	60.4	53.5
1.00E-05	715.1	369.7	93.7	82.8
1.00E-06			191.5	172.5
1.00E-07			431.2	406.7

Source: Howard Slavin et al., "Application of accelerated user equilibrium traffic assignments to regional planning models," in (presented at the 12th TRB National Transportation Planning Applications Conference, May 17-21, 2009, Houston, Texas, 2009).

NCTCOG uses TransCAD 5.0, but has done no formal testing of OUE. Its model converges to a relative gap of "10^{-5} in between 100-600 iterations (depending on the time period); each iteration typically takes on average 20 seconds,"[55] which would imply about 3.3 hours for 600 iterations.

PSRC is using INRO's gradient projection assignment methodology, which has improved model runtimes in the base year by more than 50%.[56] The information obtained from PSRC indicates that "results developed using the gradient projection assignment algorithm are very similar to those developed using Frank-Wolfe in a fraction of the time."[57]

4.1.1.1.4 Hybrid assignment approach
CS states

> *The hybrid assignment approach outlined on page 5-11 of the Fiscal Year 2009 Task Reports compilation is to our knowledge not used by other MPOs as described in the report. It is based on project planning experiences as well as issues that the Baltimore Metropolitan Council (BMC) and other MPOs have encountered related to convergence and stability. Currently BMC uses an approach in which they use the final weights from a previous equilibrium assignment.*
>
> *…*
>
> *This hybrid assignment approach could provide several potential benefits to TPB, most notably, substantial time savings achieved through the use of incremental assignment on the intermediate assignment loops. These loops would produce stable network time skims for use in the final loop. The final feedback loop would use a user equilibrium assignment with a high level of convergence to ensure the stability of the final volumes. The final trip table, not an average of successive loops, would be assigned to the network. As an additional benefit, this process would also provide a direct link between the assigned volumes and the final trip table.[58]*

4.1.1.1.5 Speed feedback convergence metrics
CS states

> *There is no measure used as state of the practice to show convergence between speed feedback loops. This type of convergence would be measured in addition to network volume convergence, which is typically measured using relative gap or some related measure. Only the Denver Regional Council of Governments (DRCOG) was found to measure this type of convergence at all, using the criterion of achieving one percent or less of links with a greater than 10 percent change in link volume. Another possible measure of convergence between feedback loops has been proposed by Slavin (2007) as the "skim matrix root mean square error." This metric measures the difference between skim matrices in adjacent feedback loops. As convergence is reached,*

---

[55] Ibid., 1-17.
[56] Ibid., 1-18.
[57] Ibid.
[58] Ibid., 1-20.

the difference between the skim matrices should decrease, indicating increasing stability between loops. As stated by Dr. Slavin, the use of both this metric and the relative gap convergence method for traffic assignment creates a fixed point solution for the travel demand forecasting problem… To our knowledge, since its introduction in 2007, no agency or MPO has adopted this measure for feedback convergence.[59]

4.1.2 Task 8 – Potential Short-Term Model Enhancements: Trip Purposes and Special Generators

4.1.2.1 Topic: Possibly adding or changing trip purposes

4.1.2.1.1 TPB request of CS

The TPB travel model currently has four trip purposes: Home-based work (HBW), home-based shop (HBS), home-based other (HBO), and non-home-based (NHB). TPB staff is considering, as part of the re-estimated Version 2.3 Travel Model on the new zone system, splitting the NHB purpose into two purposes: non-home-based work (NHBW or NHW) and non-home-based other (NHBO or NHO). The TPB staff is also considering the merits of adding a home-based school or home-based university trip purpose.

4.1.2.1.2 Findings

Non-home-based trips: "Nearly two-thirds of the regional travel demand models reviewed by CS have separate non-home-based-work-related (NHB WR) and non-home-based other (NHBO) trip purposes. Based on the survey conducted for TRB Special Report 288, the NHB WR trip purpose was used in 12 regional travel demand models, out of a total of 36 large MPOs surveyed (VHB, 2007)."[60] "Few regional models develop separate mode choice models for NHB WR and NHBO trip purposes."[61]

Home-based college/university: "Almost half of the large MPO regional travel demand models reviewed by CS for this task have a home-based college/university (HBU) trip purpose."[62] "Based on the survey conducted for TRB Special Report 288 (VHB, 2007), the home-based college/university trip purpose was used in 48 MPOs out of a total of 219 MPOs surveyed." "Of those MPOs having HBU trip purposes in trip generation, half carry them only through the trip distribution process. Half of the MPOs do mode choice modeling for HBU."

Home-based school trips: "Based on the survey conducted for TRB Special Report 288 (VHB, 2007), the HBSch trip purpose was used in 80 MPOs out of a total of 219 MPOs surveyed. CS' review indicates that it is fairly common for large MPOs to include a distinct HBSch purpose. More than two-thirds of the

---

[59] Ibid.
[60] Cambridge Systematics, Inc., *Short-Term Model Enhancements: Trip Purposes and Special Generators (Task 8)*, 2-3.
[61] Ibid., 2-4.
[62] Ibid., 2-5.

regional travel demand models reviewed had a home-based school trip purpose."[63] It may prove challenging to forecast future school locations and enrollment.[64]

4.1.2.1.3 Conclusions
- Split NHB into NHB WR and NHBO trip purposes and model them at least through trip distribution.
- Establish a HBU trip category and model in trip generation and distribution, assuming data are available to support it.
- Establish a HBSch trip category for trip generation and distribution, assuming data are available to support it.[65]

4.1.2.2 Topic: Special generators

4.1.2.2.1 TPB request of CS
Airport auto driver forecasts are currently formulated as exogenous inputs to the regional travel model. The process involves the use of a Fratar-technique in which forecasted airport trip tables are developed using observed travel patterns that are adjusted over time in accordance with adopted household and job growth forecasts. The auto trips destined to the airport are added to all the auto trips resulting from the mode choice model. No mode choice modeling of air passenger trips is done and transit trips are omitted entirely. Should TPB change the way it models trips made by air passengers to the three commercial airports? Should TPB add any special generators to the travel model, such as universities, regional shopping centers, or military bases? In terms of group quarters populations, can/should a synthetic model be developed to estimate the trip generation effects of group quarters?

4.1.2.2.2 Findings
Air passenger trips: "Modeling airport trips is a common practice in regional travel demand models of large MPOs. In a survey conducted in 2007, about two-thirds of the 23 MPOs responding to the survey reported modeling airport passenger trips in their regional models (Gosling 2008). Most of the 23 MPOs are among the country's 35 largest MPOs. CS' review of regional models as part of this task indicated over 80 percent model air passenger trips one way or another."[66] According to the latest air passenger survey, the transit mode share to the three commercial airports is about 19% and is about 26% to National Airport.[67]

Visitor trips, special events, and group quarters: "Visitor trips are often overlooked in regional travel demand models. Of the regional models reviewed by CS for this task, only a quarter explicitly account

---

[63] Ibid., 2-8.
[64] Ibid., 2-9.
[65] Ibid., 2-12.
[66] Ibid., 2-13.
[67] Ronald Milone, "TPB's Development of Airport Passenger Trip Forecasts" (presented at the Travel Forecasting Subcommittee of the TPB Technical Committee of the National Capital Region Transportation Planning Board, held at the Metropolitan Washington Council of Governments, Washington, D.C., March 19, 2010), 11.

for trips made by visitors."[68] However, areas with many tourists do tend to explicitly account for visitor/tourist trips. Very few MPOs model special events as part of the regional travel demand model. Very few MPOs model shopping centers specifically as a special generator in their regional travel demand model. It is not a common practice to model group quarters, military bases, and colleges/ universities as special generators. On the subject of group quarters, CS states that, although the group quarters population makes up only about 2% of the total, "considering adding representation of travel for group quarter population, even in a crude way, is probably better than ignoring it completely as a short-term enhancement."[69]

4.1.2.2.3 Conclusions

CS recommends TPB consider the following enhancement for short-term enhancements of the regional travel model:

- Develop an airport trip submodel incorporating the current best practice, taking full advantage of the ongoing air passenger travel survey data. This airport model would include ground access mode choice models with a nested logit structure for at least four market segments (resident business trips, resident non-business trips, non-resident business trips, and non-resident non-business trips).
- Plan a visitor travel survey and a special events survey in support of model development for a visitor model and a special events model. At the same time, an evaluation of the exogenously generated visitor/tourist auto driver trips data can be made to see if the data fully account for trips made by visitors within the region. Interim enhancements can be made using some simple assumptions and adjustments.
- Model HBU trips as an independent trip purpose as recommended in the earlier section. Other college-related trips from college dormitories and other group quarter trips should be estimated using simplified assumptions or using trip rates from other similar regions, and checked against the ITE trip rates.
- It is not recommended to treat shopping centers as a special generator.
- Explore use of ITE trip generation rates for treatment of group quarter trip generation.[70]

4.1.3 Task 9 – Potential Short-Term Model Enhancements: Time of Day Model, Queue Delay Function, and Two-Step Assignment

4.1.3.1 Topic: Time of day models

4.1.3.1.1 TPB request of CS

A time-of-day model is used to represent the spread of trips across different times of the day. The two primary ways to implement time-of-day models are fixed factors (often from a household travel survey) and choice models. Fixed factors are the more common method and the method used by TPB. Choice models have the benefit that they can represent peak spreading, which is either the shifting of trips

---

[68] Cambridge Systematics, Inc., *Short-Term Model Enhancements: Trip Purposes and Special Generators (Task 8)*, 2-14.

[69] Ibid., 2-15.

[70] Ibid., 2-18.

from one part of the peak period to another part of the peak period, or shifting out of the peak period entirely. What are the benefits of moving from a fixed-factors model to a time-of-day choice model? Can we make use of the INRIX highway travel time data for model calibration/validation?

4.1.3.1.2 CS Findings

Time-of-day choice models are less commonly used in trip-based models. CS notes the two chief advantages of time-of-day choice models: "First, choice models are able to forecast changes in time of day splits in the future, which is not possible using the fixed factor methodology. Secondly, time of day choice models are able to capture the effects of 'peak spreading' and time of day changes caused by congestion and variable pricing policies." CS described a new FHWA research project in this area that resulted in a new time-of-day choice model methodology that was validated in Denver and San Francisco and applied in Seattle (PSRC). CS detailed the implementation of the PSRC time-of-day model. CS noted that "choice models typically use far more time periods than the fixed factor methodology" and that was certainly the case with the PSRC model. CS notes that time-of-day choice models can be difficult to estimate, due to the nature of the choice being modeled.

TPB's use of fixed factors by mode, purpose, and direction is consistent with the current state of the practice. Although CS touts the benefits of using a time-of-day choice model, it does not directly recommend that TPB move to such a model. However, CS does recommend that, if one were to proceed down that path, it does recommend that "the daily trip tables be divided into at least four or preferably five large time periods."[71] CS also noted that the INRIX data cannot be used as the primary data source for developing a time-of-day choice model, since the data do not cover a majority of the roadways in the region. Instead, a procedure similar to that used by PSRC could be implemented. However, CS felt that the INRIX data could be of use for model validation. Lastly, CS recommends that users of the TPB model, such as local governments, not use the time-of-day outputs from the regional model directly (such as the AM peak period volume on a given link), since these are based on the fixed factors in the time-of-day model, which are regionally developed, and are not accurate for individual facilities or intersections.

4.1.3.2 Topic: Queuing delay function

4.1.3.2.1 TPB request of CS

The TPB, like most MPOs in the U.S., uses a static traffic assignment (STA), which means that demand is assumed to be constant during the specific assignment period (in TPB's example: AM peak period, PM peak period, and off-peak). In a static traffic assignment model, link speeds are represented by volume-delay functions (VDFs), which capture the fact that as the link becomes more congested, the time to traverse the link goes up. STAs typically do not explicitly account for intersection (node) delay, however the link's VDF can be viewed as implicitly including the sum of the link delay and intersection delay. Another (well known) limitation of STA models is that some of the loaded links may have assigned volumes that are greater than the physical capacity of the given links, i.e., the volume-to-capacity ratio is

---

[71] Cambridge Systematics, Inc., *Short-Term Model Enhancements: Transit-Related Enhancements (Task 10)*, 3-5.

greater than one.[72] One of the model enhancements done by TPB staff to minimize the number of overloaded links, particularly freeways and freeway ramps, was the introduction of a queuing delay function (QDF), which would act in conjunction with the VDF, but would be focused on intersection delay. The idea was to represent a phenomena that is not natively part of traditional STA models, namely that of queuing and traffic blockages, which result in reduced link speeds. TPB staff found that the addition of a QDF did, in fact, reduce the number of overloaded links. It also, however, may have resulted in some unintended consequences, such as unrealistically slow modeled speeds on freeways and an unrealistic shifting of volume from freeways to arterials, due to the way that QDFs were applied only to freeways and freeway ramps, but not to arterials and other types of roads.   As noted by CS in its report, the queuing delay is not related to the length of the link, so it is possible for a very short link to have a very high level of queuing delay.

TPB staff asked CS to review the current use of the queuing delay function, answering questions such as

- Should we be using a queuing delay function in the travel model?
- Are other MPOs using these? If not, why not?
- Does CS have any suggestions for us related to the way we are using the queuing delay function and/or any recommendations for improvement?
- Link speeds on some freeway links in our model are quite low, when compared to observed data. Is the queuing delay function the cause of this?

4.1.3.2.2 CS Findings

According to CS, two main methods have been used in practice to account for increased delay in congested networks. First, new VDFs have been developed that more accurately reflect the breakdown in traffic flow that occurs in at very high volume levels, such as the Akçelik (or Akcelik) curve. Second, some have explicitly incorporated intersection delay by developing a VDF that is both link-based and node-based. This second approach is less common, but it is the one that TPB has chosen, via the QDF. CS describes MPOs and other agencies that have taken the first approach (new VDFs that reflect the breakdown in traffic, principally the Akcelik curve), such as VDOT, MTC, SCAG. CS also described MPOs and agencies that have taken the second approach, namely explicitly incorporating node delays into their volume delay calculations. Agencies that explicitly incorporate node delay include the North Jersey Transportation Planning Authority (NJTPA), San Diego Association of Governments (SANDAG), Greater Buffalo-Niagara Regional Transportation Council (GBNRTC), and Portland Metro. According to CS, the Pima Association of Governments (PAG) did a pilot study on incorporating node delay in their VDF.

CS performed a series of actual tests of the Version 2.2 Travel Model using different variations of the standard QDF:

- **Base** scenario using existing conical VDF and QDF only on freeway and ramp links;
- **QDF-All** scenario using existing conical VDF and QDF on all facility types in the network;

---

[72] Yi-Chang Chiu et al., *A Primer for Dynamic Traffic Assignment* (Transportation Research Board, 2010), http://www.nextrans.org/ADB30/UPLOAD/ssharma/dta_primer.pdf.

- **QDF-Surface** scenario using existing conical VDF and QDF only on surface streets (not freeways or ramps);
- **No-QDF** scenario removing the QDF from all facility types and extending the VDF so that links with v/c ratios higher than 3.0 are penalized according to the conical function; and
- **Akçelik** scenario removing the QDF from all facility types, using instead a sample Akçelik curve for the VDF on all facility types. The sample Akçelik function was developed based on recommended coefficients from the Highway Capacity Manual 2000 and a functional form used by the Metropolitan Transportation Commission in the San Francisco region.

A few findings from the model tests:

- Caveat: None of these scenarios, especially the Akçelik scenario, have been calibrated or validated for the TPB model, and further work on the subject would be expected.
- Screenline validation, total for 35 screenlines:
  - Base scenario: overestimates traffic by 2.4 percent.
  - Only the QDF-All scenario matches the screenline volumes closer, with an overestimation of 0.1 percent.
  - Akcelik scenario: Received the poorest result – overestimation of 7.8% -- but the poor match should not be viewed as a failure of the Akcelik scenario, since it had not be calibrated for the TPB region. "It is possible that a calibrated and validated Akçelik volume delay function could have the desired affect without the need for the queue delay function."

Other major findings and conclusions:

- The No-QDF scenario achieves approximately the same results without the need for a QDF while using a VDF that has been validated for the Washington region.
- The Akçelik function also shows some promise in achieving TPB's goals.
- The TPB model is the only one that CS encountered which applies queuing delay only to freeway links.
- The QDF may not be the most accurate way to capture the desired network constraints.
- CS recommends TPB go with the first approach, which is state of the practice, namely a newly calibrated set of link-based VDFs that reflect the breakdown in traffic at higher volumes. Using this approach, TPB could
  - Continue use of an expanded and/or re-calibrated conical function
  - Switch to an Akçelik curve
  - Possibly employ different functional forms of VDFs on different facility types (e.g., conical functions for freeway versus Akcelik functions for surface streets).
- Should it still be advantageous to model node-related delay in the TPB model, further investigations should be made into the process, starting with the procedures detailed in the CS white paper. Developing this type of function will require significant data collection, both to estimate the amount of delay encountered at different types of intersections and to categorize each node in the TPB highway network.

4.1.3.3 Topic: Proposed elimination of the two-step ("multi-run") assignment procedure used for modeling high occupancy toll (HOT) lane facilities

4.1.3.3.1 TPB request of CS

In the fall of 2008, as part of air quality conformity work, the traffic assignment process was modified to improve the assignment of HOV/HOT traffic on the Capital Beltway in Virginia and the I-395 Shirley Highway.[73] The previous process, shown in Figure 32, included three traffic assignments by time period with five trip markets assigned in each traffic assignment, resulting in 180 UE iterations per speed feedback iteration, or 1,260 UE iterations per model run. The revised process, shown in Figure 33, splits the AM traffic assignment into two parts: non-HOV 3+ (i.e., SOV, HOV2, trucks, and airport passengers) and HOV 3+. Similarly, the PM traffic assignment is also split into the same two parts: non-HOV 3+ and HOV3+. This new traffic assignment process is sometimes referred to as the "two-step assignment," since it splits the AM and PM assignment each into two parts.[74] The result is five (not three) traffic assignments, with either four, one, or five trip markets, depending on which assignment is being conducted (see Figure 33). The fifth traffic assignment, representing the off-peak period, includes all five trip markets – it is only the AM and PM peak assignments where the non-HOV 3+ and HOV 3+ are split out. This results in 300 UE iterations per speed feedback iteration, or 2,100 UE iterations per model run (a 67% increase).

There is another procedure that sometimes gets referred to as the "two-step assignment": When the model is run twice, first to develop HOV travel times (the so-called "base" run), then a second time (the "conformity" or "final" run), where the HOV skims from the first assignment are substituted for those that would be obtained otherwise from the HOT lanes. As described by CS:

> *The current Version 2.2 model framework requires two model runs to be performed in order to address HOV policy and capture the impacts of HOT lanes. This process was developed to accommodate the stated policy of Virginia Department of Transportation (VDOT) that HOT facilities will not degrade the operations of HOV users. The "base run" captures the travel time for unimpeded flow of HOV traffic on HOT lanes consistent with the stated operational policy. The "conformity run" substitutes the HOV skims thus obtained for the HOV skims that would otherwise be obtained by simply skimming the networks with HOT lanes in operation. Only the HOV skims are taken from the "base run;" skims for all other modes are taken from the "conformity run." Under this framework, the "base run" serves solely as a means for measuring times for HOV traffic on HOT facilities. CS has proposed combining the two-steps [**"multi-run assignment"**] into a one-step process to save model run time and to provide more consistency in mode choice modeling.[75]*

---

[73] Ronald Milone and Mark Moran, "TPB Models Development Status Report" (presented at the Travel Forecasting Subcommittee of the TPB Technical Committee of the National Capital Region Transportation Planning Board, held at the Metropolitan Washington Council of Governments, Washington, D.C., November 21, 2008).

[74] Jinchul Park to Files, "Two Step Traffic Assignment for HOT Lane Modeling in 2008 CLRP," Memorandum, December 2, 2008.

[75] Cambridge Systematics, Inc., *Short-Term Model Enhancements: Time of Day Model, Queue Delay Function, and Two-Step Assignment (Task 9)*, 3-19.

In order to avoid confusion with the first type of "two-step" assignment, this latter process will be referred to as the "multi-run assignment."

Figure 32 Traffic assignment in the Version 2.2 Travel Model prior to fall 2008: three assignments, each with five market segments, resulting in 180 user equilibrium iterations

	# UE Iterations	Period	Trip Markets Assigned
Assignment 1	60	AM	1 SOV 2 HOV 2-Occ. 3 HOV 3+-Occ. 4 Trucks 5 Airport Pax
Assignment 2	60	PM	1 SOV 2 HOV 2-Occ. 3 HOV 3+-Occ. 4 Trucks 5 Airport Pax
Assignment 3	60	Off-Peak	1 SOV 2 HOV 2-Occ. 3 HOV 3+-Occ. 4 Trucks 5 Airport Pax

Source: Ronald Milone and Mark Moran, "TPB Models Development Status Report" (Presentation at the Travel Forecasting Subcommittee presented at the Travel Forecasting Subcommittee, Washington, D.C., November 21, 2008).

In the first step of the two-step assignment (assignments #1 and #3), non-HOV 3+ traffic (i.e., SOV, HOV 2, truck, and airport passenger trips) is assigned to all facilities (HOV and general purpose). In the second step, HOV 3+ traffic is assigned to HOT lanes and other facilities on the partially loaded network. The pre-assignment of non-HOV 3+ traffic results in congested link speeds for the general purpose lanes. This means that HOV 3+ traffic has a greater incentive to use HOV facilities, which results in improved HOV 3+ loadings on priority-use and general-use facilities.

Figure 33 Traffic assignment in the Version 2.2 Travel Model after fall 2008: five assignments, with one, four, or five market segments, resulting in 300 user equilibrium iterations

	# UE Iterations	Period	Trip Markets Assigned
Assignment 1	60	AM	1 SOV 2 HOV 2-Occ. 3 Trucks 4 Airport Pax
Assignment 2	60	AM	1 HOV 3+-Occ.
Assignment 3	60	PM	1 SOV 2 HOV 2-Occ. 3 Trucks 4 Airport Pax
Assignment 4	60	PM	1 HOV 3+-Occ.
Assignment 5	60	Off-Peak	1 SOV 2 HOV 2-Occ. 3 HOV 3+-Occ. 4 Trucks 5 Airport Pax

Source: Ronald Milone and Mark Moran, "TPB Models Development Status Report" (Presentation at the Travel Forecasting Subcommittee presented at the Travel Forecasting Subcommittee, Washington, D.C., November 21, 2008).

Convergence in the speed feedback loop is currently not checked.

TPB staff asked for more details on the pros and cons of eliminating the "multi-run assignment." Further details on the two-step assignment can be found in a number of references.[76]

4.1.3.3.2 CS Findings

Once again, CS has proposed combining the two-steps into a one-step process to save model run time and to provide more consistency in mode choice modeling. On the consistency issue, CS argues that, under the current multi-run assignment procedure, since HOV skims are obtained on a network that does not allow non-HOV vehicles to use HOT facilities, this has both an intended and unintended consequence. The intended consequence is that it ensures free flow traffic conditions, which is supposed to be guaranteed by the regional HOT operational policy. The unintended consequence is that the "accuracy of the HOV time skims on the non-highway links (especially arterials that load onto the highways) [is] likely affected by the fact that fewer vehicles will be using the tolled highway paths,"

---

[76] Ronald Milone and Meseret Seifu to Files, "Transmittal of Version 2.2 travel model files as per the 2008 CLRP/2009-2014 TIP air quality determination," Memorandum, December 17, 2008; Jinchul Park to Files, "Two Step Traffic Assignment for HOT Lane Modeling in 2008 CLRP," Memorandum, December 2, 2008; Ronald Milone and Mark Moran, "TPB Models Development Status Report" (presented at the Travel Forecasting Subcommittee of the TPB Technical Committee of the National Capital Region Transportation Planning Board, held at the Metropolitan Washington Council of Governments, Washington, D.C., November 21, 2008).

which results in "different time skims for non-freeway links being used in the final assignment for the HOV and HOT modes."[77]

CS recommends eliminating the multi-run assignment and replacing it with just one application of the travel model. CS further recommends "that the toll rate be set based on link capacity rather than speed,"[78] arguing that speed is typically not well represented in travel demand model traffic assignments.

CS performed an actual test of it proposal, using the Version 2.2 Travel Model (Ver. 2.2.11 dated spring 2009). CS found that the revised procedure, which eliminated the multi-run assignment had "the desired benefit of accurately measuring HOV travel times without negatively affecting the results of the assignment procedure." CS documented the model performance in its report.

4.1.3.4 Topic: Application of the travel model: the benefits and drawbacks to batch files versus Cube Base's Application Manager

4.1.3.4.1 TPB request of CS
Applying the TPB travel model: What are the benefits and drawbacks of moving from batch files to a more graphical approach, such as Cube's "Application Manager," which allows one to run all or parts of the travel model from within a graphical user interface (GUI)?

4.1.3.4.2 CS Findings
CS finds that, based on its experience with Cube Application and Scenario Manager, "the graphical interface makes model application easy for users, although it can be a little tricky to set-up at the beginning. Also, it can make error checking a little more time consuming since locating error messages in different files is more challenging than the current structure."[79] CS finds that Application and Scenario Manager "it is not always desirable for running complex models," such as the TPB model.

4.1.4 Task 10 – Potential Short-Term Model Enhancements: Transit-Related Enhancements

4.1.4.1 Topic: Representing fare subsidies in the travel model

4.1.4.1.1 TPB request of CS
Given the preponderance of fare subsidies, like WMATA's SmartBenefits program, should such fare subsidies be reflected in the travel model? If so, what is the best way to do this? COG/TPB staff has already done some work in this area.[80]

4.1.4.1.2 CS Findings
"The scan of regional travel demand models indicates that no large MPO has consideration of transit fare subsidies built into their travel demand model, though a few incorporate fare-free zones. Also,

---

[77] Cambridge Systematics, Inc., *Short-Term Model Enhancements: Time of Day Model, Queue Delay Function, and Two-Step Assignment (Task 9)*, 3-20.
[78] Ibid.
[79] Ibid., 3-22.
[80] Milone et al., *FY-2009 Development Program for TPB Travel Forecasting Models*, Page 2-24.

some agencies include treatment of discounted fare media as part of the fare system representation."[81] CS pointed out four issues that would complicate incorporating transit into the TPB travel model:

- Application of fare subsidies solely to the Metrorail trips may potentially bias the forecast of trips in other transit modes.
- The method that was tested by TPB staff assumes the maximum benefit is provided, even though many employers do not provide this level of benefit.
- It is not easy to implement a similar method for bus-related trips.
- Various problems related to forecasting the subsidy.

These problems notwithstanding, CS did encourage TPB to consider other methods of incorporating the fare subsidy that could be applied to all transit modes, given the prevalence of these subsidies. CS delineated the following possible options:

1. Make use of recent travel surveys to estimate the presence of fare subsidies in all the transit modes. Although, this approach would not eliminate all of the issues identified above, "it would potentially eliminate some of the modal bias."
2. "Explore the relationship between fare subsidy presence and the type of employment in the attraction TAZ. If this relationship can be established, it can be used to forecast the potential effects of employment relocation and redistribution in the future." Or one could explore "using the same dimensions used to reflect parking cost subsidies." "For example, potentially the parking subsidy could be explicitly represented as a separate calculation from the parking cost and the same underlying look-up methods used to apply parking subsidies and fare subsidies."[82]
3. "A third avenue to explore is more general distributions of fare subsidies on a geographic basis (e.g., district-to-district or county-to-county) which might be more stable over the planning horizon. Such a more aggregate approach would mirror the approach used by other MPOs to represent the use of discounted fare media."

4.1.4.2 Topic: Representing fare systems in the travel model

4.1.4.2.1 TPB request of CS

The Washington, D.C. area is known to have a very complex fare system. To model this complex fare system, TPB staff has developed a number of structures and techniques. It might be useful to have CS to examine the way we are representing fares (e.g., MFARE1 and MFARE2 process, "bus" fare zones) and then to compare this to how other MPOs are representing fares in their models to see if there is a better way to represent fares and fare structures.

4.1.4.2.2 CS Findings

CS reviewed the representation of fare systems in the existing TPB regional travel demand model and also reviewed the state of the practice on fare representation in regional models in a sample of the country's largest metropolitan planning organizations (MPOs). Based on these reviews and experiences

---

[81] Cambridge Systematics, Inc., *Short-Term Model Enhancements: Transit-Related Enhancements (Task 10)*, 4-10.
[82] Ibid., 4-11.

elsewhere, an explicit representation of transit fares by provider and mode appears to be a preferred method for use in the regional travel demand model and should be considered as a short-term model enhancement. "The Cube modeling software can accommodate a wide range of fare coding approaches, although clearly the Washington region has a very complex transit fare structure. Cube TP+ can accommodate using up to 255 "modes" in the model stream. Using a two-part mode code can thus permit up to 25 different operators (first two digits of the code) using up to 10 modes (last digit of the code). While the TRNBUILD transit module relies on the mode numbers themselves, Cube Voyager can further use the OPERATOR feature to differentiate transit fares in its PT transit module. It is recommended that TPB consider incorporating the revised treatment of transit fares among its short-term model enhancements."[83]

4.1.4.3 Topic: Treatment of bus speeds in the travel model

4.1.4.3.1 TPB request of CS

Is our current approach, using local bus time degradation factors,[84] adequate/state of the practice? The current approach was based on guidance from AECOM Consult, Inc.[85]

4.1.4.3.2 CS Findings

CS noted that there are three main ways to represent bus speed relationships in regional travel demand models: 1) bus speed curves; 2) a regression model; and 3) a detailed representation of bus speeds as a function of highway speeds that takes into account operational characteristics, such as number of stops per link and delay per stop, due to factors such as dwell time, loading time, and acceleration/deceleration rates. In the recommendations section, CS recommended TPB adopt the third methodology, which is being used by SANDAG and NCTCOG:

> *While the current TPB bus travel time approach was designed to represent increasing congestion in the Washington region, it does not provide a direct linkage between bus travel speeds and the level of roadway congestion. In addition, since congestion varies in different parts of the region, differential impacts on transit travel time would be expected. That is, some routes might be affected more by increasing congestion than others. TPB may wish to now consider establishing a tighter linkage between bus speeds and highway congestion. An enhanced connection would permit significant improvements to regional highway capacity to accrue benefits to transit riders as well as auto drivers and reduce the potential for overstatement of the shifts to auto modes in future model runs.*

> *It is recommended that TPB consider establishing an explicit relationship between bus speed and highway speed, along with bus delay. It can take the following form:*

---

[83] Ibid., 4-9.

[84] Ronald Milone to Files, "Methodology for linking future bus speeds to highway congestion in the Version 2.1/D model," Memorandum, July 14, 2004; Milone et al., *TPB Travel Forecasting Model, Version 2.2: Specification, Validation, and User's Guide*, Page 14-3.

[85] Jeff Bruggeman and Bill Woodford to Ronald Milone, "Comments on MWCOG Modeling Procedures," Memorandum, June 30, 2004.

$Time_{Bus} = Time_{Auto}$ *+ Bus Delay*

Highway travel time reflects traffic congestion on the highway system. Bus delay captures all sorts of delays caused by the bus operations, including dwell time and acceleration and deceleration, loading time, and recovery time. Bus delay can be formulated as a delay factor multiplied by the number of stops (alternatively, link length). The delay factor can be empirically estimated using actual or scheduled bus run times and best estimates for auto travel time on the highway system. The relationship should be established by bus submodes, peak and off-peak periods, area types, and facility types.[86]

4.1.4.4 Topic: Estimation of mode choice models: Statistical estimations vs. setting coefficients by fiat and calibrating alternative-specific constants

4.1.4.4.1 TPB request of CS

On p. 2-19 of CS's FY 2009 report,[87] CS recommends that "the new 2008 household survey data should be used to update and re-calibrate the mode choice model parameters." Based on FTA guidance, there seems to be a tendency away from pure statistical estimation of time and cost coefficients and toward setting these values by fiat and then adjusting nesting constants to get the model to calibrate. What is the experience with other MPOs in this regard?

4.1.4.4.2 CS Findings

Most mode choice models are disaggregate choice models (typically logit). The classical way to develop a disaggregate choice model involves the following steps:

- Model specification
- Disaggregate model estimation
- Disaggregate model validation
- Aggregate model calibration/validation
- Possible loop back to the top, to re-specify a new model structure
- When done, implement model and apply it in an aggregate fashion (typically on a zone-to-zone basis).

CS delineates three major approaches for developing disaggregate choice models:

- Estimation approach: A statistical estimation of model coefficients and constants is conducted using locally collected survey data and some sort of maximum-likelihood estimation (MLE) routine. Examples of software that can be used include Alogit, NLOGIT/LIMDEP, Biogeme, SAS/ETS, and ELM.

---

[86] Ibid., 4-20.
[87] Cambridge Systematics, Inc., *Fiscal Year 2009 Task Reports*.

- Assertion approach: Values for some of the model coefficients and/or constants are asserted. The remaining model parameters are generally developed using an aggregate calibration routine or process.
- Hybrid approach: Statistical estimation is conducted using locally collected survey data, but some values for model parameters are asserted or constrained in the estimation process.

CS found examples of MPOs conducting all three approaches. CS also discussed FTA requirements related to mode choice model development for New Starts proposals, including listing some of the "problematic characteristics of transit forecasting methods," such as unusual coefficient values and inconsistencies between the transit path-builder and the mode choice model. For example, FTA expects the coefficient on in-vehicle time (Civtt) to be between -0.03 and -0.02; and FTA expects the ratio of the coefficients on out-of-vehicle time and in-vehicle time to be between 2.0 and 3.0. Many in the industry would argue that it is because of the FTA New Starts guidance that many MPOs and consultants are using the "assertion approach." CS states that "FTA recognizes the limitations of mode choice model estimations and in particular, believes that too many resources were spent on model estimation and too little resources on model calibration and validation."[88]

CS recommends that a "hybrid approach" be taken by TPB staff, starting with statistical estimation, and constraining coefficient values if need be the case. CS also recommends taking into account the FTA guidance on what constitutes reasonable parameter values. CS also recommends engaging the FTA in the model development process early on (especially if one is working on a New Starts application).

4.2 Conferences

One or more TPB staff in the models development unit attended the following conferences in FY 2010 (July 1, 2009 to June 30, 2010):

- Transportation Research Board (TRB) 89th Annual Meeting, January 10-14, 2010
- 3rd TRB Conference on Innovations in Travel Modeling (ITM 2010), May 10-12, 2010

4.2.1 89th Annual Meeting of the TRB

The Annual Meeting of the TRB is held every year in Washington, D.C. in January. The 89th Annual Meeting of the TRB was held January 10-14, 2010. It attracted more than 10,000 transportation professionals from around the world. It covered all transportation modes, with more than 3,000 presentations in nearly 600 sessions. TPB staff attended a number of sessions. Below is a list of some of the papers presented at some of the sessions attended by TPB staff:

- Michael Florian and Shuguang He, "Changing assignment algorithms: the price of better convergence."
- Hannes Gordon, "Density and LRT: Case of Canberra, Australia."
- Sudeshna Sen et al., "Evaluation of Weighting Methodologies for Household Travel Surveys."
- Vincent L. Bernardin and Michael Conger, "From Academia to Application: Results from Calibration and Validation of the First Hybrid Accessibility-Based Model."

---

[88] Ibid., 4-25.

- Ozlem Yanmaz-Tuzel and Christopher E. Ozbay, "Impacts of Gasoline Prices on New Jersey Transit Ridership."
- Ashley Raye Haire and Randy B. Machemehl, "Regional and Modal Variability in Gasoline Price Effects on US Transit Ridership."
- Farhana Bond, "The Merits of Using Metropolitan Statistical Areas to Delineate Metropolitan Planning Organization Boundaries."

4.2.2 3rd TRB Conference on Innovations in Travel Modeling

One person from the models development unit of the TPB staff attended the 3rd TRB Conference on Innovations in Travel Modeling (ITM 2010), held May 10-12, 2010 in Tempe, Arizona. The goal of ITM 2010 was to serve as a forum for sharing the latest developments in travel modeling and to allow one to identify challenges with deploying cutting-edge computational methods to meet evolving planning contexts. The first two conferences in this series were held in Austin, Texas (2006) and Portland, Oregon (2008). The third conference was designed to build on the successes of the previous two conferences. There were about 200 participants at the conference. A full conference program, including a list of participants, can be found on the conference website (http://itm2010.fulton.asu.edu/ocs/custom/itm/Conference%20Program_ITM2010.pdf). The conference presentations, and, in some cases, papers can also be found on the website (http://itm2010.fulton.asu.edu/ocs/index.php/itm/itm2010/schedConf/allpapers). What follows is a discussion of a few of the interesting findings from the meeting.

One of the recommendations from TRB's Special Report 288 was the need to establish a travel forecasting handbook: "A national travel forecasting handbook should be developed and kept current to provide salient information to those practicing travel demand forecasting."[89] The recommended handbook was to include information for practitioners on three-step, four-step, and advanced models. Instead of a handbook, however, a web-based resource is being developed, known as the Travel Forecasting Resource (www.tfresource.org). The rationale behind developing a website instead of a paper handbook is to provide a dynamic information source, which will evolve as the practice of travel forecasting evolves. At the current time, the website, which will be guided by two oversight committees, is still under development, so it does not yet contain any detailed information. The Federal Highway Administration (FHWA) through the TRB has provided funding for this effort. Along with FHWA and TRB, the American Association of State Highway and Transportation Officials (AASHTO), the American Public Transportation Association (APTA), the Center for Clean Air Policy (CCAP), FTA, the Association of Metropolitan Planning Organizations (AMPO), the National Association of Regional Councils (NARC) and the Institute of Transportation Engineers (ITE) provide agency oversight for this work.

In the opening plenary session, a representative from the FHWA Office of Planning indicated that about 3-4% of the MPOs are "out in front" (i.e., using so-called "advanced" models), which means that over

---

[89] Transportation Research Board of the National Academies, *TRB Special Report 288, Metropolitan Travel Forecasting: Current Practice and Future Direction* (Washington, D.C.: Transportation Research Board of the National Academies, 2007), 12.

95% are still using more traditional four-step, aggregate travel models. Consequently, in addition to helping advance the state of the practice, FHWA needs to continue to support traditional models, which are used in so many MPOs.

There was an interesting presentation (and paper) entitled, "A GPS-based Bicycle Route Choice Model for San Francisco, California." The authors, who work for the San Francisco County Transportation Authority (SFCTA), sought to obtain information about bicycle route choice using Global Positioning System (GPS) devices. Instead of mailing the devices to participants, then retrieving the devices, the SFCTA decided to use the GPS receivers that already exist in smartphones, such as the Apple iPhone and Google Android smartphone. They developed a free smartphone application ("app") called CycleTracks (http://www.sfcta.org/CycleTracks). Apart from ease of distribution and increased sampling of the small population of cyclists, the advantage of this approach was the ability to record personal characteristics and trip purpose using the smartphone app. Of particular interest to agencies that have GPS-based data to process, such as the TPB, was the section of the presentation/paper entitled "GPS post processing," especially the references to two techniques for data cleaning and assigning trips to links/paths through the network:

> *Next, we cleaned and smoothed the data, and identified intermediate destinations and changes of travel mode by analyzing idle times, speeds, and accelerations using the fuzzy logic method of Schüssler & Axhausen.[90] The mode detection algorithm labeled an excessively large proportion of the GPS traces as transit trips because of high 95th percentile speeds. Therefore, we relabeled any such trace as a bike trip, as long as the algorithm found no activities and only one stage. Finally, the GPS points were allocated to the street network using the map matching algorithm of Schüssler & Axhausen.[91] [92]*

Lastly, Frank Koppelman, Professor Emeritus of Northwestern University, made an interesting presentation entitled, "Review and Critique of Developments in Travel Modeling."[93] He discussed developments in discrete choice models, developments in activity-based travel demand modeling, and various issues and concerns. He discussed the different classes of logit models, such as

- Multinomial Logit Models (MNL)

---

[90] Nadine Schuessler and Kay Axhausen, "Processing Raw Data from Global Positioning Systems Without Additional Information," *Transportation Research Record: Journal of the Transportation Research Board* 2105, no. 1 (December 1, 2009): 28-36, http://dx.doi.org/10.3141/2105-04.

[91] Nadine Schuessler and Kay W. Axhausen, *Map-matching of GPS traces on high-resolution navigation networks using the Multiple Hypothesis Technique (MHT)*, Working Paper, Arbeitsberichte Verkehrs- und Raumplanung (Zürich, Switzerland: ETH Zürich, Institut für Verkehrsplanung, Transporttechnik, Strassen- und Eisenbahnbau, 2009), http://e-citations.ethbib.ethz.ch/view/pub:32384.

[92] Jeffrey Hood, Elizabeth Sall, and Billy Charlton, "A GPS-based Bicycle Route Choice Model for San Francisco, California," in *conference website* (presented at the 3rd Conference on Innovations in Travel Modeling, Tempe, Arizona, 2010), 4, http://itm2010.fulton.asu.edu/ocs/index.php/itm/itm2010/schedConf/allpapers.

[93] Frank S. Koppelman, "Review and Critique of Developments in Travel Modeling" (presented at the 3rd Conference on Innovations in Travel Modeling, Workshop W1: Innovations in Integrated Urban Modeling, Tempe, Arizona, May 10, 2010), http://itm2010.fulton.asu.edu/ocs/index.php/itm/itm2010/schedConf/allpapers.

- Nested Logit Models (NL)
- Generalized Extreme Value Models (GEV)
  - Paired Combinatorial Logit (PCL)
  - Cross-Correlated Logit (CCL)
  - Generalized Nested Logit (GNL)
  - Net GEV
- Mixed Logit Models
- Mixed Other Models

He discussed the advantages and disadvantages of multinomial logit (MNL) and nested-logit (NL) model formulations. At one point, he asked the meeting attendees whether "drive-access to transit" should be placed in the "auto" nest or the "transit" nest of a mode choice model including both nests. In response to his question, he indicated that it really belonged in both nests, and, with generalized nested logit (GNL), it can be placed in both nests at the same time, since GNL allows for overlapping groups (see Figure 34).
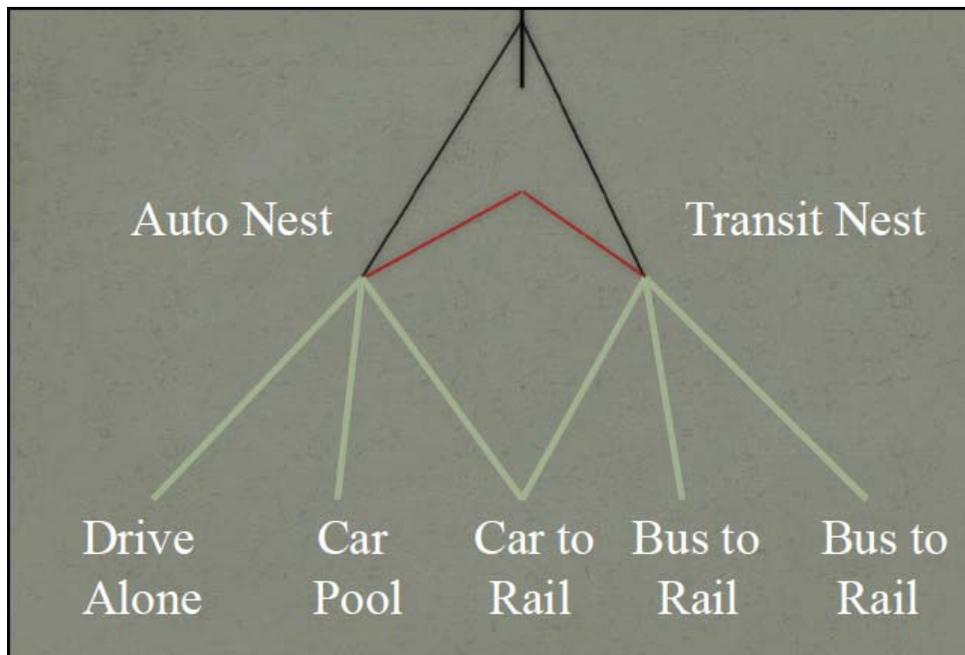
Figure 34 Placing "car to transit" in both the auto nest and the transit nest, by using GNL

Source: Frank S. Koppelman, "Review and Critique of Developments in Travel Modeling" (presented at the 3rd Conference on Innovations in Travel Modeling, Workshop W1: Innovations in Integrated Urban Modeling, Tempe, Arizona, May 10, 2010)

Toward the end of his presentation, there was a discussion about "choice-based sampling" in household travel surveys and its effects on mode choice modeling. David Kurth, Cambridge Systematics, Inc., indicated that choice-based sampling typically means that the estimated constants are biased. Dr.

Koppelman indicated that model builders should use all the data unweighted, but then, to correct for the biased constant values, model builders should apply techniques to adjust the constants.

4.3 Training and Webinars

One or more TPB staff in the models development unit attended the following training and/or webinars in FY 2010:

- Citilabs training hosted at MWCOG
  - "Scenario Analysis, Editing, and Mapping with Cube," July 27, 2009
  - "Model Development with Cube Base," July 28, 2009
  - "Travel Demand Forecasting with Cube Voyager," July 29, 2009
  - "Integrating Geodatabases and GIS with Cube 5," July 30-31, 2009
- Travel Model Improvement Program (TMIP) webinars
  - "Sharing Travel Model Development and Estimation Experience," September 28, 2009
  - "Dynamic Traffic Assignment #2: Put Dynamic Traffic Assignment to Work," October 23, 2009
  - "Sharing Travel Model Development and Estimation Experience," December 7, 2009
- Citilabs webinars
  - "Citilabs Sugar Network Editor," January 28, 2010
  - "New Features in Cube 5.1," February 26, 2010
  - "New Assignment Methods in Cube Voyager," March 11, 2010
  - "New Public Transit Timetabling Methods in Cube Voyager," April 1, 2010
  - "Activity-Based Modeling in Cube Voyager," April 8, 2010
  - "Moving to Cube GIS (5.1)," April 15, 2010
  - "How To Implement Cube Cluster," June 3, 2010
- Internal staff training
  - "MS Access and SAS SQL Queries," by Mary Martchouk, November 25, 2009
  - "Cube Voyager scripting techniques," by Ron Milone, December 21, 2009

4.4 AMPO Travel Modeling Work Group

The Association of Metropolitan Planning Organizations (AMPO) is a non-profit membership organization that serves the needs and interests of MPOs nationwide. For the past several years, TPB has actively promoted an AMPO technical committee that focuses specifically on issues relating to travel modeling practices at MPOs. The group, the AMPO Travel Modeling Work Group (TMWG), has been a useful forum for technicians to share information on the development and practice of travel forecasting methods that are used in current application.

In June of 2007, the Transportation Research Board issued a special report on the current state of the practice in travel forecasting.[94] The report addressed the current state of the practice in travel modeling

---

[94] Transportation Research Board of the National Academies, *TRB Special Report 288, Metropolitan Travel Forecasting: Current Practice and Future Direction* (Washington, D.C.: Transportation Research Board of the National Academies, 2007)

with respect to conventional four-step models. The report also included recommendations for moving toward more advanced (tour-based /activity-based) modeling practice. One such recommendation stressed the need for MPOs engaged in implementing advanced modeling techniques to document their experience. Further, the report also recommended that studies should be performed to compare the performance of conventional and advanced models.

These recommendations have resonated among some AMPO members, and have ultimately led to an AMPO-directed research initiative supported through pooled funding from interested MPOs. In December 2008, an RFP was issued to conduct research on MPO experiences with advanced travel modeling practices, specifically to develop an up-to-date assessment of how well advanced travel models have performed in practice, in terms of costs, advantages, drawbacks, and transferable components.   Eleven MPOs have financially contributed to the first phase of the research initiative (the TPB being one of the eleven).

The first phase will consist of four work tasks:

1) Identify MPO experiences with advanced travel models that would be of interest to other practitioners
2) Describe the status of documentation of and information available from selected MPO experiences with advanced travel models
3) Identify work activities required to develop additional documentation needed of MPO experiences with advanced travel models
4) Design a study to develop additional documentation and carry out a comprehensive assessment of advanced travel models

The first two tasks would seek to identify what documentation exists on MPO experiences with advanced models, the quality of the documentation, and what conclusions may be drawn. The third task will be a determination of what information remains to be collected in order to permit a comprehensive assessment of the advanced models relative to conventional models. The fourth and final task will be to design a second phase of research designed to collect information identified task 3, that is to fill in the data "gaps", so that a comprehensive assessment can be made.

During FY-2010, TPB has worked with the other funding MPOs on this study to monitor the AMPO study. Progress has been slow but steadily. Task 1 has been completed and the Task 2 Scope of Work has been refined based on the findings of Task 1. The study (Phase 1) will continue during the next year. The results of the study will likely influence the way that MPOs phase advanced models into practice.

4.5 Modeling Air Passenger Trips to the Three Commercial Airports

Airport auto driver forecasts are currently formulated as exogenous inputs to the regional travel model. The process involves the use of a Fratar-technique in which forecasted airport trip tables are developed using observed travel patterns that are adjusted over time in accordance with adopted household and job growth forecasts. The auto trips destined to the airport are added to all the auto trips resulting from the mode choice model. No mode choice modeling of air passenger trips is done and transit trips are omitted entirely. Given the fact that Ronald Reagan Washington National Airport has one of the highest

rates of transit usage in the U.S. (about 15% transit mode share) and Dulles International Airport is likely to be accessible by Metrorail in the year 2016, there could be benefits to modeling more than just auto driver trips to the three commercial airports.

For cities with more than one commercial airport, like the Washington, D.C. area, airport trip modeling typically has two components: airport choice (e.g., which of the three commercial airports would a traveler choose to use?) and ground access mode choice (the choice between the available modes of transportation to the airport). A literature review was conducted in 2008 by Gosling for the Transportation Research Board to study the different models that can be used for airport trips.[95] Unfortunately, none of the proposed methods was found to be feasible in the Washington, D.C. area, due to limited funding, lack of available data, and the complexity associated with modeling three regional airports.

At a recent meeting of the TFS,[96] a consultant suggested a way to include modes other than only auto driver trips to the three commercial airports. The current process uses a Fratar approach, meaning it starts with a seed matrix, which is adjusted based on forecasted values for the row and column totals of the matrix. He suggested that the seed matrix could include all modes at this point (including transit). Then, one could apply a simple mode choice model at a later step to extract the auto driver trips to the airports. The mode choice model could even be a simple constant-shares model, perhaps based on data from the most recent Air Passenger Survey. In the absence of a more complex model, these same mode shares could be applied to future-year trip tables. This strategy, while being insensitive to transit service improvements, would allow one to include transit trips to the airports in the modeling process and would yield more reasonable transit assignments. Since this strategy is an extension of an existing process, it is not too time consuming and could be relatively easily implemented in the Version 2.3 travel model.

While the simple methodology for including transit trips as described above is an improvement to the current modeling practice, it is desirable to devise a model that is responsive to future transportation system changes. Thus, in 2010, as part of an ongoing "Review of Best Practices" completed by Cambridge Systematics, TPB requested that they provide suggestions with regard to modeling airport trips. Cambridge Systematics proposed to "develop a separate model set based outside the modeling stream for traditional trip purposes and to include the ground access mode choice models with a nested structure".[97] According to the CS suggestion, in the first step, the trips to each airport will be generated. Next, a nested mode choice model that includes transit will be estimated and applied to the generated trips. Lastly, the trips by each mode will be added to the other trips and traffic assignment will be performed. This methodology will allow one to assess the impacts of changes in the transportation system, which is a desirable outcome. This model still includes the assumption that the share of the trips handled by each of the three airports remains constant. This assumption is not easy to remove in the

---

[95] Geoffrey D. Gosling, ACRP Synthesis 5: Airport Ground Access Mode Choice Models: A Synthesis of Airport Practice, Airport Cooperative Research Program (Washington, D.C.: Transportation Research Board, 2008).

[96] March 19, 2010.

[97] Feng Liu, "Task 8- Potential Short- Term Model Enhancements" (Presentation to the TPB Travel Forecasting Subcommittee presented at the TPB Travel Forecasting Subcommittee, Washington, D.C., May 21, 2010).

absence of a model that is able to estimate demand by airline carrier and ticket prices, which is beyond the scope of the regional travel demand model. The airport trip model proposed by CS is anticipated to be implemented in the version of the travel demand model following the Version 2.3 model.

Chapter 5 Looking Ahead

This report has documented a wide array of activities that have been undertaken in the models development program during FY-2010, addressing the areas of data collection, model maintenance and development, and research. The primary area of TPB's work effort has been involved with laying the foundation for the Version 2.3 model, to be released during FY-2011. This foundation includes a more detailed TAZ system along with newly developed networks and land use. The foundation also includes the assemblage of newly collected survey data- what is arguable the largest influx of newly collected travel data in over a decade.

During FY-2011, staff looks forward to completing estimation and calibration of the Version 2.3 model steps using the network, land activity, and survey data processed during FY-2010. In order to proceed with this work, base year (2007) highway and transit networks will be built and multi-modal paths will be evaluated. In order to develop first-cut restrained highway speeds, observed highway trips from the HTS will be assigned to the highway network. The resulting assigned screenline volumes and assigned VMT will be compared to available counts to ascertain the degree of possible under-reporting that exists in the 2007/08 survey. Under-reporting will need to be addressed in the trip generation process.

With the completion of restrained highway and transit skims, Version 2.3 estimation and calibration work will proceed during the fall of 2010. The model performance tests will address simulated screenline volumes, VMT comparisons, and daily trips by mode and submode. TPB will concurrently be developing a future-year highway and transit network with which to test the Version 2.3 model in a forecast mode. TPB considers the evaluation of future year simulation a vital component of model validation for any new model.

TPB will continue to monitor the travel forecasting practices of other MPOs through: 1) its involvement with the national AMPO Travel Modeling Work Group, 2) the on-going consultant-supported contract for conducting focused research in travel modeling, and ongoing attendance at conferences and webinars.

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

Purpose	Mode	Page		
HBW	Transit	A	-	1
HBW	Auto Driver	A	-	1
HBW	Auto Pax	A	-	2
HBW	Walk	A	-	2
HBW	Bike	A	-	3
HBW	Other (Non-Modeled)	A	-	3
HBW	Auto Person	A	-	4
HBW	Total Motorized Person (Auto Person & Transit)	A	-	4
HBW	Transit Percentage	A	-	5
HBW	Avg. Auto Occupancy	A	-	5
HBW	Total Modeled Person (Motorized & NonMotorized)	A	-	6
HBS	Transit	A	-	6
HBS	Auto Driver	A	-	7
HBS	Auto Pax	A	-	7
HBS	Walk	A	-	8
HBS	Bike	A	-	8
HBS	Other (Non-Modeled)	A	-	9
HBS	Auto Person	A	-	9
HBS	Total Motorized Person (Auto Person & Transit)	A	-	10
HBS	Transit Percentage	A	-	10
HBS	Avg. Auto Occupancy	A	-	11
HBS	Total Modeled Person (Motorized & NonMotorized)	A	-	11
HBO	Transit	A	-	12
HBO	Auto Driver	A	-	12
HBO	Auto Pax	A	-	13
HBO	Walk	A	-	13
HBO	Bike	A	-	14
HBO	Other (Non-Modeled)	A	-	14
HBO	Auto Person	A	-	15
HBO	Total Motorized Person (Auto Person & Transit)	A	-	15
HBO	Transit Percentage	A	-	16
HBO	Avg. Auto Occupancy	A	-	16
HBO	Total Modeled Person (Motorized & NonMotorized)	A	-	17
NHW	Transit	A	-	17
NHW	Auto Driver	A	-	18
NHW	Auto Pax	A	-	18
NHW	Walk	A	-	19
NHW	Bike	A	-	19
NHW	Other (Non-Modeled)	A	-	20
NHW	Auto Person	A	-	20
NHW	Total Motorized Person (Auto Person & Transit)	A	-	21
NHW	Transit Percentage	A	-	21
NHW	Avg. Auto Occupancy	A	-	22
NHW	Total Modeled Person (Motorized & NonMotorized)	A	-	22
NHO	Transit	A	-	23
NHO	Auto Driver	A	-	23
NHO	Auto Pax	A	-	24
NHO	Walk	A	-	24
NHO	Bike	A	-	25
NHO	Other (Non-Modeled)	A	-	25
NHO	Auto Person	A	-	26
NHO	Total Motorized Person (Auto Person & Transit)	A	-	26
NHO	Transit Percentage	A	-	27
NHO	Avg. Auto Occupancy	A	-	27
NHO	Total Modeled Person (Motorized & NonMotorized)	A	-	28
Total	Transit	A	-	28
Total	Auto Driver	A	-	29
Total	Auto Pax	A	-	29
Total	Walk	A	-	30
Total	Bike	A	-	30
Total	Other (Non-Modeled)	A	-	31
Total	Auto Person	A	-	31
Total	Total Motorized Person (Auto Person & Transit)	A	-	32
Total	Transit Percentage	A	-	32
Total	Avg. Auto Occupancy	A	-	33
Total	Total Modeled Person (Motorized & NonMotorized)	A	-	33

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW    MODE: Transit
```

| DESTINATION |
ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	8971	1819	2384	676	1241	1748	534	392	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17766
2 DC NC	73329	10080	5743	3118	2048	2886	2203	2347	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	101753
3 MTG	68163	7171	20600	1854	2227	3935	1775	264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105987
4 PG	51978	7704	7154	9232	1509	2407	960	1252	0	219	0	0	0	0	0	0	0	0	0	0	0	0	0	82415
5 ARLCR	3459	0	0	0	0	613	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4071
6 ARNCR	26943	729	1524	880	3465	5298	827	971	204	0	0	0	0	0	0	0	0	0	105	0	0	0	0	40946
7 ALX	16729	2747	210	0	1669	3515	1515	814	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27200
8 FFX	54491	5729	1768	1446	8830	14842	3199	2529	238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93072
9 LDN	3915	586	200	0	256	259	518	0	259	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5993
10 PW	11808	3647	0	417	1352	3754	380	1236	0	385	0	0	0	0	0	0	0	0	0	0	0	0	0	22980
11 FRD	3499	957	2804	447	0	360	0	0	0	0	846	0	0	0	0	0	0	0	0	0	0	0	0	8914
12 CAR	551	417	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	968
13 HOW	8141	1067	276	260	0	1358	537	0	0	0	0	0	285	0	0	0	0	0	0	0	0	0	0	11922
14 AAR	15658	1395	2005	0	1924	479	72	1145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22679
15 CAL	2382	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2382
16 STM	459	0	0	1039	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1498
17 CHS	3814	0	297	348	264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4723
18 FAU	1900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1900
19 STA	1649	231	0	0	262	3168	0	506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5816
20 CL/JF	1764	0	1106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2870
21 SP/FB	2415	0	0	0	418	0	1092	969	0	0	0	0	0	0	0	0	0	0	0	0	489	0	0	5383
22 KGEO	402	0	0	0	0	0	0	0	0	244	0	0	0	0	0	0	0	0	0	0	0	0	0	646
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	362420		46070		25466		13612		701		846		285		0		0		105		489		0	
		44279		19717		44623		12425		849		0		0		0		0		0		0		571886

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW    MODE: Auto Driver
```

| DESTINATION |
ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	4503	3125	1007	208	0	1244	0	994	406	0	0	0	0	713	0	0	0	0	0	0	0	0	0	12199
2 DC NC	44933	30820	17282	15512	1111	5419	1893	10595	1493	534	0	0	185	3388	185	0	0	0	0	0	0	0	0	133350
3 MTG	36895	35934	234258	26938	3261	10921	1923	26316	2158	729	3205	0	9008	7305	0	0	0	0	459	838	0	0	0	400148
4 PG	42614	40389	44049	146699	1901	9520	3735	21188	1666	193	116	1123	6527	11943	0	0	4940	0	0	0	0	0	0	336603
5 ARLCR	0	613	613	0	204	226	0	1661	0	409	0	0	210	0	0	0	0	0	0	0	0	0	0	3935
6 ARNCR	17066	7611	4806	824	4231	16742	4117	21749	1674	533	0	0	0	329	108	0	0	0	337	0	0	0	0	80127
7 ALX	13055	4460	1934	1911	1876	6246	11793	13644	263	1397	0	0	0	367	0	0	0	0	0	0	0	0	0	56945
8 FFX	54721	20650	17652	5879	16368	36649	28601	304653	18464	19158	0	0	2562	238	424	0	336	815	1052	471	0	132	0	528823
9 LDN	4525	2556	4271	0	662	2661	1066	61475	54536	2227	0	0	0	382	0	0	0	662	0	480	0	0	0	135504
10 PW	5455	8065	2645	2016	3628	6307	6690	80184	5416	77978	0	0	0	0	0	492	295	2907	2914	0	636	0	0	205628
11 FRD	1002	2564	25580	2634	168	260	229	1997	2587	298	81840	3913	3917	1211	0	0	0	0	0	468	0	0	0	128668
12 CAR	583	99	8406	2706	0	0	165	165	0	0	2134	38696	10593	5601	0	0	0	0	0	0	0	0	0	69149
13 HOW	4781	2753	15720	21598	260	325	601	2315	276	0	423	967	51539	21599	0	0	138	0	0	325	0	0	0	123618
14 AAR	9137	7689	6698	26774	1491	2309	1900	4521	0	203	0	801	19536	133973	610	81	0	0	0	144	0	0	0	215866
15 CAL	3155	1726	726	5342	239	724	0	3039	0	362	0	0	1078	6363	14152	7449	487	0	0	0	0	0	0	44842
16 STM	1768	2753	459	3404	0	0	0	390	0	0	0	0	0	572	4127	50930	5356	0	0	0	0	0	0	69759
17 CHS	5188	4462	1160	13570	1057	2586	1769	5273	0	0	0	0	0	2044	1685	1257	27711	0	0	0	0	289	0	68052
18 FAU	549	0	566	0	0	883	431	8827	1816	6135	0	0	0	0	0	0	0	9291	0	0	214	0	0	28712
19 STA	1637	2124	857	131	0	506	1285	7845	0	11456	0	0	0	0	0	0	0	0	16184	536	9022	893	0	52476
20 CL/JF	534	0	562	0	0	0	0	3356	5698	0	3617	0	157	0	0	0	314	0	12314	0	297	0	0	26848
21 SP/FB	1955	916	787	1011	567	594	0	617	0	2458	0	0	0	0	0	0	258	5808	1622	31616	4828	0	0	53038
22 KGEO	286	0	0	0	0	0	328	0	804	0	0	0	366	0	244	1000	244	838	0	889	7684	0	0	12684
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	254344		390036		37024		66198		96451		91335		105312		21290		40262		27592		42377		0	
		179309		277156		104120		581135		124874		45500		196395		60453		14493		17197		14122		2786976

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW    MODE: Auto Pax
```

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	1303	468	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1770
2 DC NC	5909	3610	185	307	191	0	0	0	0	0	0	0	355	0	0	0	0	0	0	0	0	0	0	10557
3 MTG	2634	3635	14139	1331	303	0	0	884	0	0	205	0	0	0	0	0	0	0	0	0	0	0	0	23132
4 PG	3908	3540	1900	16226	0	1076	0	1068	0	0	0	0	0	1641	0	0	0	0	0	0	0	0	0	29360
5 ARLCR	102	0	0	0	0	226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	328
6 ARNCR	1706	513	0	0	102	1045	208	0	119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3693
7 ALX	1349	0	0	0	207	1419	1214	113	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4303
8 FFX	5025	1832	0	0	500	2065	698	12045	2095	553	0	0	0	0	0	0	0	0	0	0	0	0	0	24813
9 LDN	841	0	0	0	512	0	0	2270	2394	293	0	0	0	0	0	0	0	0	0	0	0	0	0	6309
10 PW	718	833	1054	1054	636	1196	1890	747	0	4287	0	0	0	0	0	0	0	0	0	0	0	0	0	12415
11 FRD	0	0	1125	0	0	0	0	0	0	0	5293	836	0	0	0	0	0	0	0	0	0	0	0	7254
12 CAR	165	0	176	0	0	0	0	0	0	0	99	2969	380	963	0	0	0	0	0	0	0	0	0	4753
13 HOW	336	0	208	240	0	0	0	0	0	0	0	0	1645	0	0	0	0	0	0	0	0	0	0	2429
14 AAR	562	562	1000	949	0	0	0	0	0	0	0	0	0	6802	0	0	0	0	0	0	0	0	0	9874
15 CAL	0	0	0	0	0	724	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	724
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	973	5249	0	0	0	0	0	0	0	6222
17 CHS	0	0	348	1164	0	0	0	628	0	0	0	0	0	0	0	0	2311	0	0	0	0	0	0	4451
18 FAU	0	0	0	0	0	0	0	276	276	167	0	0	0	0	0	0	0	431	0	0	0	0	0	1150
19 STA	0	0	0	0	268	0	946	0	506	0	0	0	0	0	0	0	0	0	2015	0	1114	0	0	4849
20 CL/JF	0	0	0	0	0	0	0	195	1200	0	0	0	0	0	0	0	0	0	0	214	0	0	0	1609
21 SP/FB	0	0	0	0	0	0	0	0	0	736	0	0	0	0	0	0	0	0	491	0	617	0	0	1844
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	768	0	768
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	24559	14993	20134	21271	2451	8018	4011	19172	6084	6542	5598	3805	2380	9406	973	5249	2311	431	2505	214	1731	768	0	162607

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW    MODE: Walk
```

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	19228	353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19581
2 DC NC	6658	9947	430	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17035
3 MTG	146	410	11281	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11837
4 PG	0	0	0	2331	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2331
5 ARLCR	420	0	0	0	0	226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	646
6 ARNCR	0	0	0	0	1597	5591	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7188
7 ALX	133	0	0	0	0	0	4404	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4537
8 FFX	0	0	0	0	0	0	0	8216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8216
9 LDN	0	0	0	0	0	0	0	0	1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1995
10 PW	0	0	0	0	0	0	0	0	0	807	0	0	0	0	0	0	0	0	0	0	0	0	0	807
11 FRD	0	0	0	0	0	0	0	0	0	0	3439	0	0	0	0	0	0	0	0	0	0	0	0	3439
12 CAR	0	0	0	0	0	0	0	0	0	0	0	897	0	0	0	0	0	0	0	0	0	0	0	897
13 HOW	0	0	0	0	0	0	0	0	0	0	0	0	1286	0	0	0	0	0	0	0	0	0	0	1286
14 AAR	0	0	0	0	0	0	0	0	0	0	0	0	0	3997	0	0	0	0	0	0	0	0	0	3997
15 CAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 CHS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 STA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	482	0	0	0	482
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	26584	10711	11711	2331	1597	5817	4404	8216	1995	807	3439	897	1286	3997	0	0	0	0	0	482	0	0	0	84275

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW   MODE: Bike

        DESTINATION
ORIGIN |    1     2     3     4     5     6     7     8     9    10    11    12    13    14    15    16    17    18    19    20    21    22    23 |  TOTAL
================================================================================================================================================
 1 DC CR|  185   914     0   191     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   1290
 2 DC NC| 6993  1767   208   338   430     0     0    92     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   9828
 3 MTG  | 2527     0  4877     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   7404
 4 PG   |  560     0     0  1280     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   1840
 5 ARLCR|  204     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    204
 6 ARNCR| 1322     0     0     0     0     0   659     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   1982
 7 ALX  |  896     0     0     0   420   393     0   786     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   2496
 8 FFX  |  861   238     0     0     0   784     0  1354     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   3237
 9 LDN  |    0     0     0     0     0     0     0   191   480     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    671
10 PW   |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
11 FRD  |    0     0     0     0     0     0     0     0     0     0   918     0     0     0     0     0     0     0     0     0     0     0     0 |    918
12 CAR  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
13 HOW  |    0     0   325     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    325
14 AAR  |    0     0     0     0     0     0     0     0     0     0     0     0     0  1868     0     0     0     0     0     0     0     0     0 |   1868
15 CAL  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
16 STM  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
17 CHS  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0   453     0     0     0     0     0     0 |    453
18 FAU  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
19 STA  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
20 CL/JF|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
21 SP/FB|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
22 KGEO |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
23 EXTL |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
================================================================================================================================================
 TOTAL 13548        5410        850        659        480        918          0          0        453          0          0          0          0 |
             2920        1809       1177       2424          0          0       1868          0          0          0          0          0    32514


2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW   MODE: Other (Non-Modeled)

        DESTINATION
ORIGIN |    1     2     3     4     5     6     7     8     9    10    11    12    13    14    15    16    17    18    19    20    21    22    23 |  TOTAL
================================================================================================================================================
 1 DC CR|  943     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    943
 2 DC NC| 3647   570     0     0     0   215     0   185     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   4616
 3 MTG  |  275  1095   485   862     0     0   218   411     0     0     0     0   109     0     0     0     0     0     0     0     0     0     0 |   3454
 4 PG   |  477     0   998   387     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   1862
 5 ARLCR|    0   409     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    409
 6 ARNCR|    0   206     0     0     0   535   108     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    849
 7 ALX  |  702     0     0     0     0     0   178     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    879
 8 FFX  | 1116   238     0     0   471   238   119  1339   848     0     0     0     0     0   522     0     0     0     0     0     0     0     0 |   4890
 9 LDN  |    0     0   662     0     0     0     0   764   159     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   1586
10 PW   |    0    98     0     0     0     0     0     0     0   843     0     0     0     0     0     0     0     0     0     0     0     0     0 |    941
11 FRD  |    0     0     0     0     0     0     0     0     0     0   900     0     0     0     0     0     0     0     0     0     0     0     0 |    900
12 CAR  |    0     0     0     0     0     0     0     0     0     0     0   513     0     0     0     0     0     0     0     0     0     0     0 |    513
13 HOW  |    0     0   579     0     0     0     0     0     0     0     0     0   208     0     0     0     0     0     0     0     0     0     0 |    787
14 AAR  |    0     0     0     0     0     0     0   144     0     0     0     0     0  1950     0     0     0     0     0     0     0     0     0 |   2094
15 CAL  |    0     0     0     0     0     0     0   249     0     0     0     0     0     0   249     0     0     0     0     0     0     0     0 |    498
16 STM  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
17 CHS  |    0     0     0   808     0     0     0   348     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   1156
18 FAU  |    0     0     0     0   429     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    429
19 STA  |  451     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0   903     0     0 |   1354
20 CL/JF|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
21 SP/FB|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
22 KGEO |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0   118     0     0 |    118
23 EXTL |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
================================================================================================================================================
 TOTAL  7610        2724        900        623       1007        900        208        249          0          0       1021          0 |
             2616        2057        988       3439        843        513       2059        522          0          0          0    28277
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW   MODE: Auto Person

```
         DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |  TOTAL
       =========================================================================================================================================================================
  1 DC CR|  5805   3593   1007    208      0   1244      0    994    406      0      0      0      0    713      0      0      0      0      0      0      0      0      0 |  13969
  2 DC NC| 50843  34430  17466  15820   1301   5419   1893  10595   1493    534      0      0    539   3388    185      0      0      0      0      0      0      0      0 | 143906
  3 MTG  | 39530  39568 248397  28269   3564  10921   1923  27200   2158    729   3411      0   9008   7305      0      0      0      0    459    838      0      0      0 | 423280
  4 PG   | 46521  43929  45949 162926   1901  10596   3735  22256   1666    193    116   1123   6527  13585      0      0   4940      0      0      0      0      0      0 | 365963
  5 ARLCR|   102    613    613      0    204    451      0   1661      0    409      0      0    210      0      0      0      0      0      0      0      0      0      0 |   4263
  6 ARNCR| 18772   8124   4806    824   4333  17787   4325  21749   1793    533      0      0      0    329    108      0      0      0    337      0      0      0      0 |  83820
  7 ALX  | 14403   4460   1934   1911   2084   7665  13007  13757    263   1397      0      0      0    367      0      0      0      0      0      0      0      0      0 |  61248
  8 FFX  | 59747  22482  17652   5879  16868  38714  29299 316697  20559  19711      0      0   2562    238    424      0    336    815   1052    471      0    132      0 | 553637
  9 LDN  |  5366   2556   4271      0   1174   2661   1066  63745  56929   2520      0      0      0    382      0      0      0    662      0    480      0      0      0 | 141814
 10 PW   |  6173   8898   3699   3070   4264   7502   8581  80931   5416  82265      0      0      0      0      0    492    295   2907   2914      0    636      0      0 | 218043
 11 FRD  |  1002   2564  26705   2634    168    260    229   1997   2587    298  87133   4749   3917   1211      0      0      0      0      0    468      0      0      0 | 135922
 12 CAR  |   748     99   8582   2706      0      0    165    165      0      0   2233  41665  10974   6564      0      0      0      0      0      0      0      0      0 |  73901
 13 HOW  |  5118   2753  15928  21838    260    325    601   2315    276      0    423    967  53184  21599      0      0    138      0      0    325      0      0      0 | 126048
 14 AAR  |  9699   8250   7698  27723   1491   2309   1900   4521      0    203      0    801  19536 140775    610     81      0      0      0    144      0      0      0 | 225740
 15 CAL  |  3155   1726    726   5342    239   1447      0   3039      0    362      0      0   1078   6363  14152   7449    487      0      0      0      0      0      0 |  45566
 16 STM  |  1768   2753    459   3404      0      0      0    390      0      0      0      0      0    572   5100  56179   5356      0      0      0      0      0      0 |  75981
 17 CHS  |  5188   4462   1508  14734   1057   2586   1769   5902      0      0      0      0      0   2044   1685   1257  30022      0      0      0      0    289      0 |  72503
 18 FAU  |   549      0    566      0      0    883    431   9103   2092   6302      0      0      0      0      0      0      0   9722      0      0    214      0      0 |  29863
 19 STA  |  1637   2124    857    131      0    774   1285   8791      0  11962      0      0      0      0      0      0      0      0  18199    536  10136    893      0 |  57326
 20 CL/JF|   534      0    562      0      0      0      0   3551   6898      0   3617      0    157      0      0      0      0    314      0  12528      0    297      0 |  28457
 21 SP/FB|  1955    916    787   1011    567    594      0    617      0   3194      0      0      0      0      0      0      0    258   6298   1622  32233   4828      0 |  54881
 22 KGEO |   286      0      0      0      0      0      0    328      0    804      0      0      0    366      0    244   1000    244    838      0    889   8452      0 |  13453
 23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
       =========================================================================================================================================================================
  TOTAL  278902       410171        39475        70209       102535        96933       107692        22263        42573        30097        44109          0 |
            194303        298427       112138       600307       131416        49305       205801        65703        14924        17412        14891     2949583
```

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW   MODE: Total Motorized Person (Auto Person & Transit)

```
         DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |  TOTAL
       =========================================================================================================================================================================
  1 DC CR| 14776   5411   3391    884   1241   2992    534   1387    406      0      0      0      0    713      0      0      0      0      0      0      0      0      0 |  31735
  2 DC NC|124172  44510  23209  18937   3349   8305   4097  12942   1493    534      0      0    539   3388    185      0      0      0      0      0      0      0      0 | 245660
  3 MTG  |107692  46740 268996  30123   5791  14856   3698  27463   2158    729   3411      0   9008   7305      0      0      0      0    459    838      0      0      0 | 529267
  4 PG   | 98499  51633  53103 172158   3409  13003   4695  23509   1666    412    116   1123   6527  13585      0      0   4940      0      0      0      0      0      0 | 448378
  5 ARLCR|  3561    613    613      0    204   1064      0   1661      0    409      0      0    210      0      0      0      0      0      0      0      0      0      0 |   8334
  6 ARNCR| 45715   8853   6330   1704   7798  23085   5152  22720   1996    533      0      0      0    329    108      0      0      0    442      0      0      0      0 | 124766
  7 ALX  | 31133   7207   2144   1911   3753  11180  14523  14571    263   1397      0      0      0    367      0      0      0      0      0      0      0      0      0 |  88448
  8 FFX  |114238  28211  19420   7325  25698  53556  32497 319206  20797  19711      0      0   2562    238    424      0    336    815   1052    471      0    132      0 | 646709
  9 LDN  |  9282   3142   4471      0   1430   2920   1585  63745  57188   2520      0      0      0    382      0      0      0    662      0    480      0      0      0 | 147807
 10 PW   | 17982  12546   3699   3486   5616  11257   8961  82168   5416  82651      0      0      0      0      0    492    295   2907   2914      0    636      0      0 | 241023
 11 FRD  |  4501   3521  29509   3081    168    620    229   1997   2587    298  87979   4749   3917   1211      0      0      0      0      0    468      0      0      0 | 144836
 12 CAR  |  1299    516   8582   2706      0      0    165    165      0      0   2233  41665  10974   6564      0      0      0      0      0      0      0      0      0 |  74869
 13 HOW  | 13258   3819  16204  22097    260   1683   1137   2315    276      0    423    967  53469  21599      0      0    138      0      0    325      0      0      0 | 137970
 14 AAR  | 25357   9646   9703  27723   3415   2788   1972   5666      0    203      0    801  19536 140775    610     81      0      0      0    144      0      0      0 | 248419
 15 CAL  |  5538   1726    726   5342    239   1447      0   3039      0    362      0      0   1078   6363  14152   7449    487      0      0      0      0      0      0 |  47948
 16 STM  |  2227   2753    459   4443      0      0      0    390      0      0      0      0      0    572   5100  56179   5356      0      0      0      0      0      0 |  77480
 17 CHS  |  9002   4462   1805  15081   1321   2586   1769   5902      0      0      0      0      0   2044   1685   1257  30022      0      0      0      0    289      0 |  77226
 18 FAU  |  2449      0    566      0      0    883    431   9103   2092   6302      0      0      0      0      0      0      0   9722      0      0    214      0      0 |  31762
 19 STA  |  3286   2356    857    131    262   3942   1285   9297      0  11962      0      0      0      0      0      0      0      0  18199    536  10136    893      0 |  63142
 20 CL/JF|  2298      0   1668      0      0      0      0   3551   6898      0   3617      0    157      0      0      0      0    314      0  12528      0    297      0 |  31327
 21 SP/FB|  4371    916    787   1011    985    594   1092   1586      0   3194      0      0      0      0      0      0      0    258   6298   1622  32722   4828      0 |  60264
 22 KGEO |   688      0      0      0      0      0      0    328      0   1048      0      0      0    366      0    244   1000    244    838      0    889   8452      0 |  14099
 23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
       =========================================================================================================================================================================
  TOTAL  641323       456241        64941        83821       103235        97779       107977        22263        42573        30202        44597          0 |
            238582        318144       156761       612731       132265        49305       205801        65703        14924        17412        14891     3521469
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW   MODE: Transit Percentage
```

ORIGIN \ DEST	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	60.7	33.6	70.3	76.5	100.0	58.4	100.0	28.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56.0
2 DC NC	59.1	22.6	24.7	16.5	61.1	34.7	53.8	18.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41.4
3 MTG	63.3	15.3	7.7	6.2	38.5	26.5	48.0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.0
4 PG	52.8	14.9	13.5	5.4	44.3	18.5	20.4	5.3	0	53.2	0	0	0	0	0	0	0	0	0	0	0	0	0	18.4
5 ARLCR	97.1	0	0	0	0	57.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48.9
6 ARNCR	58.9	8.2	24.1	51.6	44.4	22.9	16.1	4.3	10.2	0	0	0	0	0	0	0	0	0	23.7	0	0	0	0	32.8
7 ALX	53.7	38.1	9.8	0	44.5	31.4	10.4	5.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30.8
8 FFX	47.7	20.3	9.1	19.7	34.4	27.7	9.8	0.8	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.4
9 LDN	42.2	18.6	4.5	0	17.9	8.9	32.7	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.1
10 PW	65.7	29.1	0	11.9	24.1	33.4	4.2	1.5	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	9.5
11 FRD	77.7	27.2	9.5	14.5	0	58.1	0	0	0	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	6.2
12 CAR	42.4	80.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3
13 HOW	61.4	27.9	1.7	1.2	0	80.7	47.2	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	8.6
14 AAR	61.8	14.5	20.7	0	56.4	17.2	3.7	20.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.1
15 CAL	43.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.0
16 STM	20.6	0	0	23.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.9
17 CHS	42.4	0	16.4	2.3	20.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.1
18 FAU	77.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.0
19 STA	50.2	9.8	0	0	100.0	80.4	0	5.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.2
20 CL/JF	76.8	0	66.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.2
21 SP/FB	55.3	0	0	0	42.4	0	100.0	61.1	0	0	0	0	0	0	0	0	0	0	0	0	1.5	0	0	8.9
22 KGEO	58.4	0	0	0	0	0	0	0	23.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.6
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	56.5	18.6	10.1	6.2	39.2	28.5	16.2	2.0	0.7	0.6	0.9	0	0.3	0	0	0	0	0	0.3	0	1.1	0	0	16.2

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW   MODE: Avg. Auto Occupancy
```

ORIGIN \ DEST	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	1.29	1.15	1.00	1.00	0	1.00	0	1.00	1.00	0	0	0	0	1.00	0	0	0	0	0	0	0	0	0	1.15
2 DC NC	1.13	1.12	1.01	1.02	1.17	1.00	1.00	1.00	1.00	1.00	0	0	2.92	1.00	1.00	0	0	0	0	0	0	0	0	1.08
3 MTG	1.07	1.10	1.06	1.05	1.09	1.00	1.00	1.03	1.00	1.00	1.06	0	1.00	1.00	0	0	0	1.00	1.00	0	0	0	0	1.06
4 PG	1.09	1.09	1.04	1.11	1.00	1.11	1.00	1.05	1.00	1.00	1.00	1.00	1.00	1.14	0	0	1.00	0	0	0	0	0	0	1.09
5 ARLCR	0	1.00	1.00	0	1.00	2.00	0	1.00	0	1.00	0	0	1.00	0	0	0	0	0	0	0	0	0	0	1.08
6 ARNCR	1.10	1.07	1.00	1.00	1.02	1.06	1.05	1.00	1.07	1.00	0	0	0	1.00	1.00	0	0	0	1.00	0	0	0	0	1.05
7 ALX	1.10	1.00	1.00	1.00	1.11	1.23	1.10	1.01	1.00	1.00	0	0	0	1.00	0	0	0	0	0	0	0	0	0	1.08
8 FFX	1.09	1.09	1.00	1.00	1.03	1.06	1.02	1.04	1.11	1.03	0	0	1.00	1.00	1.00	0	1.00	1.00	1.00	0	1.00	0	0	1.05
9 LDN	1.19	1.00	1.00	0	1.77	1.00	1.00	1.04	1.04	1.13	0	0	0	1.00	0	0	0	1.00	0	1.00	0	0	0	1.05
10 PW	1.13	1.10	1.40	1.52	1.18	1.19	1.28	1.01	1.00	1.05	0	0	0	0	0	1.00	1.00	1.00	1.00	0	1.00	0	0	1.06
11 FRD	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.06	1.21	1.00	1.00	0	0	0	0	0	1.00	0	0	0	1.06
12 CAR	1.28	1.00	1.02	1.00	0	0	1.00	1.00	0	0	1.05	1.08	1.04	1.17	0	0	0	0	0	0	0	0	0	1.07
13 HOW	1.07	1.00	1.01	1.01	1.00	1.00	1.00	1.00	1.00	0	1.00	1.00	1.03	1.00	0	0	1.00	0	0	1.00	0	0	0	1.02
14 AAR	1.06	1.07	1.15	1.04	1.00	1.00	1.00	1.00	0	1.00	0	1.00	1.00	1.05	1.00	1.00	0	0	1.00	0	0	0	0	1.05
15 CAL	1.00	1.00	1.00	1.00	1.00	2.00	0	1.00	0	1.00	0	0	1.00	1.00	1.00	1.00	1.00	0	0	0	0	0	0	1.02
16 STM	1.00	1.00	1.00	1.00	0	0	0	1.00	0	0	0	0	0	1.00	1.24	1.10	1.00	0	0	0	0	0	0	1.09
17 CHS	1.00	1.00	1.30	1.09	1.00	1.00	1.00	1.12	0	0	0	0	0	1.00	1.00	1.00	1.08	0	0	0	0	1.00	0	1.07
18 FAU	1.00	0	1.00	0	0	1.00	1.00	1.03	1.15	1.03	0	0	0	0	0	0	0	1.05	0	0	1.00	0	0	1.04
19 STA	1.00	1.00	1.00	1.00	0	1.53	1.00	1.12	0	1.04	0	0	0	0	0	0	0	0	1.12	1.00	1.12	1.00	0	1.09
20 CL/JF	1.00	0	1.00	0	0	0	0	1.06	1.21	0	1.00	0	1.00	0	0	0	0	1.00	0	1.02	0	1.00	0	1.06
21 SP/FB	1.00	1.00	1.00	1.00	1.00	1.00	0	1.00	0	1.30	0	0	0	0	0	0	0	1.00	1.08	1.00	1.02	1.00	0	1.03
22 KGEO	1.00	0	0	0	0	0	0	1.00	0	1.00	0	0	0	1.00	0	1.00	1.00	1.00	1.00	0	1.00	1.10	0	1.06
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1.10	1.08	1.05	1.08	1.07	1.08	1.06	1.03	1.06	1.05	1.06	1.08	1.02	1.05	1.05	1.09	1.06	1.03	1.09	1.01	1.04	1.05	0	1.06

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBW   MODE: Total Modeled Person (Motorized & NonMotorized)
```

	DESTINATION																							
ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	34188	6679	3391	1075	1241	2992	534	1387	406	0	0	0	0	713	0	0	0	0	0	0	0	0	0	52606
2 DC NC	137823	56225	23847	19275	3779	8305	4097	13034	1493	534	0	0	539	3388	185	0	0	0	0	0	0	0	0	272523
3 MTG	110365	47149	285154	30123	5791	14856	3698	27463	2158	729	3411	0	9008	7305	0	0	0	0	459	838	0	0	0	548508
4 PG	99059	51633	53103	175770	3409	13003	4695	23509	1666	412	116	1123	6527	13585	0	0	4940	0	0	0	0	0	0	452550
5 ARLCR	4184	613	613	0	204	1290	0	1661	0	409	0	0	210	0	0	0	0	0	0	0	0	0	0	9183
6 ARNCR	47038	8853	6330	1704	9395	28676	5811	22720	1996	533	0	0	0	329	108	0	0	0	442	0	0	0	0	133936
7 ALX	32162	7207	2144	1911	4173	11573	18927	15357	263	1397	0	0	0	367	0	0	0	0	0	0	0	0	0	95480
8 FFX	115099	28449	19420	7325	25698	54340	32497	328796	20797	19711	0	0	2562	238	424	0	336	815	1052	471	0	132	0	658162
9 LDN	9282	3142	4471	0	1430	2920	1585	63936	59664	2520	0	0	0	382	0	0	0	662	0	480	0	0	0	150474
10 PW	17982	12546	3699	3486	5616	11257	8961	82168	5416	83054	0	0	0	0	0	492	295	2907	2914	0	636	0	0	241830
11 FRD	4501	3521	29509	3081	168	620	229	1997	2587	298	92336	4749	3917	1211	0	0	0	0	0	468	0	0	0	149192
12 CAR	1299	516	8582	2706	0	0	165	165	0	0	2233	42562	10974	6564	0	0	0	0	0	0	0	0	0	75767
13 HOW	13258	3819	16529	22097	260	1683	1137	2315	276	0	423	967	54755	21599	0	0	138	0	0	325	0	0	0	139581
14 AAR	25357	9646	9703	27723	3415	2788	1972	5666	0	203	0	801	19536	146640	610	81	0	0	0	144	0	0	0	254284
15 CAL	5538	1726	726	5342	239	1447	0	3039	0	362	0	0	1078	6363	14152	7449	487	0	0	0	0	0	0	47948
16 STM	2227	2753	459	4443	0	0	0	390	0	0	0	0	0	572	5100	56179	5356	0	0	0	0	0	0	77480
17 CHS	9002	4462	1805	15081	1321	2586	1769	5902	0	0	0	0	0	2044	1685	1257	30475	0	0	0	0	289	0	77679
18 FAU	2449	0	566	0	0	883	431	9103	2092	6302	0	0	0	0	0	0	0	9722	0	0	214	0	0	31762
19 STA	3286	2356	857	131	262	3942	1285	9297	0	11962	0	0	0	0	0	0	0	0	18199	536	10136	893	0	63142
20 CL/JF	2298	0	1668	0	0	0	0	3551	6898	0	3617	0	157	0	0	0	314	0	13010	0	0	297	0	31810
21 SP/FB	4371	916	787	1011	985	594	1092	1586	0	3194	0	0	0	0	0	0	0	258	6298	1622	32722	4828	0	60264
22 KGEO	688	0	0	0	0	0	0	328	0	1048	0	0	0	366	0	244	1000	244	838	0	889	8452	0	14099
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```
 TOTAL   681455      473362      67387      88884       105711     102136      109263      22263      43026      30202      44597      0
             252212      322285      163755      623372     133071      50202      211666     65703      14924      17894      14891      3638258
```

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS   MODE: Transit
```

	DESTINATION																							
ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	1117	1221	510	215	0	1049	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4111
2 DC NC	13476	13727	1150	3146	191	787	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32476
3 MTG	4654	1179	5153	0	0	0	109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11095
4 PG	1494	1270	181	3969	181	245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7340
5 ARLCR	420	0	204	0	0	450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1074
6 ARNCR	889	204	0	0	210	2530	0	413	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4245
7 ALX	645	0	0	0	207	225	566	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1644
8 FFX	1131	0	0	0	0	915	0	1630	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3676
9 LDN	0	80	0	0	0	191	0	0	259	0	0	0	0	0	0	0	0	0	0	0	0	0	0	530
10 PW	0	0	0	0	0	318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	318
11 FRD	224	0	0	0	0	0	0	0	0	0	382	0	0	0	0	0	0	0	0	0	0	0	0	606
12 CAR	0	0	0	0	0	0	0	0	0	0	0	639	0	0	0	0	0	0	0	0	0	0	0	639
13 HOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 AAR	72	0	0	72	0	0	0	0	0	0	0	0	0	1124	0	0	0	0	0	0	0	0	0	1268
15 CAL	239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	239
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	526	0	0	0	0	0	0	0	526
17 CHS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 STA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	463	0	0	0	463
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```
 TOTAL   24360       7197       861       676        259        382        0         0          0          0          0          463        0
             17680       7329       6710      2043       0          639       1124       526         0          0          0          70250
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS   MODE: Auto Driver

ORIGIN	DESTINATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	2156	1136	307	0	0	1592	92	515	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5797
2 DC NC	5172	46469	13943	11698	104	4290	661	3263	261	0	0	0	104	522	0	0	338	0	0	0	0	0	0	86824
3 MTG	1600	7316	280027	5307	615	528	205	2986	124	620	982	0	1200	949	0	0	436	0	143	0	0	0	0	303038
4 PG	1934	4689	11292	186487	0	414	109	2068	184	181	271	0	1866	10325	389	286	9436	0	0	0	0	197	0	230129
5 ARLCR	0	105	0	0	429	1386	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1919
6 ARNCR	1560	1041	639	102	990	40854	5631	12339	112	0	93	0	0	204	0	0	0	0	0	0	0	0	0	63564
7 ALX	491	444	338	532	133	2672	28771	8808	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42189
8 FFX	238	119	1635	748	928	7423	7150	309449	9130	7309	0	0	0	0	0	0	132	0	553	0	0	0	0	344814
9 LDN	240	0	382	0	0	777	0	14521	64895	998	0	0	0	0	0	0	0	0	144	382	0	0	0	82340
10 PW	0	0	0	0	0	415	1325	13342	211	125283	0	0	0	0	0	0	0	1171	309	0	759	98	0	142913
11 FRD	0	0	3071	130	0	0	229	0	811	0	69153	3606	180	130	0	0	0	0	0	0	0	0	0	77310
12 CAR	0	190	208	290	0	0	0	0	0	0	657	49361	1579	380	0	0	0	0	0	0	0	0	0	52665
13 HOW	208	338	2231	3187	0	0	163	0	0	0	0	1201	81939	4068	0	0	0	0	0	0	0	0	0	93335
14 AAR	0	281	0	12696	0	72	0	228	0	203	0	1082	5074	165242	801	0	401	0	0	0	0	0	0	186079
15 CAL	0	0	375	3452	0	0	255	980	0	0	0	0	0	2414	17025	1002	1703	0	0	0	0	0	0	27206
16 STM	0	0	0	0	0	390	0	390	0	0	0	0	0	0	526	26183	2054	0	0	0	0	0	0	29545
17 CHS	289	0	492	4906	0	0	790	0	0	0	0	0	0	609	222	1929	39822	0	0	0	0	0	0	49059
18 FAU	0	0	0	0	0	0	0	1039	1158	3631	0	0	0	0	0	0	0	11847	577	0	0	0	0	18253
19 STA	0	0	0	0	0	268	0	363	0	1743	0	0	0	0	0	0	0	0	27267	0	8370	0	0	38010
20 CL/JF	0	0	0	0	0	0	0	148	544	0	617	0	0	0	0	0	0	79	0	13435	0	0	0	14822
21 SP/FB	0	0	0	0	0	0	0	0	0	1333	0	0	0	0	0	0	0	0	3488	0	35822	0	0	40643
22 KGEO	0	0	0	0	0	0	0	0	179	0	0	0	122	0	0	0	0	0	573	0	1002	1948	0	3823
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	13887	62126	314940	229534	3199	61081	45381	370439	77429	141481	71773	55250	91942	184966	18963	29401	54322	13097	33053	13817	45954	2243	0	1934278

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS   MODE: Auto Pax

ORIGIN	DESTINATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	683	295	0	0	0	0	92	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1162
2 DC NC	2372	12760	7187	3147	0	960	169	1619	92	0	922	0	0	338	0	0	0	0	0	0	0	0	0	29566
3 MTG	146	2417	110920	2307	615	0	0	1070	0	1240	517	0	2466	1139	0	0	436	0	0	0	0	0	0	123274
4 PG	109	1253	5194	78268	0	0	0	233	0	0	0	0	1610	4004	0	0	5423	0	0	0	0	0	0	96094
5 ARLCR	0	0	0	0	225	322	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	547
6 ARNCR	100	102	0	0	0	12002	2138	4464	112	0	0	0	0	204	0	0	0	0	0	0	0	0	0	19122
7 ALX	399	266	0	420	0	1576	6833	3961	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13455
8 FFX	784	0	238	0	0	3484	2323	152649	4839	7210	0	0	0	132	0	0	0	0	0	0	0	0	0	171659
9 LDN	0	0	0	0	0	191	0	7476	34472	998	0	0	0	0	0	0	0	0	144	0	0	0	0	43281
10 PW	0	0	0	0	0	0	318	11476	0	75017	0	0	0	0	0	0	0	1940	417	0	0	98	0	89266
11 FRD	0	0	2152	130	0	0	0	0	322	0	23623	1612	0	130	0	0	0	0	0	0	0	0	0	27968
12 CAR	0	380	208	571	0	0	0	0	99	0	1121	24652	991	0	0	0	0	0	0	0	0	0	0	28023
13 HOW	0	0	813	658	0	0	0	0	0	0	0	438	33505	3268	0	0	0	0	0	0	0	0	0	38682
14 AAR	0	0	0	6565	0	0	0	0	0	0	0	1082	7752	66999	0	0	0	0	0	0	0	0	0	82399
15 CAL	0	0	750	1704	0	0	0	2171	0	0	0	0	0	954	8453	732	1074	0	0	0	0	0	0	15838
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	884	0	11113	2484	0	0	0	0	0	0	14481
17 CHS	289	0	348	1376	0	0	476	0	0	0	0	0	0	0	0	1498	18152	0	0	0	0	0	0	22139
18 FAU	0	0	0	0	0	0	0	0	553	871	0	0	0	0	0	0	0	3601	0	0	0	0	0	5025
19 STA	0	0	0	0	0	0	0	131	0	0	0	0	0	0	0	0	0	0	20237	0	6092	0	0	26460
20 CL/JF	0	0	0	0	0	0	0	0	465	0	214	0	0	0	0	0	0	0	0	4653	0	0	0	5333
21 SP/FB	0	0	0	0	0	0	0	0	0	787	0	0	0	0	0	0	0	0	491	0	21460	0	0	22738
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	244	0	286	524	0	1055
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4882	17473	127809	95146	840	18535	12348	185344	40956	86123	26398	27783	46325	78051	8453	13343	27569	5541	21533	4653	27838	622	0	877567

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS    MODE: Walk
```

DESTINATION

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	17466	854	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18319
2 DC NC	6449	55048	430	6767	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68694
3 MTG	0	2448	30107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32554
4 PG	0	0	219	10008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10227
5 ARLCR	0	0	0	0	209	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	209
6 ARNCR	0	0	0	0	0	15979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15979
7 ALX	0	0	0	0	0	0	9299	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9299
8 FFX	0	0	0	0	0	0	476	9428	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9904
9 LDN	0	0	0	0	0	0	0	0	4388	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4388
10 PW	0	0	0	0	0	0	0	0	0	684	0	0	0	0	0	0	0	0	0	0	0	0	0	684
11 FRD	0	0	0	0	0	0	0	0	0	0	3156	0	0	0	0	0	0	0	0	0	0	0	0	3156
12 CAR	0	0	0	0	0	0	0	0	0	0	0	820	0	0	0	0	0	0	0	0	0	0	0	820
13 HOW	0	0	0	0	0	0	0	0	0	0	0	0	1825	0	0	0	0	0	0	0	0	0	0	1825
14 AAR	0	0	0	0	0	0	0	0	0	0	0	0	0	1796	0	0	0	0	0	0	0	0	0	1796
15 CAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	509	0	0	0	0	0	0	0	0	509
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 CHS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1221	0	0	0	0	0	0	1221
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 STA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	463	0	0	0	0	463
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	611	0	0	611
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	23915	58350	30756	16775	209	15979	9774	9428	4388	684	3156	820	1825	1796	509	0	1221	0	463	0	611	0	0	180660

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS    MODE: Bike
```

DESTINATION

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	522	185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	707
2 DC NC	191	986	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1269
3 MTG	0	210	2043	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2253
4 PG	0	0	0	562	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	562
5 ARLCR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 ARNCR	0	0	0	0	0	774	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	774
7 ALX	0	0	0	0	0	0	338	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	338
8 FFX	0	0	0	0	0	0	0	2145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2145
9 LDN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 PW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 FRD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 CAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 HOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 AAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 CAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	750	0	0	0	0	0	0	0	0	750
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 CHS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 STA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	713	1381	2135	562	0	774	338	2145	0	0	0	0	0	0	750	0	0	0	0	0	0	0	0	8798

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS   MODE: Other (Non-Modeled)

DESTINATION

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	416	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	416
2 DC NC	1856	527	0	367	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2750
3 MTG	0	0	838	0	0	0	0	0	0	0	0	0	109	0	0	0	0	0	0	0	0	0	0	947
4 PG	0	0	0	958	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	958
5 ARLCR	0	0	0	0	204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204
6 ARNCR	210	0	0	0	0	215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	425
7 ALX	0	0	0	0	0	0	178	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	178
8 FFX	0	0	0	0	0	0	0	1139	0	0	0	0	0	0	0	0	0	0	0	0	132	0	0	1271
9 LDN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 PW	0	0	0	0	0	0	0	0	0	422	0	0	0	0	0	0	0	0	0	0	0	0	0	422
11 FRD	0	0	0	0	0	0	0	0	0	0	360	0	0	0	0	0	0	0	0	0	0	0	0	360
12 CAR	0	0	0	0	0	0	0	0	0	0	0	0	0	190	0	0	0	0	0	0	0	0	0	190
13 HOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 AAR	0	0	0	0	0	0	0	0	0	0	0	0	0	609	0	0	0	0	0	0	0	0	0	609
15 CAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 CHS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	520	0	0	0	0	0	0	520
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 STA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2482	527	838	1324	204	215	178	1139	0	422	360	0	109	800	0	0	520	0	0	0	132	0	0	9249

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS   MODE: Auto Person

DESTINATION

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	2838	1430	307	0	0	1592	185	607	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6959
2 DC NC	7544	59229	21130	14845	104	5249	829	4882	353	0	922	0	104	860	0	0	338	0	0	0	0	0	0	116389
3 MTG	1746	9733	390946	7614	1231	528	205	4056	124	1860	1499	0	3666	2088	0	0	872	0	143	0	0	0	0	426311
4 PG	2044	5943	16486	264755	0	414	109	2301	184	181	271	0	3476	14329	389	286	14859	0	0	0	0	197	0	326223
5 ARLCR	0	105	0	0	653	1708	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2466
6 ARNCR	1660	1142	639	102	990	52856	7768	16804	225	0	93	0	0	407	0	0	0	0	0	0	0	0	0	82686
7 ALX	890	710	338	952	133	4248	35604	12769	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55643
8 FFX	1021	119	1872	748	928	10907	9474	462099	13969	14519	0	0	0	132	0	0	132	0	553	0	0	0	0	516473
9 LDN	240	0	382	0	0	968	0	21997	99367	1997	0	0	0	0	0	0	0	0	288	382	0	0	0	125621
10 PW	0	0	0	0	0	415	1643	24819	211	200299	0	0	0	0	0	0	0	3112	726	0	759	197	0	232180
11 FRD	0	0	5223	260	0	0	229	0	1133	0	92776	5217	180	260	0	0	0	0	0	0	0	0	0	105279
12 CAR	0	571	417	860	0	0	0	0	0	99	1779	74013	2569	380	0	0	0	0	0	0	0	0	0	80688
13 HOW	208	338	3044	3845	0	0	163	0	0	0	0	1639	115444	7336	0	0	0	0	0	0	0	0	0	132017
14 AAR	0	281	0	19261	0	72	0	228	0	203	0	2164	12826	232241	801	0	401	0	0	0	0	0	0	268478
15 CAL	0	0	1125	5156	0	0	255	3151	0	0	0	0	0	3369	25478	1734	2777	0	0	0	0	0	0	43045
16 STM	0	0	0	0	0	390	0	390	0	0	0	0	0	884	526	37296	4538	0	0	0	0	0	0	44025
17 CHS	579	0	840	6282	0	0	1265	0	0	0	0	0	0	609	222	3427	57974	0	0	0	0	0	0	71198
18 FAU	0	0	0	0	0	0	0	1039	1711	4503	0	0	0	0	0	0	0	15448	577	0	0	0	0	23278
19 STA	0	0	0	0	0	268	0	494	0	1743	0	0	0	0	0	0	0	0	47504	0	14462	0	0	64470
20 CL/JF	0	0	0	0	0	0	0	148	1009	0	831	0	0	0	0	0	0	79	0	18088	0	0	0	20155
21 SP/FB	0	0	0	0	0	0	0	0	0	2121	0	0	0	0	0	0	0	0	3978	0	57282	0	0	63381
22 KGEO	0	0	0	0	0	0	0	0	0	179	0	0	0	122	0	0	0	0	817	0	1289	2472	0	4878
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	18770	79599	442749	324680	4039	79616	57729	555783	118385	227605	98172	83034	138267	263016	27416	42743	81891	18638	54586	18471	73791	2866	0	2811845

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS   MODE: Total Motorized Person (Auto Person & Transit)

        DESTINATION
 ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22    23 |  TOTAL
========================================================================================================================================================================
  1 DC CR|  3955   2651    817    215      0   2640    185    607      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |  11070
  2 DC NC| 21020  72956  22279  17991    295   6037    829   4882    353      0    922      0    104    860      0      0    338      0      0      0      0      0     0 | 148866
  3 MTG  |  6400  10912 396099   7614   1231    528    314   4056    124   1860   1499      0   3666   2088      0      0    872      0    143      0      0      0     0 | 437406
  4 PG   |  3538   7213  16667 268724    181    659    109   2301    184    181    271      0   3476  14329    389    286  14859      0      0      0      0    197     0 | 333563
  5 ARLCR|   420    105    204      0    653   2158      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |   3540
  6 ARNCR|  2549   1346    639    102   1200  55386   7768  17216    225      0     93      0      0    407      0      0      0      0      0      0      0      0     0 |  86932
  7 ALX  |  1535    710    338    952    340   4473  36170  12769      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |  57287
  8 FFX  |  2152    119   1872    748    928  11823   9474 463729  13969  14519      0      0      0    132      0      0    132      0    553      0      0      0     0 | 520149
  9 LDN  |   240     80    382      0      0   1159      0  21997  99626   1997      0      0      0      0      0      0      0      0    288    382      0      0     0 | 126151
 10 PW   |     0      0      0      0      0    733   1643  24819    211 200299      0      0      0      0      0      0      0   3112    726      0    759    197     0 | 232498
 11 FRD  |   224      0   5223    260      0      0    229      0   1133      0  93159   5217    180    260      0      0      0      0      0      0      0      0     0 | 105884
 12 CAR  |     0    571    417    860      0      0      0      0     99      0   1779  74652   2569    380      0      0      0      0      0      0      0      0     0 |  81327
 13 HOW  |   208    338   3044   3845      0      0    163      0      0      0      0   1639 115444   7336      0      0      0      0      0      0      0      0     0 | 132017
 14 AAR  |    72    281      0  19261     72     72      0    228      0    203      0   2164  12826 233365    801      0    401      0      0      0      0      0     0 | 269746
 15 CAL  |   239      0   1125   5156      0      0    255   3151      0      0      0      0      0   3369  25478   1734   2777      0      0      0      0      0     0 |  43283
 16 STM  |     0      0      0      0      0    390      0    390      0      0      0      0      0    884    526  37823   4538      0      0      0      0      0     0 |  44552
 17 CHS  |   579      0    840   6282      0      0   1265      0      0      0      0      0      0    609    222   3427  57974      0      0      0      0      0     0 |  71198
 18 FAU  |     0      0      0      0      0      0      0   1039   1711   4503      0      0      0      0      0      0      0  15448    577      0      0      0     0 |  23278
 19 STA  |     0      0      0      0      0    268      0    494      0   1743      0      0      0      0      0      0      0      0  47504      0  14925      0     0 |  64933
 20 CL/JF|     0      0      0      0      0      0      0    148   1009      0    831      0      0      0      0      0      0     79      0  18088      0      0     0 |  20155
 21 SP/FB|     0      0      0      0      0      0      0      0      0   2121      0      0      0      0      0      0      0      0   3978      0  57282      0     0 |  63381
 22 KGEO |     0      0      0      0      0      0      0      0    179      0      0      0    122      0      0      0      0      0    817      0   1289   2472     0 |   4878
 23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |      0
========================================================================================================================================================================
  TOTAL  43130         449946          4901         58405         118644         98554         138267         27416         81891         54586         74254           0 |
               97279         332009         86326         557826         227605         83672         264140         43269         18638         18471          2866         2882095


2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS   MODE: Transit Percentage

        DESTINATION
 ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22    23 |  TOTAL
========================================================================================================================================================================
  1 DC CR|  28.2   46.0   62.4  100.0      0   39.7      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |  37.1
  2 DC NC|  64.1   18.8    5.2   17.5   64.8   13.0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |  21.8
  3 MTG  |  72.7   10.8    1.3      0      0      0   34.8      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |   2.5
  4 PG   |  42.2   17.6    1.1    1.5  100.0   37.2      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |   2.2
  5 ARLCR| 100.0      0  100.0      0      0   20.8      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |  30.3
  6 ARNCR|  34.9   15.1      0      0   17.5    4.6      0    2.4      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |   4.9
  7 ALX  |  42.0      0      0      0   60.9    5.0    1.6      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |   2.9
  8 FFX  |  52.5      0      0      0      0    7.7      0    0.4      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |   0.7
  9 LDN  |     0  100.0      0      0      0   16.5      0      0    0.3      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |   0.4
 10 PW   |     0      0      0      0      0   43.4      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |   0.1
 11 FRD  | 100.0      0      0      0      0      0      0      0      0      0    0.4      0      0      0      0      0      0      0      0      0      0      0     0 |   0.6
 12 CAR  |     0      0      0      0      0      0      0      0      0      0      0    0.9      0      0      0      0      0      0      0      0      0      0     0 |   0.8
 13 HOW  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |      0
 14 AAR  | 100.0      0      0      0  100.0      0      0      0      0      0      0      0      0    0.5      0      0      0      0      0      0      0      0     0 |   0.5
 15 CAL  | 100.0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |   0.6
 16 STM  |     0      0      0      0      0      0      0      0      0      0      0      0      0    1.4      0      0      0      0      0      0      0      0     0 |   1.2
 17 CHS  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |      0
 18 FAU  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |      0
 19 STA  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0    3.1      0     0 |   0.7
 20 CL/JF|     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |      0
 21 SP/FB|     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |      0
 22 KGEO |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |      0
 23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |      0
========================================================================================================================================================================
  TOTAL   56.5           1.6           17.6           1.2            0.2            0.4             0              0            0              0            0.6           0 |
                18.2           2.2           7.8            0.4             0            0.8            0.4            1.2            0              0             0            2.4
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS    MODE: Avg. Auto Occupancy
```

| DESTINATION | | | | | | | | | | | | | | | | | | | | | | | | |
ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	1.32	1.26	1.00	0	0	1.00	2.00	1.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.20
2 DC NC	1.46	1.27	1.52	1.27	1.00	1.22	1.26	1.50	1.35	0	0	0	1.00	1.65	0	0	1.00	0	0	0	0	0	0	1.34
3 MTG	1.09	1.33	1.40	1.43	2.00	1.00	1.00	1.36	1.00	3.00	1.53	0	3.05	2.20	0	0	2.00	0	1.00	0	0	0	0	1.41
4 PG	1.06	1.27	1.46	1.42	0	1.00	1.00	1.11	1.00	1.00	1.00	0	1.86	1.39	1.00	1.00	1.57	0	0	0	0	1.00	0	1.42
5 ARLCR	0	1.00	0	0	1.52	1.23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.29
6 ARNCR	1.06	1.10	1.00	1.00	1.00	1.29	1.38	1.36	2.00	0	1.00	0	0	2.00	0	0	0	0	0	0	0	0	0	1.30
7 ALX	1.81	1.60	1.00	1.79	1.00	1.59	1.24	1.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.32
8 FFX	4.29	1.00	1.15	1.00	1.00	1.47	1.32	1.49	1.53	1.99	0	0	0	0	0	0	1.00	0	1.00	0	0	0	0	1.50
9 LDN	1.00	0	1.00	0	0	1.25	0	1.51	1.53	2.00	0	0	0	0	0	0	0	0	2.00	1.00	0	0	0	1.53
10 PW	0	0	0	0	0	1.00	1.24	1.86	1.00	1.60	0	0	0	0	0	0	0	2.66	2.35	0	1.00	2.00	0	1.62
11 FRD	0	0	1.70	2.00	0	0	1.00	0	1.40	0	1.34	1.45	1.00	2.00	0	0	0	0	0	0	0	0	0	1.36
12 CAR	0	3.00	2.00	2.97	0	0	0	0	99.39	0	2.71	1.50	1.63	1.00	0	0	0	0	0	0	0	0	0	1.53
13 HOW	1.00	1.00	1.36	1.21	0	0	1.00	0	0	0	0	1.36	1.41	1.80	0	0	0	0	0	0	0	0	0	1.41
14 AAR	0	1.00	0	1.52	0	1.00	0	1.00	0	1.00	0	2.00	2.53	1.41	1.00	0	1.00	0	0	0	0	0	0	1.44
15 CAL	0	0	3.00	1.49	0	0	1.00	3.22	0	0	0	0	0	1.40	1.50	1.73	1.63	0	0	0	0	0	0	1.58
16 STM	0	0	0	0	0	1.00	0	1.00	0	0	0	0	0	0	1.00	1.42	2.21	0	0	0	0	0	0	1.49
17 CHS	2.00	0	1.71	1.28	0	0	1.60	0	0	0	0	0	0	1.00	1.00	1.78	1.46	0	0	0	0	0	0	1.45
18 FAU	0	0	0	0	0	0	0	1.00	1.48	1.24	0	0	0	0	0	0	0	1.30	1.00	0	0	0	0	1.28
19 STA	0	0	0	0	0	1.00	0	1.36	0	1.00	0	0	0	0	0	0	0	0	1.74	0	1.73	0	0	1.70
20 CL/JF	0	0	0	0	0	0	0	1.00	1.86	0	1.35	0	0	0	0	0	0	1.00	0	1.35	0	0	0	1.36
21 SP/FB	0	0	0	0	0	0	0	0	0	1.59	0	0	0	0	0	0	0	0	1.14	0	1.60	0	0	1.56
22 KGEO	0	0	0	0	0	0	0	0	1.00	0	0	0	1.00	0	0	0	0	0	1.43	0	1.29	1.27	0	1.28
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1.35		1.41		1.26		1.27		1.53		1.37		1.50		1.45		1.51		1.65		1.61		0	
		1.28		1.41		1.30		1.50		1.61		1.50		1.42		1.45		1.42		1.34		1.28		1.45

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBS    MODE: Total Modeled Person (Motorized & NonMotorized)
```

| DESTINATION | | | | | | | | | | | | | | | | | | | | | | | | |
ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	21943	3689	817	215	0	2640	185	607	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30096
2 DC NC	27660	128990	22802	24758	295	6037	829	4882	353	0	922	0	104	860	0	0	338	0	0	0	0	0	0	218829
3 MTG	6400	13570	428248	7614	1231	528	314	4056	124	1860	1499	0	3666	2088	0	0	872	0	143	0	0	0	0	472214
4 PG	3538	7213	16886	279293	181	659	109	2301	184	181	271	0	3476	14329	389	286	14859	0	0	0	0	197	0	344352
5 ARLCR	420	105	204	0	863	2158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3750
6 ARNCR	2549	1346	639	102	1200	72139	7768	17216	225	0	93	0	0	407	0	0	0	0	0	0	0	0	0	103685
7 ALX	1535	710	338	952	340	4473	45807	12769	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66924
8 FFX	2152	119	1872	748	928	11823	9949	475302	13969	14519	0	0	0	132	0	0	132	0	553	0	0	0	0	532198
9 LDN	240	80	382	0	0	1159	0	21997	104015	1997	0	0	0	0	0	0	0	0	288	382	0	0	0	130539
10 PW	0	0	0	0	0	733	1643	24819	211	200984	0	0	0	0	0	0	0	3112	726	0	759	197	0	233182
11 FRD	224	0	5223	260	0	0	229	0	1133	0	96315	5217	180	260	0	0	0	0	0	0	0	0	0	109041
12 CAR	0	571	417	860	0	0	0	0	99	0	1779	75471	2569	380	0	0	0	0	0	0	0	0	0	82146
13 HOW	208	338	3044	3845	0	0	163	0	0	0	0	1639	117269	7336	0	0	0	0	0	0	0	0	0	133843
14 AAR	72	281	0	19261	72	72	0	228	0	203	0	2164	12826	235161	801	0	401	0	0	0	0	0	0	271542
15 CAL	239	0	1125	5156	0	0	255	3151	0	0	0	0	0	3369	26737	1734	2777	0	0	0	0	0	0	44543
16 STM	0	0	0	0	0	390	0	390	0	0	0	0	0	884	526	37823	4538	0	0	0	0	0	0	44552
17 CHS	579	0	840	6282	0	0	1265	0	0	0	0	0	0	609	222	3427	59195	0	0	0	0	0	0	72419
18 FAU	0	0	0	0	0	0	0	1039	1711	4503	0	0	0	0	0	0	0	15448	577	0	0	0	0	23278
19 STA	0	0	0	0	0	268	0	494	0	1743	0	0	0	0	0	0	0	0	47967	0	14925	0	0	65396
20 CL/JF	0	0	0	0	0	0	0	148	1009	0	831	0	0	0	0	0	0	79	0	18088	0	0	0	20155
21 SP/FB	0	0	0	0	0	0	0	0	0	2121	0	0	0	0	0	0	0	0	3978	0	57893	0	0	63992
22 KGEO	0	0	0	0	0	0	0	0	179	0	0	0	122	0	0	0	0	0	817	0	1289	2472	0	4878
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	67757		482837		5110		68517		123033		101710		140092		28675		83111		55048		74866		0	
		157009		349346		103080		569399		228289		84492		265937		43269		18638		18471		2866		3071553

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO   MODE: Transit

        DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |  TOTAL
=========================================================================================================================================================================
  1 DC CR|  3850   4640    619      0    382   1050      0      0    191      0      0      0      0    215      0      0      0      0      0      0      0      0      0 |  10946
  2 DC NC| 32523  50046   3518   4528    281   1933    295    406    922      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |  94451
  3 MTG  | 13185   3484  13506   1994    918    437    549    124      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |  34197
  4 PG   |  9453   7084   1483  16013    608    653      0    895      0      0      0      0    608      0      0      0      0      0      0      0      0      0      0 |  36798
  5 ARLCR|  1146      0      0      0      0    204      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   1350
  6 ARNCR|  6581   1304    209      0    225   2639      0    880      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |  11837
  7 ALX  |  1518    449      0      0    210      0   1573    178      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   3928
  8 FFX  |  7616    767    905      0      0    821    119   3409      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |  13638
  9 LDN  |   651     80      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    731
 10 PW   |   996      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    996
 11 FRD  |   255      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    255
 12 CAR  |     0      0      0      0    417      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    417
 13 HOW  |   883    673      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   1555
 14 AAR  |   216    688      0      0      0      0      0      0      0      0      0      0      0   2565      0      0      0      0      0      0      0      0      0 |   3469
 15 CAL  |   498      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    498
 16 STM  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
 17 CHS  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0    412      0      0      0      0      0      0 |    412
 18 FAU  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
 19 STA  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
 20 CL/JF|     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
 21 SP/FB|     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
 22 KGEO |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
 23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
=========================================================================================================================================================================
  TOTAL  79369          20240           3041           2536           1113             0              0            608             0            412             0             0             0             0 |
              69214          22535           7737           5891              0              0           2780             0             0             0             0             0 | 215477


2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO   MODE: Auto Driver

        DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |  TOTAL
=========================================================================================================================================================================
  1 DC CR|  3799   5043    577    430      0    700    713    713      0      0      0      0    382    349      0      0      0      0      0      0      0      0      0 |  12705
  2 DC NC| 33984 117670  26270  10268    423   4076   1734   6887   1775    169      0      0    196    423    185      0     92      0      0      0    185      0      0 | 204337
  3 MTG  | 10983  28524 563417  15426    303   1081   1310  12097   3337      0   2729    476   4446   2423      0      0    232      0      0      0    620      0      0 | 647404
  4 PG   |  9285  38281  36521 326207      0   2721   2359   4722    929    681      0    351   5104  15367   3753      0   5923      0      0      0      0      0      0 | 452204
  5 ARLCR|     0    209    105      0    420   1180    204    427      0      0      0      0      0    225      0      0      0      0      0      0      0      0      0 |   2770
  6 ARNCR|  8491   4871   2205    204   3202  72730   6414  19143    206    210      0      0    556      0      0      0    522    102      0      0      0      0      0 | 118856
  7 ALX  |  3143   1836    762    343    528   7513  43536  16648    399      0      0      0      0    367      0      0      0    266      0      0      0      0      0 |  75340
  8 FFX  |  9777   7902   7954   4337    808  24462  21753 625837  14802  12689    980      0    236    383      0      0      0      0    553    471    119      0      0 | 733063
  9 LDN  |  1938    464   2449      0      0   1675    929  21504 120655    256    586      0      0    293      0      0      0   1676      0    256      0      0      0 | 152678
 10 PW   |   465    465   1461    186    318   4198   1833  23908   3144 212660      0      0      0      0      0      0     98      0   1392    555      0      0      0 | 250683
 11 FRD  |   450   1208   7933    505    322      0    360    627    701      0 121398   6331   2524   1347      0      0      0      0      0    395      0      0      0 | 144101
 12 CAR  |     0      0   1409    706      0      0      0     99      0      0    984  84806   3696    490      0      0      0      0      0      0      0      0      0 |  92191
 13 HOW  |   397    838   5590   6337      0    413    163    673      0      0    163   1147 143757   9933      0      0    138    570      0      0      0      0      0 | 170119
 14 AAR  |   409   3478   7698  14600     72    448     72    857      0      0    372      0  13902 291531   1523      0    679      0      0      0      0      0      0 | 335640
 15 CAL  |   498    256      0   1366      0      0      0      0      0      0      0      0    239   1606  49297   2517    256      0      0      0      0      0      0 |  56035
 16 STM  |   230    448      0   1648      0      0      0      0      0      0      0      0      0    263   2960  50085   4437      0    459      0      0      0      0 |  60529
 17 CHS  |  1531   2207    289   7754    695    587    186    436    251      0      0      0    145    500   1731   2375  67361      0      0      0    145    145      0 |  86340
 18 FAU  |     0    577    334      0    215      0      0   2008   1158   2632      0      0      0      0      0      0      0  25028      0   1323      0      0      0 |  33276
 19 STA  |     0      0    131      0    131    451      0    783      0   4422      0      0      0      0      0      0      0      0  41803      0  18880      0      0 |  66602
 20 CL/JF|     0      0    157      0      0      0      0    732   3202    522      0     79      0      0      0      0      0      0      0  30054      0      0      0 |  34825
 21 SP/FB|     0      0    297      0   1135      0      0    734      0   2117      0      0      0      0      0    308      0      0   7705    308  52653    129      0 |  65387
 22 KGEO |     0    164      0      0      0      0      0    118      0      0      0      0      0      0      0      0      0      0   1735      0   2366   9444      0 |  13827
 23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
=========================================================================================================================================================================
  TOTAL  85380         665562           8572          81567         150559         127732         175260          59448          79640          52809          74968              0 |
             214442         390316         122235         738953         235915          93111         325500          55383          29033          32808           9718 | 3808912
```

A-12

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO   MODE: Auto Pax

DESTINATION

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	2560	1881	0	215	0	300	0	215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5171
2 DC NC	18506	87457	17430	2417	0	1845	817	4802	532	0	0	0	0	208	0	0	261	0	0	0	0	0	0	134274
3 MTG	2792	15519	358418	3863	0	328	0	3509	470	620	1925	0	1942	930	0	0	0	0	0	0	1240	0	0	391556
4 PG	5123	19221	27644	229142	0	2555	3542	1703	566	0	0	181	2817	8092	1959	0	5838	0	0	0	0	0	0	308381
5 ARLCR	0	0	0	0	210	451	0	112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	774
6 ARNCR	5944	2431	407	204	3184	42677	2454	8108	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65409
7 ALX	889	1933	183	367	546	1312	24182	8344	0	0	0	0	0	733	0	0	0	0	0	0	0	0	0	38490
8 FFX	3714	3153	3942	0	453	11628	12247	401955	5295	4608	0	0	0	0	0	0	0	0	553	471	119	0	0	448138
9 LDN	144	0	0	0	0	1076	0	11609	101448	293	1171	0	0	0	0	0	0	0	0	0	0	0	0	115741
10 PW	211	0	422	0	0	2090	2129	17529	1054	146157	0	0	0	0	0	98	0	422	98	0	0	0	0	170210
11 FRD	0	224	6242	0	0	0	0	0	0	0	79238	6121	1736	1565	0	0	0	0	0	0	0	0	0	95126
12 CAR	0	0	862	208	0	0	0	0	0	0	785	59462	1993	0	0	0	0	0	0	0	0	0	0	63310
13 HOW	673	0	2559	3543	0	276	0	0	0	0	0	1249	98575	3301	0	0	0	0	0	0	0	0	0	110174
14 AAR	203	2886	5295	8334	0	0	0	1379	0	0	0	0	8619	166861	407	0	0	0	0	0	0	0	0	193985
15 CAL	498	256	0	239	0	0	0	0	0	0	0	0	0	1457	39540	477	256	0	0	0	0	0	0	42723
16 STM	0	0	0	526	0	0	0	0	0	0	0	0	0	263	3833	31015	1559	0	0	0	0	0	0	37197
17 CHS	186	1046	0	5505	0	222	1257	0	0	0	0	0	0	297	0	701	41141	0	0	0	145	145	0	50644
18 FAU	0	0	0	0	0	0	0	0	1606	882	0	0	0	0	0	0	0	13931	0	1323	0	0	0	17742
19 STA	0	0	0	0	0	0	0	131	0	1890	0	0	0	0	0	0	0	0	27424	0	14168	0	0	43613
20 CL/JF	0	0	0	0	0	0	0	0	1908	0	133	0	0	0	0	0	0	0	0	16173	0	0	0	18213
21 SP/FB	0	0	0	0	0	0	0	0	0	1523	0	0	0	0	0	308	0	0	5071	308	31074	129	0	38414
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	810	0	973	5447	0	7230
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

| TOTAL | 41442 | | 423404 | | 4393 | | 46628 | | 112879 | | 83252 | | 115682 | | 45739 | | 49055 | | 33957 | | 47718 | | 0 | |
| | | 136008 | | 254562 | | 64759 | | 459396 | | 155973 | | 67013 | | 183707 | | 32600 | | 14352 | | 18275 | | 5721 | | 2396515 |

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO   MODE: Walk

DESTINATION

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	20014	2822	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22836
2 DC NC	4834	94251	1529	215	368	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	101197
3 MTG	0	421	125161	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	125581
4 PG	0	181	0	64454	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64635
5 ARLCR	0	204	0	0	414	420	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1039
6 ARNCR	0	0	0	0	0	39334	429	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39873
7 ALX	0	0	0	0	0	0	22201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22201
8 FFX	0	0	0	0	0	0	0	74501	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74501
9 LDN	0	0	0	0	0	0	0	0	11484	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11484
10 PW	0	0	0	0	0	0	0	0	0	26785	0	0	0	0	0	0	0	0	0	0	0	0	0	26785
11 FRD	0	0	0	0	0	0	0	0	0	0	18772	0	0	0	0	0	0	0	0	0	0	0	0	18772
12 CAR	0	0	0	0	0	0	0	0	0	0	0	5812	0	0	0	0	0	0	0	0	0	0	0	5812
13 HOW	0	0	0	0	0	0	0	0	0	0	0	0	21014	0	0	0	0	0	0	0	0	0	0	21014
14 AAR	0	0	0	0	0	0	0	0	0	0	0	0	0	23038	0	0	0	0	0	0	0	0	0	23038
15 CAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3546	0	0	0	0	0	0	0	0	3546
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	918	0	0	0	0	0	0	0	918
17 CHS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7115	0	0	0	0	0	0	7115
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	644	0	0	0	0	0	644
19 STA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	231	923	0	0	0	0	1154
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1848	0	0	0	1848
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2463	0	0	2463
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

| TOTAL | 24848 | | 126690 | | 783 | | 22630 | | 11484 | | 18772 | | 21014 | | 3546 | | 7115 | | 923 | | 2463 | | 0 | |
| | | 97879 | | 64669 | | 39754 | | 74611 | | 26785 | | 5812 | | 23038 | | 918 | | 875 | | 1848 | | 0 | | 576456 |

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO    MODE: Bike

        DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |  TOTAL
=========================================================================================================================================================================
 1 DC CR| 1047    208      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   1255
 2 DC NC|  658   6296     92      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   7046
 3 MTG  |  109      0   9000      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   9109
 4 PG   |    0      0      0   5219      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   5219
 5 ARLCR|    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
 6 ARNCR|    0    503      0      0    420    836      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   1759
 7 ALX  |    0    183      0      0      0      0    604      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    787
 8 FFX  |  215      0      0      0      0      0      0   5364      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   5579
 9 LDN  |    0      0      0      0      0      0      0      0   2097      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   2097
10 PW   |    0      0      0      0      0      0      0      0      0    636      0      0      0      0      0      0      0      0      0      0      0      0      0 |    636
11 FRD  |    0      0      0      0      0      0      0      0      0      0    184      0      0      0      0      0      0      0      0      0      0      0      0 |    184
12 CAR  |    0      0      0      0      0      0      0      0      0      0      0    380      0      0      0      0      0      0      0      0      0      0      0 |    380
13 HOW  |    0      0      0      0      0      0      0      0      0      0      0      0    416      0      0      0      0      0      0      0      0      0      0 |    416
14 AAR  |    0      0      0      0      0      0      0      0      0      0      0      0      0    432      0      0      0      0      0      0      0      0      0 |    432
15 CAL  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0   1500      0      0      0      0      0      0      0      0 |   1500
16 STM  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
17 CHS  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
18 FAU  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
19 STA  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
20 CL/JF|    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
21 SP/FB|    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
22 KGEO |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
23 EXTL |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
=========================================================================================================================================================================
 TOTAL   2029          9093          420          604         2097          184          416         1500            0            0            0            0            0 |
               7190          5219          836         5364          636          380          432            0            0            0            0            0        36399


2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO    MODE: Other (Non-Modeled)

        DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |  TOTAL
=========================================================================================================================================================================
 1 DC CR|  834   1241    349      0      0    104      0      0     92      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   2620
 2 DC NC| 2670   8362   2725    941      0    545      0      0    185      0      0      0      0    355      0      0      0      0      0      0      0      0      0 |  15784
 3 MTG  |    0    423 119220    124      0    431      0    146      0      0      0      0      0    465      0      0      0      0      0      0      0      0      0 | 120810
 4 PG   |  608   4850   2302  85245      0    466      0    335      0      0      0      0      0   1450      0      0      0      0      0      0      0      0      0 |  95257
 5 ARLCR|    0      0      0      0      0    102      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    102
 6 ARNCR|  600    112    225      0      0  13733    102   1016      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |  15789
 7 ALX  |    0    415      0      0      0    316   3492      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   4223
 8 FFX  | 1106      0      0      0      0   1083    412 121943      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 | 124545
 9 LDN  |    0      0      0      0      0      0      0      0  35189    293      0      0      0      0      0      0      0      0      0      0      0      0      0 |  35482
10 PW   |    0      0      0      0      0      0      0    247      0  56028      0      0      0      0      0      0      0      0      0      0      0      0      0 |  56275
11 FRD  |    0      0      0      0      0      0      0      0      0  27706      0      0      0      0      0      0      0      0      0      0      0      0 |  27706
12 CAR  |    0      0      0      0      0      0      0      0      0      0      0  20009    417      0      0      0      0      0      0      0      0      0      0 |  20426
13 HOW  |    0      0      0    479      0      0      0      0      0      0      0    208  37682    276      0      0      0      0      0      0      0      0      0 |  38645
14 AAR  |    0      0      0   1106      0      0      0      0      0      0      0      0      0  39866    562   2715      0      0      0      0      0      0      0 |  44248
15 CAL  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0  11752      0    256      0      0      0      0      0      0 |  12009
16 STM  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0  16778      0      0      0      0      0      0      0 |  16778
17 CHS  |    0      0      0      0      0    148      0      0      0      0      0      0      0      0      0      0  26472      0      0      0      0      0      0 |  26620
18 FAU  |    0      0      0      0      0      0      0      0      0      0      0    882      0      0      0      0      0   6200      0      0      0      0      0 |   7082
19 STA  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0  24533      0      0    595      0 |  25128
20 CL/JF|    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0  14393      0      0      0 |  14393
21 SP/FB|    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0  24374      0      0 |  24374
22 KGEO |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0   3705      0 |   3705
23 EXTL |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
=========================================================================================================================================================================
 TOTAL   5818        124822            0         4006        35466        27706        38099        12314        26728        24533        24374            0 |
              15405         87895        16929       123688        56321        21099        42412        19493         6200        14393         4300       732000
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO   MODE: Auto Person
```

ORIGIN	DEST 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	6359	6924	577	645	0	1000	713	928	0	0	0	0	382	349	0	0	0	0	0	0	0	0	0	17876
2 DC NC	52490	205127	43700	12685	423	5921	2551	11689	2307	169	0	0	196	630	185	0	353	0	0	0	185	0	0	338612
3 MTG	13775	44043	921835	19289	303	1408	1310	15607	3807	620	4654	476	6388	3353	0	0	232	0	0	0	1860	0	0	1038960
4 PG	14408	57502	64165	555349	0	5275	5901	6425	1495	681	0	532	7921	23459	5711	0	11760	0	0	0	0	0	0	760585
5 ARLCR	0	209	105	0	630	1631	204	539	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	3544
6 ARNCR	14435	7302	2613	407	6386	115407	8868	27250	206	210	0	0	556	0	0	0	522	102	0	0	0	0	0	184266
7 ALX	4032	3769	946	709	1074	8825	3962	24992	399	0	0	0	0	1100	0	0	0	266	0	0	0	0	0	113829
8 FFX	13491	11056	11896	4337	1261	36090	34000	1027792	20097	17297	980	0	236	383	0	0	0	0	1106	942	238	0	0	1181200
9 LDN	2082	464	2449	0	0	2751	929	33112	222103	549	1757	0	0	293	0	0	0	1676	0	256	0	0	0	268420
10 PW	676	465	1883	186	318	6288	3962	41437	4198	358818	0	0	0	0	0	197	0	1813	653	0	0	0	0	420893
11 FRD	450	1431	14174	505	322	0	360	627	701	0	200636	12452	4260	2912	0	0	0	0	0	395	0	0	0	239227
12 CAR	0	0	2271	915	0	0	0	99	0	0	1769	144267	5689	490	0	0	0	0	0	0	0	0	0	155501
13 HOW	1070	838	8149	9880	0	689	163	673	0	0	163	2395	242333	13234	0	0	138	570	0	0	0	0	0	280293
14 AAR	612	6364	12994	22934	72	448	72	2236	0	0	372	0	22521	458392	1930	0	679	0	0	0	0	0	0	529626
15 CAL	995	512	0	1605	0	0	0	0	0	0	0	0	239	3063	88837	2994	512	0	0	0	0	0	0	98758
16 STM	230	448	0	2174	0	0	0	0	0	0	0	0	0	526	6793	81100	5996	0	459	0	0	0	0	97726
17 CHS	1718	3254	289	13259	695	809	1443	436	251	0	0	0	145	797	1731	3076	108502	0	0	0	289	289	0	136984
18 FAU	0	577	334	0	215	0	0	2008	2764	3514	0	0	0	0	0	0	0	38959	0	2646	0	0	0	51018
19 STA	0	0	131	0	131	451	0	914	0	6312	0	0	0	0	0	0	0	0	69227	0	33048	0	0	110215
20 CL/JF	0	0	157	0	0	0	0	732	5110	79	655	0	79	0	0	0	0	0	0	46227	0	0	0	53038
21 SP/FB	0	0	297	0	1135	0	0	734	0	3640	0	0	0	0	0	617	0	0	12776	617	83727	258	0	103801
22 KGEO	0	164	0	0	0	0	0	118	0	0	0	0	0	0	0	0	0	0	2545	0	3339	14891	0	21058
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	126823	350450	1088965	644878	12965	186994	128195	1198349	263438	391888	210984	160123	290942	509206	105187	87983	128695	43386	86767	51083	122686	15439	0	6205428

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO   MODE: Total Motorized Person (Auto Person & Transit)
```

ORIGIN	DEST 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	10209	11564	1196	645	382	2050	713	928	191	0	0	0	382	564	0	0	0	0	0	0	0	0	0	28822
2 DC NC	85013	255172	47219	17214	704	7854	2846	12095	3229	169	0	0	196	630	185	0	353	0	0	0	185	0	0	433063
3 MTG	26960	47527	935341	21283	1222	1845	1860	15731	3807	620	4654	476	6388	3353	0	0	232	0	0	0	1860	0	0	1073157
4 PG	23861	64587	65648	571362	608	5928	5901	7321	1495	681	0	532	8529	23459	5711	0	11760	0	0	0	0	0	0	797383
5 ARLCR	1146	209	105	0	630	1835	204	539	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	4894
6 ARNCR	21016	8606	2822	407	6611	118046	8868	28130	206	210	0	0	556	0	0	0	522	102	0	0	0	0	0	196102
7 ALX	5551	4218	946	709	1284	8825	69291	25169	399	0	0	0	0	1100	0	0	0	266	0	0	0	0	0	117758
8 FFX	21107	11823	12801	4337	1261	36911	34119	1031201	20097	17297	980	0	236	383	0	0	0	0	1106	942	238	0	0	1194839
9 LDN	2733	543	2449	0	0	2751	929	33112	222103	549	1757	0	0	293	0	0	0	1676	0	256	0	0	0	269150
10 PW	1672	465	1883	186	318	6288	3962	41437	4198	358818	0	0	0	0	0	197	0	1813	653	0	0	0	0	421889
11 FRD	705	1431	14174	505	322	0	360	627	701	0	200636	12452	4260	2912	0	0	0	0	0	395	0	0	0	239481
12 CAR	0	0	2271	915	417	0	0	99	0	0	1769	144267	5689	490	0	0	0	0	0	0	0	0	0	155917
13 HOW	1953	1511	8149	9880	0	689	163	673	0	0	163	2395	242333	13234	0	0	138	570	0	0	0	0	0	281849
14 AAR	828	7052	12994	22934	72	448	72	2236	0	0	372	0	22521	460958	1930	0	679	0	0	0	0	0	0	533095
15 CAL	1493	512	0	1605	0	0	0	0	0	0	0	0	239	3063	88837	2994	512	0	0	0	0	0	0	99256
16 STM	230	448	0	2174	0	0	0	0	0	0	0	0	0	526	6793	81100	5996	0	459	0	0	0	0	97726
17 CHS	1718	3254	289	13259	695	809	1443	436	251	0	0	0	145	797	1731	3076	108914	0	0	0	289	289	0	137395
18 FAU	0	577	334	0	215	0	0	2008	2764	3514	0	0	0	0	0	0	0	38959	0	2646	0	0	0	51018
19 STA	0	0	131	0	131	451	0	914	0	6312	0	0	0	0	0	0	0	0	69227	0	33048	0	0	110215
20 CL/JF	0	0	157	0	0	0	0	732	5110	79	655	0	79	0	0	0	0	0	0	46227	0	0	0	53038
21 SP/FB	0	0	297	0	1135	0	0	734	0	3640	0	0	0	0	0	617	0	0	12776	617	83727	258	0	103801
22 KGEO	0	164	0	0	0	0	0	118	0	0	0	0	0	0	0	0	0	0	2545	0	3339	14891	0	21058
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	206192	419664	1109206	667414	16006	194731	130731	1204241	264551	391888	210984	160123	291550	511987	105187	87983	129107	43386	86767	51083	122686	15439	0	6420904

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO   MODE: Transit Percentage

ORIGIN \ DESTINATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	37.7	40.1	51.8	0	100.0	51.2	0	0	100.0	0	0	0	0	38.1	0	0	0	0	0	0	0	0	0	38.0
2 DC NC	38.3	19.6	7.5	26.3	40.0	24.6	10.4	3.4	28.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.8
3 MTG	48.9	7.3	1.4	9.4	75.2	23.7	29.5	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.2
4 PG	39.6	11.0	2.3	2.8	100.0	11.0	0	12.2	0	0	0	0	7.1	0	0	0	0	0	0	0	0	0	0	4.6
5 ARLCR	100.0	0	0	0	0	11.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27.6
6 ARNCR	31.3	15.2	7.4	0	3.4	2.2	0	3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.0
7 ALX	27.4	10.7	0	0	16.3	0	2.3	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.3
8 FFX	36.1	6.5	7.1	0	0	2.2	0.3	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1
9 LDN	23.8	14.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3
10 PW	59.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2
11 FRD	36.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
12 CAR	0	0	0	0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3
13 HOW	45.2	44.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6
14 AAR	26.1	9.8	0	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0	0	0	0	0	0	0	0.7
15 CAL	33.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 CHS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	0	0	0	0	0	0.3
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 STA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	38.5	16.5	1.8	3.4	19.0	4.0	1.9	0.5	0.4	0	0	0	0.2	0.5	0	0	0.3	0	0	0	0	0	0	3.4

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO   MODE: Avg. Auto Occupancy

ORIGIN \ DESTINATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	1.67	1.37	1.00	1.50	0	1.43	1.00	1.30	0	0	0	0	1.00	1.00	0	0	0	0	0	0	0	0	0	1.41
2 DC NC	1.54	1.74	1.24	1.66	1.00	1.45	1.47	1.70	1.30	1.00	0	0	1.00	1.49	1.00	0	3.83	0	0	0	1.00	0	0	1.66
3 MTG	1.25	1.54	1.64	1.25	1.00	1.30	1.00	1.29	1.14	0	1.71	1.00	1.44	1.38	0	0	1.00	0	0	0	3.00	0	0	1.60
4 PG	1.55	1.50	1.76	1.70	0	1.94	2.50	1.36	1.61	1.00	0	1.52	1.55	1.53	1.52	0	1.99	0	0	0	0	0	0	1.68
5 ARLCR	0	1.00	1.00	0	1.50	1.38	1.00	1.26	0	0	0	0	1.00	0	0	0	0	0	0	0	0	0	0	1.28
6 ARNCR	1.70	1.50	1.18	2.00	1.99	1.59	1.38	1.42	1.00	1.00	0	0	1.00	0	0	0	1.00	1.00	0	0	0	0	0	1.55
7 ALX	1.28	2.05	1.24	2.07	2.04	1.17	1.56	1.50	1.00	0	1.36	1.00	0	3.00	0	0	0	1.00	0	0	0	0	0	1.51
8 FFX	1.38	1.40	1.50	1.00	1.56	1.48	1.56	1.64	1.36	0	1.00	0	1.00	1.00	0	0	0	0	2.00	2.00	2.00	0	0	1.61
9 LDN	1.07	1.00	1.00	0	0	1.64	1.00	1.54	1.84	2.14	3.00	0	0	1.00	0	0	0	1.00	0	1.00	0	0	0	1.76
10 PW	1.45	1.00	1.29	1.00	1.00	1.50	2.16	1.73	1.34	1.69	0	0	0	0	0	2.00	0	1.30	1.18	0	0	0	0	1.68
11 FRD	1.00	1.19	1.79	1.00	1.00	0	1.00	1.00	1.00	0	1.65	1.97	1.69	2.16	0	0	0	0	0	1.00	0	0	0	1.66
12 CAR	0	0	1.61	1.30	0	0	0	1.00	0	0	1.80	1.70	1.54	1.00	0	0	0	0	0	0	0	0	0	1.69
13 HOW	2.69	1.00	1.46	1.56	0	1.67	1.00	1.00	0	0	1.00	2.09	1.69	1.33	0	0	1.00	1.00	0	0	0	0	0	1.65
14 AAR	1.50	1.83	1.69	1.57	1.00	1.00	1.00	2.61	0	0	1.00	0	1.62	1.57	1.27	0	1.00	0	0	0	0	0	0	1.58
15 CAL	2.00	2.00	0	1.17	0	0	0	0	0	0	0	0	1.00	1.91	1.80	1.19	2.00	0	0	0	0	0	0	1.76
16 STM	1.00	1.00	0	1.32	0	0	0	0	0	0	0	0	0	2.00	2.30	1.62	1.35	0	1.00	0	0	0	0	1.61
17 CHS	1.12	1.47	1.00	1.71	1.00	1.38	7.75	1.00	1.00	0	0	0	1.00	1.59	1.00	1.30	1.61	0	0	0	2.00	2.00	0	1.59
18 FAU	0	1.00	1.00	0	1.00	0	0	1.00	2.39	1.34	0	0	0	0	0	0	0	1.56	0	2.00	0	0	0	1.53
19 STA	0	0	1.00	0	1.00	1.00	0	1.17	0	1.43	0	0	0	0	0	0	0	0	1.66	0	1.75	0	0	1.65
20 CL/JF	0	0	1.00	0	0	0	0	1.00	1.60	1.00	1.25	0	1.00	0	0	0	0	0	0	1.54	0	0	0	1.52
21 SP/FB	0	0	1.00	0	1.00	0	0	1.00	0	0	1.72	0	0	0	0	2.00	0	0	1.66	2.00	1.59	2.00	0	1.59
22 KGEO	0	1.00	0	0	0	0	0	1.00	0	0	0	0	0	0	0	0	0	1.47	0	1.41	1.58	0	0	1.52
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1.49	1.63	1.64	1.65	1.51	1.53	1.57	1.62	1.75	1.66	1.65	1.72	1.66	1.56	1.77	1.59	1.62	1.49	1.64	1.56	1.64	1.59	0	1.63

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: HBO   MODE: Total Modeled Person (Motorized & NonMotorized)

ORIGIN	DESTINATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	31270	14594	1196	645	382	2050	713	928	191	0	0	0	382	564	0	0	0	0	0	0	0	0	0	52913
2 DC NC	90504	355720	48840	17428	1072	7854	2846	12095	3229	169	0	0	196	630	185	0	353	0	0	0	185	0	0	541306
3 MTG	27069	479481	069502	21283	1222	1845	1860	15731	3807	620	4654	476	6388	3353	0	0	232	0	0	0	1860	0	0	1207847
4 PG	23861	64768	65648	641035	608	5928	5901	7321	1495	681	0	532	8529	23459	5711	0	11760	0	0	0	0	0	0	867237
5 ARLCR	1146	414	105	0	1044	2255	204	539	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	5933
6 ARNCR	21016	9109	2822	407	7031	158216	9296	28240	206	210	0	0	556	0	0	0	522	102	0	0	0	0	0	237734
7 ALX	5551	4401	946	709	1284	8825	92096	25169	399	0	0	0	0	1100	0	0	0	266	0	0	0	0	0	140746
8 FFX	21322	11823	12801	4337	1261	36911	341191	111066	20097	17297	980	0	236	383	0	0	0	0	1106	942	238	0	0	1274918
9 LDN	2733	543	2449	0	0	2751	929	33112	235684	549	1757	0	0	293	0	0	0	1676	0	256	0	0	0	282731
10 PW	1672	465	1883	186	318	6288	3962	41437	4198	386239	0	0	0	0	0	197	0	1813	653	0	0	0	0	449310
11 FRD	705	1431	14174	505	322	0	360	627	701	0	219592	12452	4260	2912	0	0	0	0	0	395	0	0	0	258437
12 CAR	0	0	2271	915	417	0	0	99	0	0	1769	150460	5689	490	0	0	0	0	0	0	0	0	0	162110
13 HOW	1953	1511	8149	9880	0	689	163	673	0	0	163	2395	263763	13234	0	0	138	570	0	0	0	0	0	303278
14 AAR	828	7052	12994	22934	72	448	72	2236	0	0	372	0	22521	484428	1930	0	679	0	0	0	0	0	0	556565
15 CAL	1493	512	0	1605	0	0	0	0	0	0	0	0	239	3063	93883	2994	512	0	0	0	0	0	0	104302
16 STM	230	448	0	2174	0	0	0	0	0	0	0	0	0	526	6793	82018	5996	0	459	0	0	0	0	98644
17 CHS	1718	3254	289	13259	695	809	1443	436	251	0	0	0	145	797	1731	3076	116029	0	0	0	289	289	0	144511
18 FAU	0	577	334	0	215	0	0	2008	2764	3514	0	0	0	0	0	0	0	39603	0	2646	0	0	0	51662
19 STA	0	0	131	0	131	451	0	914	0	6312	0	0	0	0	0	0	0	231	70150	0	33048	0	0	111369
20 CL/JF	0	0	157	0	0	0	0	732	5110	79	655	0	79	0	0	0	0	0	0	48075	0	0	0	54886
21 SP/FB	0	0	297	0	1135	0	0	734	0	3640	0	0	0	0	0	617	0	0	12776	617	86190	258	0	106264
22 KGEO	0	164	0	0	0	0	0	118	0	0	0	0	0	0	0	0	0	0	2545	0	3339	14891	0	21058
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	233068	1244988		17209		153965		278132		229940		312980		110233		136222		87689		125149		0		
		524733	737302		235321		1284216		419309		166316		535457		88901		44261		52930		15439		7033760

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW   MODE: Transit

ORIGIN	DESTINATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	20489	10258	8777	8295	531	4109	2045	4804	332	1233	234	0	533	203	495	0	1514	215	253	0	308	0	0	64627
2 DC NC	10416	2822	833	1582	250	523	113	1742	0	396	0	0	0	239	0	0	0	0	268	0	0	0	0	19185
3 MTG	6150	2309	2989	808	0	296	0	0	0	0	0	0	0	0	0	0	0	0	0	283	0	0	0	12835
4 PG	3344	1795	793	2036	614	496	0	279	0	417	0	0	0	0	0	0	348	0	0	0	0	0	0	10122
5 ARLCR	280	909	0	614	355	1649	359	856	256	147	0	0	0	0	0	0	0	0	0	0	0	0	0	5425
6 ARNCR	4914	1386	703	688	426	608	418	1056	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10199
7 ALX	1388	0	0	0	285	0	583	184	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2440
8 FFX	4830	988	0	0	238	504	215	970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7744
9 LDN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 PW	0	751	0	0	240	417	0	403	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1810
11 FRD	0	0	130	0	0	0	0	0	0	0	382	0	0	0	0	0	0	0	0	0	0	0	0	512
12 CAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 HOW	232	0	0	0	181	0	0	0	0	0	0	0	285	0	0	0	0	0	0	0	0	0	0	698
14 AAR	1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1988
15 CAL	0	0	0	0	0	366	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	366
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 CHS	148	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	148
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 STA	582	499	0	0	0	402	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1484
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	54763	14225		3121		3732		588		616		818		733		1861		521		308		0		
		21718	14023		9368		10294		2193		0		203		0		215		283		0		139584

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW    MODE: Auto Driver
```

Purpose: NHW MODE: Auto Driver

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	19279	14717	6825	8432	659	5906	3933	8302	1221	478	0	0	0	1485	0	0	970	0	131	0	0	164	0	72503
2 DC NC	10238	28866	10535	13000	799	2534	957	6145	520	204	0	0	130	1442	477	0	979	0	122	0	131	0	0	77080
3 MTG	4842	5903	150383	13746	0	2363	807	5998	1132	186	5059	457	2367	2536	0	0	0	0	332	0	0	0	0	196111
4 PG	4676	7685	12914	95023	236	878	505	4376	660	280	0	0	3913	10168	375	0	2014	0	0	0	0	0	0	143704
5 ARLCR	765	1106	645	546	1190	1639	1267	3475	0	619	0	0	0	0	0	0	0	0	0	0	0	0	0	11251
6 ARNCR	3566	1574	1565	905	1951	18578	3874	14375	226	638	0	0	0	178	0	0	145	0	863	0	0	0	0	48438
7 ALX	1861	1515	584	1006	869	3122	17940	6642	588	796	0	0	706	371	0	0	366	0	298	0	0	0	0	36664
8 FFX	8845	7186	10852	3598	2134	11143	6623	196971	9401	14508	611	0	54	281	239	236	1390	701	1039	327	1347	0	0	277485
9 LDN	1275	339	461	986	0	694	285	8126	32178	1149	0	0	0	0	0	0	0	0	261	79	0	0	0	45833
10 PW	0	349	738	193	0	1070	971	14146	806	46103	0	0	0	0	0	0	0	593	799	0	129	164	0	66062
11 FRD	0	0	2661	950	0	0	0	0	0	298	44478	974	882	0	0	0	0	0	0	538	0	0	0	50781
12 CAR	0	0	678	0	0	0	0	0	0	0	1134	18976	1070	1024	0	0	0	0	0	0	0	0	0	22881
13 HOW	163	709	1566	1763	0	0	540	210	0	0	386	1627	31766	8277	0	0	391	0	0	0	0	0	0	47398
14 AAR	661	604	2043	6800	169	578	0	191	0	362	0	967	5932	80814	764	263	0	0	0	0	0	0	0	100149
15 CAL	617	0	0	512	0	0	0	673	0	0	0	0	239	624	12369	758	249	0	0	0	0	0	0	16040
16 STM	0	0	0	459	0	0	0	522	0	0	0	0	0	0	1340	34552	1134	0	0	0	0	0	0	38007
17 CHS	109	492	0	2965	0	265	679	0	0	0	0	0	0	401	0	1401	19875	0	0	0	0	0	0	26187
18 FAU	0	0	0	0	0	0	0	686	352	287	0	0	0	0	0	0	0	3397	0	0	0	0	0	4722
19 STA	0	384	0	0	0	0	0	858	0	1231	0	0	0	0	0	0	0	0	6958	0	2161	118	0	11710
20 CL/JF	0	0	0	0	0	0	0	0	489	0	546	0	0	0	0	0	0	0	0	2272	541	0	0	3848
21 SP/FB	0	253	0	0	567	541	0	337	0	131	0	0	0	0	0	0	0	0	2493	0	18908	594	0	23825
22 KGEO	286	164	0	0	0	0	0	0	0	164	0	0	0	0	0	0	597	0	0	0	903	3265	0	5380
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	57185	71849	202449	150884	8574	49312	38382	272033	47572	67435	52215	23001	47059	107600	15564	37210	28111	4691	13296	3215	24119	4306	0	1326060

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW    MODE: Auto Pax
```

Purpose: NHW MODE: Auto Pax

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	4035	4707	581	285	340	1100	513	1216	887	1141	0	0	325	414	0	263	486	0	604	0	0	0	0	16897
2 DC NC	2225	2673	448	982	0	0	0	396	0	0	0	0	138	0	0	0	0	0	298	0	308	0	0	7466
3 MTG	132	307	11939	1039	0	0	0	770	0	0	224	0	0	0	0	0	268	0	0	0	0	0	0	14678
4 PG	191	609	485	9214	0	304	0	0	0	0	0	0	585	1252	0	230	1310	0	0	0	0	0	0	14179
5 ARLCR	446	0	0	0	0	0	0	1369	0	932	0	0	0	0	0	0	0	0	1204	0	0	0	0	3951
6 ARNCR	215	112	0	403	627	2651	694	641	0	845	0	0	0	0	0	0	0	0	0	0	0	0	0	6189
7 ALX	301	0	0	0	119	877	621	268	210	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2396
8 FFX	1948	666	646	0	1485	471	682	19815	1642	1091	0	0	0	0	0	0	0	0	363	195	0	0	0	29004
9 LDN	450	0	210	0	0	0	0	1378	4714	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6752
10 PW	965	0	0	0	932	479	0	1263	0	2313	0	0	0	0	0	0	0	0	473	0	245	0	0	6670
11 FRD	0	0	485	0	0	0	0	0	0	0	1770	165	318	0	0	0	0	0	0	0	0	0	0	2740
12 CAR	0	0	0	0	0	0	0	0	0	0	389	2109	0	290	0	0	0	0	0	0	0	0	0	2788
13 HOW	0	138	0	346	0	0	0	0	0	0	318	0	690	0	0	0	0	0	0	0	0	0	0	1492
14 AAR	281	0	0	1690	0	0	0	0	0	0	0	290	0	6843	0	0	0	0	0	0	0	0	0	9103
15 CAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 STM	263	0	0	230	0	0	0	0	0	0	0	0	0	0	0	4295	0	0	0	0	0	0	0	4788
17 CHS	486	0	268	887	0	0	0	0	0	0	0	0	0	0	0	0	2478	0	0	0	0	0	0	4118
18 FAU	275	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	549	118	0	0	0	0	942
19 STA	1308	420	0	0	1204	131	0	1104	0	0	0	0	0	0	0	0	0	118	1975	0	905	0	0	7165
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SP/FB	0	308	0	0	0	0	546	0	0	0	0	0	0	0	0	0	0	0	298	0	2165	415	0	3731
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	419	0	0	419
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	13519	9941	15062	15074	4708	6012	3057	28220	7454	6322	2701	2564	2056	8798	0	4788	4541	667	5332	195	4042	415	0	145469

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW    MODE: Walk

         DESTINATION
  ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |   TOTAL
=========================================================================================================================================================================================
  1 DC CR|221838   6424    232      0    210      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |  228704
  2 DC NC|  6851  21823    514    109      0      0      0     93      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   29390
  3 MTG  |   232    191  29185      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   29608
  4 PG   |     0    109      0   7982      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    8092
  5 ARLCR|   210      0      0      0   8302   1185      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    9696
  6 ARNCR|     0      0      0      0   2102  31452    214    323      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   34090
  7 ALX  |     0      0      0      0      0    214  13163      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   13377
  8 FFX  |   332     93      0      0      0    440      0  17304      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   18170
  9 LDN  |     0      0      0      0      0      0      0      0   3120      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    3120
 10 PW   |     0      0      0      0      0      0      0      0      0   4099      0      0      0      0      0      0      0      0      0      0      0      0      0 |    4099
 11 FRD  |     0      0      0      0      0      0      0      0      0      0   3215      0      0      0      0      0      0      0      0      0      0      0      0 |    3215
 12 CAR  |     0      0      0      0      0      0      0      0      0      0      0   1115      0      0      0      0      0      0      0      0      0      0      0 |    1115
 13 HOW  |     0      0      0      0      0      0      0      0      0      0      0      0   3267      0      0      0      0      0      0      0      0      0      0 |    3267
 14 AAR  |     0      0      0      0      0      0      0      0      0      0      0      0      0   7806      0      0      0      0      0      0      0      0      0 |    7806
 15 CAL  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 16 STM  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0    255      0      0      0      0      0      0      0 |     255
 17 CHS  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 18 FAU  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 19 STA  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 20 CL/JF|     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0   1001      0      0      0 |    1001
 21 SP/FB|     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0    813      0      0 |     813
 22 KGEO |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0    617      0 |     617
 23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
=========================================================================================================================================================================================
  TOTAL  229463         29931         10613         13377          3120          3215          3267             0             0             0          813           0 |
                28641          8092         33290         17721          4099          1115          7806           255             0          1001           617        396435


2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW    MODE: Bike

         DESTINATION
  ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |   TOTAL
=========================================================================================================================================================================================
  1 DC CR|  1761    565    490      0      0      0    183      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    2999
  2 DC NC|   447    697      0    191      0    183      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    1519
  3 MTG  |     0      0    698      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |     698
  4 PG   |     0      0      0    307      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |     307
  5 ARLCR|     0      0      0      0      0    215      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |     215
  6 ARNCR|   335      0      0      0    215    540      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    1090
  7 ALX  |   367      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |     367
  8 FFX  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
  9 LDN  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 10 PW   |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 11 FRD  |     0      0      0      0      0      0      0      0      0      0    184      0      0      0      0      0      0      0      0      0      0      0      0 |     184
 12 CAR  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 13 HOW  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 14 AAR  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 15 CAL  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 16 STM  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 17 CHS  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 18 FAU  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 19 STA  |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 20 CL/JF|     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 21 SP/FB|     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 22 KGEO |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
 23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |       0
=========================================================================================================================================================================================
  TOTAL    2910          1188           215           183             0           184             0             0             0             0             0             0 |
                 1262           498           939             0             0             0             0             0             0             0             0          7379
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW   MODE: Other (Non-Modeled)
```

ORIGIN	DESTINATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	8845	1870	0	438	904	1136	0	274	0	0	0	0	0	92	0	0	0	0	0	0	0	0	0	13560
2 DC NC	910	2037	420	0	0	210	112	403	0	238	0	0	0	0	0	0	0	0	253	0	0	0	0	4584
3 MTG	387	420	683	205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1696
4 PG	537	0	411	116	0	461	0	0	0	0	0	0	0	249	0	0	0	0	0	0	0	0	0	1774
5 ARLCR	904	0	0	0	714	204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1822
6 ARNCR	933	0	0	461	204	1183	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2782
7 ALX	0	112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	546	0	0	659
8 FFX	274	266	0	0	238	0	119	2903	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3800
9 LDN	0	0	0	0	0	0	0	408	240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	648
10 PW	0	0	0	0	0	98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98
11 FRD	0	0	0	0	0	0	0	0	0	0	0	133	0	0	0	0	0	0	0	0	0	0	0	133
12 CAR	0	0	0	0	0	0	0	0	0	0	133	115	0	0	0	0	0	0	0	0	0	0	0	248
13 HOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 AAR	0	0	0	0	0	0	0	0	0	0	0	0	0	669	0	0	0	0	0	0	0	0	0	669
15 CAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 CHS	0	0	0	0	0	0	0	348	0	0	0	0	0	0	0	0	695	0	0	0	0	0	0	1043
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 STA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	12791	4706	1514	1221	2060	3294	231	4336	240	238	133	248	0	762	249	0	695	0	253	0	546	0	0	33517

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW   MODE: Auto Person
```

ORIGIN	DESTINATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	23314	19425	7405	8717	999	7006	4446	9518	2108	1619	0	0	325	1899	0	263	1456	0	735	0	0	164	0	89400
2 DC NC	12463	31539	10983	13981	799	2534	957	6541	520	204	0	0	268	1442	477	0	979	0	420	0	439	0	0	84546
3 MTG	4974	6210	162322	14785	0	2363	807	6768	1132	186	5283	457	2367	2536	0	0	268	0	332	0	0	0	0	210790
4 PG	4867	8294	13400	104237	236	1182	505	4376	660	280	0	0	4499	11419	375	230	3324	0	0	0	0	0	0	157883
5 ARLCR	1211	1106	645	546	1190	1639	1267	4844	0	1551	0	0	0	0	0	0	0	0	1204	0	0	0	0	15202
6 ARNCR	3781	1687	1565	1308	2579	21229	4569	15016	226	1484	0	0	0	178	0	0	145	0	863	0	0	0	0	54627
7 ALX	2162	1515	584	1006	988	3999	18562	6910	798	796	0	0	706	371	0	0	366	0	298	0	0	0	0	39060
8 FFX	10793	7853	11499	3598	3620	11614	7305	216786	11043	15599	611	0	54	281	239	236	1390	701	1401	522	1347	0	0	306489
9 LDN	1725	339	671	986	0	694	285	9504	36892	1149	0	0	0	0	0	0	0	0	261	79	0	0	0	52585
10 PW	965	349	738	193	932	1549	971	15410	806	48415	0	0	0	0	0	0	0	593	1272	0	374	164	0	72732
11 FRD	0	0	3147	950	0	0	0	0	0	298	46248	1140	1200	0	0	0	0	0	0	538	0	0	0	53520
12 CAR	0	0	678	0	0	0	0	0	0	0	1523	21085	1070	1313	0	0	0	0	0	0	0	0	0	25669
13 HOW	163	847	1566	2109	0	0	540	210	0	0	705	1627	32455	8277	0	0	391	0	0	0	0	0	0	48890
14 AAR	942	604	2043	8490	169	578	0	191	0	362	0	1257	5932	87657	764	263	0	0	0	0	0	0	0	109252
15 CAL	617	0	0	512	0	0	0	673	0	0	0	0	239	624	12369	758	249	0	0	0	0	0	0	16040
16 STM	263	0	0	689	0	0	0	522	0	0	0	0	0	0	1340	38847	1134	0	0	0	0	0	0	42795
17 CHS	596	492	268	3852	0	265	679	0	0	0	0	0	0	401	0	1401	22353	0	0	0	0	0	0	30305
18 FAU	275	0	0	0	0	0	0	686	352	287	0	0	0	0	0	0	0	3946	118	0	0	0	0	5664
19 STA	1308	804	0	0	1204	131	0	1962	0	1231	0	0	0	0	0	0	0	118	8932	0	3066	118	0	18875
20 CL/JF	0	0	0	0	0	0	0	489	0	546	0	0	0	0	0	0	0	0	0	2272	541	0	0	3848
21 SP/FB	0	561	0	0	567	541	546	337	0	131	0	0	0	0	0	0	0	0	2791	0	21072	1009	0	27556
22 KGEO	286	164	0	0	0	0	0	0	0	164	0	0	0	0	597	0	0	0	0	0	1322	3265	0	5799
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	70704	81789	217511	165958	13283	55324	41439	300253	55026	73757	54916	25565	49115	116398	15564	41997	32652	5358	18628	3410	28161	4721	0	1471529

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW   MODE: Total Motorized Person (Auto Person & Transit)
```

DESTINATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
ORIGIN																								
1 DC CR	43803	29683	16183	17012	1531	11114	6491	14321	2440	2852	234	0	858	2101	495	263	2970	215	988	0	308	164	0	154028
2 DC NC	22879	34361	11816	15564	1049	3058	1069	8283	520	601	0	0	268	1442	716	0	979	0	688	0	439	0	0	103732
3 MTG	11125	8519	165311	15593	0	2659	807	6768	1132	186	5283	457	2367	2536	0	0	268	0	332	283	0	0	0	223625
4 PG	8211	10089	14193	106273	850	1678	505	4655	660	697	0	0	4499	11419	375	230	3672	0	0	0	0	0	0	168005
5 ARLCR	1491	2015	645	1160	1545	3287	1626	5700	256	1698	0	0	0	0	0	0	0	0	1204	0	0	0	0	20627
6 ARNCR	8695	3073	2267	1995	3005	21837	4987	16073	226	1484	0	0	0	178	0	0	145	0	863	0	0	0	0	64827
7 ALX	3550	1515	584	1006	1273	3999	19145	7094	798	796	0	0	706	371	0	0	366	0	298	0	0	0	0	41499
8 FFX	15622	8840	11499	3598	3857	12118	7520	217755	11043	15599	611	0	54	281	239	236	1390	701	1401	522	1347	0	0	314233
9 LDN	1725	339	671	986	0	694	285	9504	36892	1149	0	0	0	0	0	0	0	0	261	79	0	0	0	52585
10 PW	965	1100	738	193	1172	1966	971	15813	806	48415	0	0	0	0	0	0	0	593	1272	0	374	164	0	74542
11 FRD	0	0	3277	950	0	0	0	0	0	298	46631	1140	1200	0	0	0	0	0	0	538	0	0	0	54032
12 CAR	0	0	678	0	0	0	0	0	0	0	1523	21085	1070	1313	0	0	0	0	0	0	0	0	0	25669
13 HOW	395	847	1566	2109	181	0	540	210	0	0	705	1627	32740	8277	0	0	391	0	0	0	0	0	0	49588
14 AAR	2930	604	2043	8490	169	578	0	191	0	362	0	1257	5932	87657	764	263	0	0	0	0	0	0	0	111241
15 CAL	617	0	0	512	0	366	0	673	0	0	0	0	239	624	12369	758	249	0	0	0	0	0	0	16406
16 STM	263	0	0	689	0	0	0	522	0	0	0	0	0	0	1340	38847	1134	0	0	0	0	0	0	42795
17 CHS	744	492	268	3852	0	265	679	0	0	0	0	0	0	401	0	1401	22353	0	0	0	0	0	0	30454
18 FAU	275	0	0	0	0	0	0	686	352	287	0	0	0	0	0	0	0	3946	118	0	0	0	0	5664
19 STA	1891	1303	0	0	1204	533	0	1962	0	1231	0	0	0	0	0	0	0	118	8932	0	3066	118	0	20359
20 CL/JF	0	0	0	0	0	0	0	0	489	0	546	0	0	0	0	0	0	0	0	2272	541	0	0	3848
21 SP/FB	0	561	0	0	567	541	546	337	0	131	0	0	0	0	0	0	0	0	2791	0	21072	1009	0	27556
22 KGEO	286	164	0	0	0	0	0	0	0	164	0	0	0	0	0	0	597	0	0	0	1322	3265	0	5799
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	125467	103507	231736	179981	16404	64692	45171	55614	310547	55532	75950	49932	25565	116601	16298	41997	34513	5574	19149	3693	28469	4721	0	1611114

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW   MODE: Transit Percentage
```

DESTINATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
ORIGIN																								
1 DC CR	46.8	34.6	54.2	48.8	34.7	37.0	31.5	33.5	13.6	43.2	100.0	0	62.1	9.6	100.0	0	51.0	100.0	25.6	0	100.0	0	0	42.0
2 DC NC	45.5	8.2	7.1	10.2	23.9	17.1	10.5	21.0	0	66.0	0	0	0	33.3	0	0	0	39.0	0	0	0	0	0	18.5
3 MTG	55.3	27.1	1.8	5.2	0	11.1	0	0	0	0	0	0	0	0	0	0	0	0	0	100.0	0	0	0	5.7
4 PG	40.7	17.8	5.6	1.9	72.3	29.5	0	6.0	0	59.8	0	0	0	0	0	9.5	0	0	0	0	0	0	0	6.0
5 ARLCR	18.8	45.1	0	52.9	23.0	50.1	22.1	15.0	100.0	8.7	0	0	0	0	0	0	0	0	0	0	0	0	0	26.3
6 ARNCR	56.5	45.1	31.0	34.5	14.2	2.8	8.4	6.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.7
7 ALX	39.1	0	0	0	22.4	0	3.0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.9
8 FFX	30.9	11.2	0	0	6.2	4.2	2.9	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5
9 LDN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 PW	0	68.2	0	0	20.4	21.2	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.4
11 FRD	0	0	4.0	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0.9
12 CAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 HOW	58.8	0	0	0	100.0	0	0	0	0	0	0	0	0.9	0	0	0	0	0	0	0	0	0	0	1.4
14 AAR	67.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8
15 CAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.2
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 CHS	19.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 STA	30.8	38.3	0	0	0	75.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.3
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	43.6	21.0	6.1	7.8	19.0	14.5	8.3	3.3	1.1	2.9	1.1	0	1.6	0.2	4.5	0	5.4	3.9	2.7	7.7	1.1	0	0	8.7

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW    MODE: Avg. Auto Occupancy

          DESTINATION
ORIGIN |   1     2     3     4     5     6     7     8     9    10    11    12    13    14    15    16    17    18    19    20    21    22    23 | TOTAL
=======================================================================================================================================================
 1 DC CR| 1.21  1.32  1.09  1.03  1.52  1.19  1.13  1.15  1.73  3.39     0     0  0.85  1.28     0     0  1.50     0  5.61     0     0  1.00     0 | 1.23
 2 DC NC| 1.22  1.09  1.04  1.08  1.00  1.00  1.00  1.06  1.00  1.00     0     0  2.06  1.00  1.00     0  1.00     0  3.44     0  3.35     0     0 | 1.10
 3 MTG  | 1.03  1.05  1.08  1.08     0  1.00  1.00  1.13  1.00  1.00  1.04  1.00  1.00  1.00     0     0     0     0  1.00     0     0     0     0 | 1.07
 4 PG   | 1.04  1.08  1.04  1.10  1.00  1.35  1.00  1.00  1.00  1.00     0     0  1.15  1.12  1.00     0  1.65     0     0     0     0     0     0 | 1.10
 5 ARLCR| 1.58  1.00  1.00  1.00  1.00  1.00  1.00  1.39     0  2.51     0     0     0     0     0     0     0     0  1.04     0     0     0     0 | 1.35
 6 ARNCR| 1.06  1.07  1.00  1.44  1.32  1.14  1.18  1.04  1.00  2.32     0     0     0  1.00     0     0  1.00     0  1.00     0     0     0     0 | 1.13
 7 ALX  | 1.16  1.00  1.00  1.00  1.14  1.28  1.03  1.04  1.36  1.00     0     0  1.00  1.00     0     0  1.00     0  1.00     0     0     0     0 | 1.07
 8 FFX  | 1.22  1.09  1.06  1.00  1.70  1.04  1.10  1.10  1.17  1.08  1.00     0  1.00  1.00  1.00  1.00  1.00  1.00  1.35  1.59  1.00     0     0 | 1.10
 9 LDN  | 1.35  1.00  1.46  1.00     0  1.00  1.00  1.17  1.15  1.00     0     0     0     0     0     0     0     0  1.00  1.00     0     0     0 | 1.15
10 PW   |    0  1.00  1.00  1.00     0  1.45  1.00  1.09  1.00  1.05     0     0     0     0     0     0     0     0  1.59     0  2.90  1.00     0 | 1.10
11 FRD  |    0     0  1.18  1.00     0     0     0     0     0  1.00  1.04  1.17  1.36     0     0     0     0     0     0  1.00     0     0     0 | 1.05
12 CAR  |    0     0  1.00     0     0     0     0     0     0     0  1.34  1.11  1.00  1.28     0     0     0     0     0     0     0     0     0 | 1.12
13 HOW  | 1.00  1.19  1.00  1.20     0     0  1.00  1.00     0     0  1.82  1.00  1.02  1.00     0     0  1.00     0     0     0     0     0     0 | 1.03
14 AAR  | 1.42  1.00  1.00  1.25  1.00  1.00     0  1.00     0  1.00     0  1.30  1.00  1.08  1.00  1.00     0     0     0     0     0     0     0 | 1.09
15 CAL  | 1.00     0     0  1.00     0     0     0  1.00     0     0     0     0  1.00  1.00  1.00  1.00  1.00     0     0     0     0     0     0 | 1.00
16 STM  |    0     0     0  1.50     0     0     0  1.00     0     0     0     0     0     0  1.00  1.12  1.00     0     0     0     0     0     0 | 1.13
17 CHS  | 5.44  1.00     0  1.30     0  1.00  1.00     0     0     0     0     0     0  1.00     0  1.00  1.12     0     0     0     0     0     0 | 1.16
18 FAU  |    0     0     0     0     0     0     0  1.00  1.00  1.00     0     0     0     0     0     0     0  1.16     0     0     0     0     0 | 1.20
19 STA  |    0  2.09     0     0     0     0     0  2.29     0  1.00     0     0     0     0     0     0     0     0  1.28     0  1.42  1.00     0 | 1.61
20 CL/JF|    0     0     0     0     0     0     0     0  1.00     0  1.00     0     0     0     0     0     0     0     0  1.00  1.00     0     0 | 1.00
21 SP/FB|    0  2.22     0     0  1.00  1.00     0  1.00     0  1.00     0     0     0     0     0     0     0     0  1.12     0  1.11  1.70     0 | 1.16
22 KGEO | 1.00  1.00     0     0     0     0     0     0     0  1.00     0     0     0     0     0     0  1.00     0     0     0  1.46  1.00     0 | 1.08
23 EXTL |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    0
=======================================================================================================================================================
  TOTAL   1.24        1.07        1.55        1.08        1.16        1.05        1.04        1.00        1.16        1.40        1.17           0 |
                1.14        1.10        1.12        1.10        1.09        1.11        1.08        1.13        1.14        1.06        1.10        1.11


2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHW    MODE: Total Modeled Person (Motorized & NonMotorized)

          DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 | TOTAL
========================================================================================================================================================================================
 1 DC CR|267402  36672  16905  17012   1741  11114   6674  14321   2440   2852    234      0    858   2101    495    263   2970    215    988      0    308    164      0 | 385731
 2 DC NC| 30177  56882  12330  15864   1049   3241   1069   8377    520    601      0      0    268   1442    716      0    979      0    688      0    439      0      0 | 134641
 3 MTG  | 11357   8710 195194  15593      0   2659    807   6768   1132    186   5283    457   2367   2536      0      0    268      0    332    283      0      0      0 | 253931
 4 PG   |  8211  10199  14193 114562    850   1678    505   4655    660    697      0      0   4499  11419    375    230   3672      0      0      0      0      0      0 | 176404
 5 ARLCR|  1701   2015    645   1160   9847   4687   1626   5700    256   1698      0      0      0      0      0      0      0      0   1204      0      0      0      0 |  30538
 6 ARNCR|  9030   3073   2267   1995   5322  53829   5200  16396    226   1484      0      0      0    178      0      0    145      0    863      0      0      0      0 | 100007
 7 ALX  |  3916   1515    584   1006   1273   4213  32308   7094    798    796      0      0    706    371      0      0    366      0    298      0      0      0      0 |  55243
 8 FFX  | 15955   8934  11499   3598   3857  12558   7520 235059  11043  15599    611      0     54    281    239    236   1390    701   1401    522   1347      0      0 | 332402
 9 LDN  |  1725    339    671    986      0    694    285   9504  40012   1149      0      0      0      0      0      0      0      0    261     79      0      0      0 |  55705
10 PW   |   965   1100    738    193   1172   1966    971  15813    806  52514      0      0      0      0      0      0      0    593   1272      0    374    164      0 |  78640
11 FRD  |     0      0   3277    950      0      0      0      0      0    298  50029   1140   1200      0      0      0      0      0      0    538      0      0      0 |  57431
12 CAR  |     0      0    678      0      0      0      0      0      0      0   1523  22201   1070   1313      0      0      0      0      0      0      0      0      0 |  26785
13 HOW  |   395    847   1566   2109    181      0    540    210      0      0    705   1627  36007   8277      0      0    391      0      0      0      0      0      0 |  52855
14 AAR  |  2930    604   2043   8490    169    578      0    191      0    362      0   1257   5932  95463    764    263      0      0      0      0      0      0      0 | 119047
15 CAL  |   617      0      0    512      0    366      0    673      0      0      0      0    239    624  12369    758    249      0      0      0      0      0      0 |  16406
16 STM  |   263      0      0    689      0      0      0    522      0      0      0      0      0      0   1340  39102   1134      0      0      0      0      0      0 |  43050
17 CHS  |   744    492    268   3852      0    265    679      0      0      0      0      0      0    401      0   1401  22353      0      0      0      0      0      0 |  30454
18 FAU  |   275      0      0      0      0      0      0    686    352    287      0      0      0      0      0      0      0   3946    118      0      0      0      0 |   5664
19 STA  |  1891   1303      0      0   1204    533      0   1962      0   1231      0      0      0      0      0      0      0    118   8932      0   3066    118      0 |  20359
20 CL/JF|     0      0      0      0      0      0      0      0    489      0    546      0      0      0      0      0      0      0      0   3273    541      0      0 |   4849
21 SP/FB|     0    561      0      0    567    541    546    337      0    131      0      0      0      0      0      0      0      0   2791      0  21885   1009      0 |  28369
22 KGEO |   286    164      0      0      0      0      0      0      0    164      0      0      0      0      0      0    597      0      0      0   1322   3882      0 |   6416
23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
========================================================================================================================================================================================
  TOTAL  357839       262856        27232        58732        58734        58931        53199        16298        34513        19149        29282            0 |
              133410       188571        98920       328268        80049        26681       124407        42252         5574         4694         5338      2014928
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO    MODE: Transit

        DESTINATION
ORIGIN |    1     2     3     4     5     6     7     8     9    10    11    12    13    14    15    16    17    18    19    20    21    22    23 |  TOTAL
=========================================================================================================================================================
 1 DC CR| 7448  4101  2287   109     0  1321   354   473     0     0     0     0     0   574     0     0     0     0     0     0     0     0     0 |  16669
 2 DC NC| 5218  9620  1516  6239     0   104   411     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0   104 |  23108
 3 MTG  | 1182  1411  6406   590   177   393     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |  10159
 4 PG   |  197   555   338  4218   204     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   5513
 5 ARLCR|  659     0   417     0   112   236     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   1424
 6 ARNCR| 1334   525    92     0     0   105     0   799     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   2855
 7 ALX  |  418   207     0     0     0     0   309   297     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   1231
 8 FFX  |  914     0     0     0   898   535     0   894     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   3242
 9 LDN  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
10 PW   |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
11 FRD  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
12 CAR  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
13 HOW  |  268     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    268
14 AAR  |    0     0     0     0     0     0     0     0     0     0     0     0     0   897     0     0     0     0     0     0     0     0     0 |    897
15 CAL  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
16 STM  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
17 CHS  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
18 FAU  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
19 STA  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
20 CL/JF|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
21 SP/FB|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
22 KGEO |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
23 EXTL |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
=========================================================================================================================================================
 TOTAL  17640       11056       1392        1075           0           0           0         1470           0           0           0           0           0 |
           16420       11156       2693        2463           0           0        1470           0           0           0           0           0      65365
```

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO    MODE: Auto Driver

        DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |   TOTAL
=================================================================================================================================================================================
 1 DC CR| 13580  10778   2335   3265    209   1236   1662   2172    794    307      0      0      0     81      0    451    127      0      0      0      0      0      0 |  36998
 2 DC NC| 10306  46644  13847   9036   1057   2345   1383   2911      0    395      0    322    268      0      0      0    145      0      0      0      0      0      0 |  88660
 3 MTG  |  1258  12942 261852  10630      0    528    314   3898    917    303   3275   1648   2065   1656    307      0    145      0      0      0      0      0      0 | 301737
 4 PG   |  2771   7649  11565 157327      0    204    181   2681      0    181      0     99   4802   5753   1859      0   5649      0      0      0      0      0      0 | 200722
 5 ARLCR|   215    215      0    109    359    843    334    482      0    246      0      0      0      0      0      0      0      0      0      0      0      0      0 |   2804
 6 ARNCR|   552   2157    401    792   1882  21266   3752   8723    332      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |  39858
 7 ALX  |   405    627    438    527    252   3135  32931  12926      0    379    382      0      0      0      0    145      0      0      0      0      0      0      0 |  52146
 8 FFX  |  1523   2196   3573   1618    672   9658  12937 289864  11937  12205      0      0      0    471    109      0      0    849    521    132    769      0      0 | 349034
 9 LDN  |   191      0    341    256      0    295      0   7926  62422   1404    298      0      0    178      0      0    353      0   1002      0      0      0      0 |  74667
10 PW   |     0    636      0      0      0    521    211   8216   1115 107261      0      0      0      0      0    169    772   1728      0    363      0      0 | 120993
11 FRD  |     0      0   2576      0      0      0      0    215      0      0  76800   1667   1021    228      0      0      0      0    569      0      0      0 |  83074
12 CAR  |     0      0    264      0      0      0      0      0      0      0   1752  45352    573    650      0      0      0      0      0      0      0      0 |  48591
13 HOW  |     0      0   1987   3099      0     54      0     93      0      0    996    857  68313   4486      0      0      0      0      0      0      0      0 |  79884
14 AAR  |   124     92   2491  13012      0    178    163    439      0      0    394    413   2170 154597   2103     81    401      0    451      0      0      0 | 177107
15 CAL  |     0    184      0   1387      0      0      0    510      0      0      0      0      0    632  26467    978   1421      0      0      0      0      0 |  31578
16 STM  |     0      0      0    489      0    390      0      0      0      0      0      0      0      0    801  38412   1375      0      0      0      0      0 |  41467
17 CHS  |     0    524    546   3168      0      0    145    263      0      0      0    181      0    314    809   1658  55543      0      0      0      0    348 |  63499
18 FAU  |   259      0      0      0      0      0      0      0    211    442      0      0      0      0      0      0      0  17816      0      0      0    179 |  18907
19 STA  |     0      0    297      0      0      0      0    905      0   1981    130      0      0    394      0      0      0      0  20417      0   1930    118 |  26171
20 CL/JF|     0      0      0      0      0      0      0      0      0      0    395      0      0      0      0      0      0      0  13036      0      0      0 |  13432
21 SP/FB|     0      0      0      0      0      0      0    349      0   1063      0      0      0      0      0      0      0   6079    308  41508    392      0 |  49700
22 KGEO |     0      0      0      0      0      0      0    118      0    179      0      0      0      0     98      0    179      0      0    404   2306      0 |   3285
23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
=================================================================================================================================================================================
 TOTAL  31183      302514        4430       54012       77727       84420       79212       32455       65119       29196       44975          0 |
           84645      204716      40655      342691      126346      50540      169439      41677      19970      15047       3343    1904312
```

A-23

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO    MODE: Auto Pax
```

	DESTINATION																							
ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	3415	3694	839	736	112	551	621	1302	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11527
2 DC NC	4384	19133	8672	5569	615	644	92	880	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39990
3 MTG	1123	5251	132249	5356	0	221	0	1606	470	0	1774	515	1027	0	0	0	0	0	297	0	0	0	0	149890
4 PG	691	3957	4958	77526	0	0	0	0	0	0	130	208	3638	2264	256	0	1313	0	0	0	0	0	0	94941
5 ARLCR	0	0	0	0	0	824	0	553	0	627	0	0	0	0	0	0	0	0	595	0	0	0	0	2600
6 ARNCR	1045	336	904	0	489	8647	1224	3220	332	0	0	0	0	0	0	0	0	0	295	0	0	0	0	16492
7 ALX	0	261	419	367	0	971	9189	5437	236	211	0	0	0	0	0	375	145	0	0	0	0	0	0	17611
8 FFX	440	2183	303	104	553	2624	7617	130672	4004	8169	0	0	0	0	0	0	0	0	0	0	0	0	0	156669
9 LDN	0	0	0	0	0	0	0	4132	33654	0	0	99	0	0	0	0	0	0	0	1564	0	0	0	39450
10 PW	0	0	0	0	0	0	422	6261	0	71687	0	0	0	0	0	0	0	0	442	2356	0	245	0	81413
11 FRD	0	0	1569	130	0	0	0	0	0	0	36114	625	0	0	0	0	0	0	0	327	0	0	0	38765
12 CAR	0	0	0	0	0	0	0	0	0	0	849	30223	0	281	0	0	0	0	0	0	0	0	0	31353
13 HOW	0	0	1877	1936	0	0	0	0	0	0	0	455	39292	1989	0	0	0	0	0	0	0	0	0	45548
14 AAR	698	1252	3058	8180	0	0	0	0	0	0	0	0	1288	84109	255	0	0	0	0	0	0	0	0	98840
15 CAL	0	0	0	477	0	0	0	0	0	0	0	0	0	767	11718	255	1132	0	0	0	0	0	0	14349
16 STM	0	0	0	0	0	0	375	0	0	0	0	0	0	884	0	15870	1184	0	0	0	0	0	0	18313
17 CHS	0	191	0	622	0	0	145	0	0	0	0	181	0	0	314	1873	22030	0	0	0	0	0	0	25355
18 FAU	0	0	0	0	0	0	0	0	0	334	0	0	0	0	0	0	0	7682	231	0	0	0	0	8247
19 STA	399	0	297	0	298	164	0	0	0	560	0	0	0	0	0	0	0	0	14133	0	2156	0	0	18007
20 CL/JF	0	0	0	0	0	0	0	0	0	0	195	0	0	0	0	0	0	0	0	6922	0	0	0	7117
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3710	308	25599	274	0	29891
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98	0	0	0	0	759	129	0	987
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	12195		155146		2068		19684		38951		39061		45245		12543		25804		21618		28759		0	
		36259		101004		14645		154063		81589		32308		90294		18471		8123		9122		403		947355

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO    MODE: Walk
```

	DESTINATION																							
ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	60583	2236	109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62928
2 DC NC	3026	60666	543	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64235
3 MTG	109	2148	50675	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52932
4 PG	0	0	0	16229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16229
5 ARLCR	0	177	0	0	1076	210	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1464
6 ARNCR	0	0	0	0	306	10482	0	119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10907
7 ALX	0	0	0	0	0	0	14388	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14388
8 FFX	0	0	0	0	0	0	0	25616	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25616
9 LDN	0	0	0	0	0	0	0	0	4244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4244
10 PW	0	0	0	0	0	0	0	0	0	6952	0	0	0	0	0	0	0	0	0	0	0	0	0	6952
11 FRD	0	0	0	0	0	0	0	0	0	0	6224	0	0	0	0	0	0	0	0	0	0	0	0	6224
12 CAR	0	0	0	0	0	0	0	0	0	0	0	2904	0	0	0	0	0	0	0	0	0	0	0	2904
13 HOW	0	0	0	0	0	0	0	0	0	0	0	0	4198	0	0	0	0	0	0	0	0	0	0	4198
14 AAR	0	0	0	0	0	0	0	0	0	0	0	0	0	10878	0	0	0	0	0	0	0	0	0	10878
15 CAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	852	0	0	0	0	0	0	0	0	852
16 STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2309	0	0	0	0	0	0	0	2309
17 CHS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1599	0	0	0	0	0	0	1599
18 FAU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	431	0	0	0	0	0	431
19 STA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118	0	0	0	0	118
20 CL/JF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1127	0	0	0	1127
21 SP/FB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2594	0	0	2594
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	63718		51327		1382		14388		4244		6224		4198		852		1599		118		2594		0	
		65228		16229		10692		25735		6952		2904		10878		2309		431		1127		0		293130

A-24

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO    MODE: Bike
         DESTINATION
ORIGIN |    1     2     3     4     5     6     7     8     9    10    11    12    13    14    15    16    17    18    19    20    21    22    23 |  TOTAL
==================================================================================================================================================
 1 DC CR| 1094   394   109     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   1598
 2 DC NC|  177  2086    92     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   2355
 3 MTG  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
 4 PG   |    0     0     0  1123     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   1123
 5 ARLCR|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
 6 ARNCR|    0     0     0     0     0   481     0   125     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    606
 7 ALX  |    0     0     0     0     0     0   225     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    225
 8 FFX  |    0     0     0     0     0   125     0   503     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    629
 9 LDN  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
10 PW   |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
11 FRD  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
12 CAR  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
13 HOW  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
14 AAR  |    0     0     0     0     0     0     0     0     0     0     0     0     0    72     0     0     0     0     0     0     0     0     0 |     72
15 CAL  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
16 STM  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
17 CHS  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
18 FAU  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
19 STA  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
20 CL/JF|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
21 SP/FB|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
22 KGEO |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
23 EXTL |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
==================================================================================================================================================
  TOTAL  1271   202     0   225     0     0     0     0     0    72     0     0     0     0     0     0 |
          2480        1123         606         629         0           0          72           0           0           0           0           0     6608
```

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO    MODE: Other (Non-Modeled)
         DESTINATION
ORIGIN |    1     2     3     4     5     6     7     8     9    10    11    12    13    14    15    16    17    18    19    20    21    22    23 |  TOTAL
==================================================================================================================================================
 1 DC CR| 1816   687     0   215     0   235     0  1106     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   4058
 2 DC NC|  980  5245   169   116     0   109     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   6620
 3 MTG  |    0   169 13458   310     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |  13937
 4 PG   |    0     0   708  6996     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   7703
 5 ARLCR|  210     0     0     0     0   222     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    432
 6 ARNCR|  360   109     0     0   319  1234   206   121     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   2350
 7 ALX  |    0     0     0     0     0   308   594     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |    902
 8 FFX  | 1106     0     0   249     0    61     0 10996   455     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |  12866
 9 LDN  |    0     0     0     0     0     0     0   455  2832     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |   3287
10 PW   |    0     0     0     0     0     0     0     0     0  4386     0     0     0     0     0     0     0     0     0     0     0     0     0 |   4386
11 FRD  |    0     0     0     0     0     0     0     0     0     0  3366     0     0     0     0     0   520     0     0     0     0     0     0 |   3886
12 CAR  |    0     0     0     0     0     0     0     0     0     0     0  2582   208     0     0     0     0     0     0     0     0     0     0 |   2790
13 HOW  |    0     0     0     0     0     0     0     0     0     0     0     0  2546     0     0     0     0     0     0     0     0     0     0 |   2546
14 AAR  |    0     0     0   181     0     0     0     0     0     0     0     0     0  8755     0     0     0     0     0     0     0     0     0 |   8936
15 CAL  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0  1573     0   256     0     0     0     0     0     0 |   1829
16 STM  |    0     0     0     0     0     0     0     0     0     0   520     0     0     0     0  1144     0     0     0     0     0     0     0 |   1664
17 CHS  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0  1935     0     0     0     0     0     0 |   1935
18 FAU  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0   610     0     0     0     0     0 |    610
19 STA  |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0  1399     0     0     0     0 |   1399
20 CL/JF|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0  1539     0     0     0 |   1539
21 SP/FB|    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
22 KGEO |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0   564     0 |    564
23 EXTL |    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0 |      0
==================================================================================================================================================
  TOTAL  4472 14335         319         800        3287        3886        2754        1573        2192        1399           0           0 |
          6210       8067        2169       12678        4386        2582        8755        1664         610        1539         564    84240
```

A-25

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO    MODE: Auto Person
```

```
           DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |  TOTAL
========================================================================================================================================================================================
 1 DC CR| 16995  14473   3175   4001    321   1787   2283   3474   1050    307      0      0      0     81      0    451    127      0      0      0      0      0      0 |  48524
 2 DC NC| 14691  65778  22519  14605   1672   2988   1475   3791      0    395      0    322    268      0      0      0    145      0      0      0      0      0      0 | 128650
 3 MTG  |  2381  18193 394101  15986      0    748    314   5504   1386    303   5049   2163   3093   1656    307      0    145      0    297      0      0      0      0 | 451627
 4 PG   |  3461  11606  16523 234853      0    204    181   2681      0    181    130    308   8439   8018   2115      0   6962      0      0      0      0      0      0 | 295663
 5 ARLCR|   215    215      0    109    359   1668    334   1035      0    873      0      0      0      0      0      0      0      0    595      0      0      0      0 |   5403
 6 ARNCR|  1597   2493   1305    792   2371  29913   4976  11943    665      0      0      0      0      0      0      0      0      0    295      0      0      0      0 |  56350
 7 ALX  |   405    888    857    894    252   4107  42119  18363    236    589    382      0      0      0      0    375    289      0      0      0      0      0      0 |  69757
 8 FFX  |  1962   4379   3876   1722   1225  12281  20555 420536  15941  20374      0      0    471    109      0      0    849    521    132    769      0      0      0 | 505703
 9 LDN  |   191      0    341    256      0    295      0  12059  96076   1404    298     99      0    178      0      0      0    353      0   2566      0      0      0 | 114116
10 PW   |     0    636      0      0      0    521    632  14476   1115 178948      0      0      0      0      0      0    169   1214   4084      0    609      0      0 | 202405
11 FRD  |     0      0   4145    130      0      0      0    215      0      0 112914   2292   1021    228      0      0      0      0      0    896      0      0      0 | 121839
12 CAR  |     0      0    264      0      0      0      0      0      0      0   2601  75576    573    931      0      0      0      0      0      0      0      0      0 |  79944
13 HOW  |     0      0   3863   5035      0     54      0     93      0      0    996   1312 107605   6475      0      0      0      0      0      0      0      0      0 | 125433
14 AAR  |   822   1345   5549  21192      0    178    163    439      0      0    394    413   3458 238706   2358     81    401      0    451      0      0      0      0 | 275948
15 CAL  |     0    184      0   1864      0      0      0    510      0      0      0      0      0   1399  38185   1232   2553      0      0      0      0      0      0 |  45927
16 STM  |     0      0      0    489      0    390    375      0      0      0      0      0      0    884    801  54282   2559      0      0      0      0      0      0 |  59780
17 CHS  |     0    715    546   3790      0      0    289    263      0      0      0    362      0    314   1124   3531  77572      0      0      0      0    348      0 |  88855
18 FAU  |   259      0      0      0      0      0      0      0    211    776      0      0      0      0      0      0      0  25498    231      0      0    179      0 |  27154
19 STA  |   399      0    594      0    298    164      0    905      0   2541    130      0      0    394      0      0      0      0  34550      0   4086    118      0 |  44178
20 CL/JF|     0      0      0      0      0      0      0      0      0      0    590      0      0      0      0      0      0      0      0  19959      0      0      0 |  20548
21 SP/FB|     0      0      0      0      0      0      0    349      0   1063      0      0      0      0      0      0      0      0   9788    617  67107    666      0 |  79590
22 KGEO |     0      0      0      0      0      0      0    118      0    179      0      0      0      0      0    197      0    179      0      0   1164   2435      0 |   4272
23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
========================================================================================================================================================================================
 TOTAL  43378        457659        6498        73697        116678        123481        124457        44998        90922        50814        73734          0 |
            120904        305720        55300        496755        207935        82847        259734        60149        28094        24169        3745        2851667
```

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO    MODE: Total Motorized Person (Auto Person & Transit)
```

```
           DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |  TOTAL
========================================================================================================================================================================================
 1 DC CR| 24443  18574   5462   4111    321   3108   2637   3948   1050    307      0      0      0    654      0    451    127      0      0      0      0      0      0 |  65193
 2 DC NC| 19909  75398  24035  20844   1672   3092   1886   3791      0    395      0    322    268      0      0      0    145      0      0      0      0      0      0 | 151758
 3 MTG  |  3563  19604 400507  16576    177   1141    314   5504   1386    303   5049   2163   3093   1656    307      0    145      0    297      0      0      0      0 | 461786
 4 PG   |  3658  12161  16861 239072    204    204    181   2681      0    181    130    308   8439   8018   2115      0   6962      0      0      0      0      0      0 | 301176
 5 ARLCR|   874    215    417    109    471   1903    334   1035      0    873      0      0      0      0      0      0      0      0    595      0      0      0      0 |   6828
 6 ARNCR|  2931   3018   1398    792   2371  30018   4976  12742    665      0      0      0      0      0      0      0      0      0    295      0      0      0      0 |  59205
 7 ALX  |   823   1095    857    894    252   4107  42429  18660    236    589    382      0      0      0      0    375    289      0      0      0      0      0      0 |  70988
 8 FFX  |  2876   4379   3876   1722   2123  12817  20555 421430  15941  20374      0      0    471    109      0      0    849    521    132    769      0      0      0 | 508944
 9 LDN  |   191      0    341    256      0    295      0  12059  96076   1404    298     99      0    178      0      0      0    353      0   2566      0      0      0 | 114116
10 PW   |     0    636      0      0      0    521    632  14476   1115 178948      0      0      0      0      0      0    169   1214   4084      0    609      0      0 | 202405
11 FRD  |     0      0   4145    130      0      0      0    215      0      0 112914   2292   1021    228      0      0      0      0      0    896      0      0      0 | 121839
12 CAR  |     0      0    264      0      0      0      0      0      0      0   2601  75576    573    931      0      0      0      0      0      0      0      0      0 |  79944
13 HOW  |   268      0   3863   5035      0     54      0     93      0      0    996   1312 107605   6475      0      0      0      0      0      0      0      0      0 | 125701
14 AAR  |   822   1345   5549  21192      0    178    163    439      0      0    394    413   3458 239603   2358     81    401      0    451      0      0      0      0 | 276844
15 CAL  |     0    184      0   1864      0      0      0    510      0      0      0      0      0   1399  38185   1232   2553      0      0      0      0      0      0 |  45927
16 STM  |     0      0      0    489      0    390    375      0      0      0      0      0      0    884    801  54282   2559      0      0      0      0      0      0 |  59780
17 CHS  |     0    715    546   3790      0      0    289    263      0      0      0    362      0    314   1124   3531  77572      0      0      0      0    348      0 |  88855
18 FAU  |   259      0      0      0      0      0      0      0    211    776      0      0      0      0      0      0      0  25498    231      0      0    179      0 |  27154
19 STA  |   399      0    594      0    298    164      0    905      0   2541    130      0      0    394      0      0      0      0  34550      0   4086    118      0 |  44178
20 CL/JF|     0      0      0      0      0      0      0      0      0      0    590      0      0      0      0      0      0      0      0  19959      0      0      0 |  20548
21 SP/FB|     0      0      0      0      0      0      0    349      0   1063      0      0      0      0      0      0      0      0   9788    617  67107    666      0 |  79590
22 KGEO |     0      0      0      0      0      0      0    118      0    179      0      0      0      0      0    197      0    179      0      0   1164   2435      0 |   4272
23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |      0
========================================================================================================================================================================================
 TOTAL  61018        468715        7890        74771        116678        123481        124457        44998        90922        50814        73734          0 |
            137323        316876        57993        499218        207935        82847        261204        60149        28094        24169        3745        2917033
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO   MODE: Transit Percentage

          DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |  TOTAL
=====================================================================================================================================================================================
 1 DC CR|  30.5   22.1   41.9    2.7     0    42.5   13.4   12.0     0      0      0      0      0    87.7     0      0      0      0      0      0      0      0      0 |  25.6
 2 DC NC|  26.2   12.8    6.3   29.9     0     3.4   21.8     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |  15.2
 3 MTG  |  33.2    7.2    1.6    3.6  100.0   34.4     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   2.2
 4 PG   |   5.4    4.6    2.0    1.8  100.0     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   1.8
 5 ARLCR|  75.4     0   100.0     0    23.9   12.4     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |  20.9
 6 ARNCR|  45.5   17.4    6.6     0      0     0.3     0     6.3     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   4.8
 7 ALX  |  50.8   18.9     0      0      0      0     0.7    1.6     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   1.7
 8 FFX  |  31.8     0      0      0    42.3    4.2     0     0.2     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   0.6
 9 LDN  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
10 PW   |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
11 FRD  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
12 CAR  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
13 HOW  | 100.0     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |   0.2
14 AAR  |    0      0      0      0      0      0      0      0      0      0      0      0      0     0.4     0      0      0      0      0      0      0      0      0 |   0.3
15 CAL  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
16 STM  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
17 CHS  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
18 FAU  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
19 STA  |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
20 CL/JF|    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
21 SP/FB|    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
22 KGEO |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
23 EXTL |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
=====================================================================================================================================================================================
 TOTAL    28.9           2.4          17.6           1.4            0             0             0             0             0             0             0             0            0 |
                 12.0           3.5            4.6            0.5            0             0             0            0.6            0             0             0             0 |   2.2


2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO   MODE: Avg. Auto Occupancy

          DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23 |  TOTAL
=====================================================================================================================================================================================
 1 DC CR|  1.25   1.34   1.36   1.23   1.54   1.45   1.37   1.60   1.32   1.00     0      0      0    1.00     0    1.00   1.00     0      0      0      0      0      0 |  1.31
 2 DC NC|  1.43   1.41   1.63   1.62   1.58   1.27   1.07   1.30     0    1.00     0    1.00   1.00     0      0      0    1.00     0      0      0      0      0      0 |  1.45
 3 MTG  |  1.89   1.41   1.51   1.50     0    1.42   1.00   1.41   1.51   1.00   1.54   1.31   1.50   1.00   1.00     0    1.00     0      0      0      0      0      0 |  1.50
 4 PG   |  1.25   1.52   1.43   1.49     0    1.00   1.00   1.00     0    1.00     0    3.10   1.76   1.39   1.14     0    1.23     0      0      0      0      0      0 |  1.47
 5 ARLCR|  1.00   1.00     0    1.00   1.00   1.98   1.00   2.15     0    3.55     0      0      0      0      0      0      0      0      0      0      0      0      0 |  1.93
 6 ARNCR|  2.89   1.16   3.25   1.00   1.26   1.41   1.33   1.37   2.00     0      0      0      0      0      0      0      0      0      0      0      0      0      0 |  1.41
 7 ALX  |  1.00   1.42   1.96   1.70   1.00   1.31   1.28   1.42     0    1.56   1.00     0      0      0      0      0    2.00     0      0      0      0      0      0 |  1.34
 8 FFX  |  1.29   1.99   1.08   1.00   1.82   1.27   1.59   1.45   1.34   1.67     0      0      0    1.00   1.00     0      0    1.00   1.00   1.00   1.00     0      0 |  1.45
 9 LDN  |  1.00     0    1.00   1.00     0    1.00     0    1.52   1.54   1.00   1.00  99.39     0    1.00     0      0      0    1.00     0    2.56     0      0      0 |  1.53
10 PW   |    0    1.00     0      0      0    1.00   3.00   1.76   1.00   1.67     0      0      0      0      0      0    1.00   1.57   2.36     0    1.68     0      0 |  1.67
11 FRD  |    0      0    1.61     0      0      0      0    1.00     0      0    1.47   1.38   1.00   1.00     0      0      0      0      0    1.58     0      0      0 |  1.47
12 CAR  |    0      0    1.00     0      0      0      0      0      0      0    1.48   1.67   1.00   1.43     0      0      0      0      0      0      0      0      0 |  1.65
13 HOW  |    0      0    1.94   1.62     0    1.00     0    1.00     0      0    1.00   1.53   1.58   1.44     0      0      0      0      0      0      0      0      0 |  1.57
14 AAR  |  6.63  14.57   2.23   1.63     0    1.00   1.00   1.00     0      0    1.00   1.00   1.59   1.54   1.12   1.00   1.00     0    1.00     0      0      0      0 |  1.56
15 CAL  |    0    1.00     0    1.34     0      0      0    1.00     0      0      0      0      0      0    2.21   1.44   1.26   1.80     0      0      0      0      0 |  1.45
16 STM  |    0      0      0    1.00     0    1.00     0      0      0      0      0      0      0      0    1.00   1.41   1.86     0      0      0      0      0      0 |  1.44
17 CHS  |    0    1.36   1.00   1.20     0      0    2.00   1.00     0      0      0    2.00     0    1.00   1.39   2.13   1.40     0      0      0      0    1.00     0 |  1.40
18 FAU  |  1.00     0      0      0      0      0      0      0    1.00   1.76     0      0      0      0      0      0      0    1.43     0      0      0    1.00     0 |  1.44
19 STA  |    0      0    2.00     0      0      0      0    1.00     0    1.28   1.00     0      0    1.00     0      0      0      0    1.69     0    2.12   1.00     0 |  1.69
20 CL/JF|    0      0      0      0      0      0      0      0      0      0    1.49     0      0      0      0      0      0      0      0    1.53     0      0      0 |  1.53
21 SP/FB|    0      0      0      0      0      0      0    1.00     0    1.00     0      0      0      0      0      0      0      0    1.61   2.00   1.62   1.70     0 |  1.60
22 KGEO |    0      0      0      0      0      0      0    1.00     0    1.00     0      0      0      0    2.00     0    1.00     0      0    2.88   1.06     0 |  1.30
23 EXTL |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 |    0
=====================================================================================================================================================================================
 TOTAL    1.39           1.51           1.47           1.36           1.50           1.46           1.57           1.39           1.40           1.74           1.64           0 |
                 1.43           1.49           1.36           1.45           1.65           1.64           1.53           1.44           1.41           1.61           1.12 |   1.50
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: NHO   MODE: Total Modeled Person (Motorized & NonMotorized)

DESTINATION

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	86120	21205	5680	4111	321	3108	2637	3948	1050	307	0	0	0	654	0	451	127	0	0	0	0	0	0	129719
2 DC NC	23112	138149	24670	20844	1672	3092	1886	3791	0	395	0	322	268	0	0	145	0	0	0	0	0	0	0	218348
3 MTG	3673	21752	451181	16576	177	1141	314	5504	1386	303	5049	2163	3093	1656	307	0	145	0	297	0	0	0	0	514718
4 PG	3658	12161	16861	256424	204	204	181	2681	0	181	130	308	8439	8018	2115	0	6962	0	0	0	0	0	0	318528
5 ARLCR	874	393	417	109	1547	2113	334	1035	0	873	0	0	0	0	0	0	0	0	595	0	0	0	0	8291
6 ARNCR	2931	3018	1398	792	2678	40981	4976	12986	665	0	0	0	0	0	0	0	0	0	295	0	0	0	0	70718
7 ALX	823	1095	857	894	252	4107	57042	18660	236	589	382	0	0	0	0	375	289	0	0	0	0	0	0	85602
8 FFX	2876	4379	3876	1722	2123	12942	20555	447549	15941	20374	0	0	0	471	109	0	0	849	521	132	769	0	0	535189
9 LDN	191	0	341	256	0	295	0	12059	100319	1404	298	99	0	178	0	0	0	353	0	2566	0	0	0	118360
10 PW	0	636	0	0	0	521	632	14476	1115	185900	0	0	0	0	0	0	169	1214	4084	0	609	0	0	209357
11 FRD	0	0	4145	130	0	0	0	215	0	0	119137	2292	1021	228	0	0	0	0	0	896	0	0	0	128063
12 CAR	0	0	264	0	0	0	0	0	0	0	2601	78480	573	931	0	0	0	0	0	0	0	0	0	82848
13 HOW	268	0	3863	5035	0	54	0	93	0	0	996	1312	111803	6475	0	0	0	0	0	0	0	0	0	129900
14 AAR	822	1345	5549	21192	0	178	163	439	0	0	394	413	3458	250552	2358	81	401	0	451	0	0	0	0	287794
15 CAL	0	184	0	1864	0	0	0	510	0	0	0	0	0	1399	39037	1232	2553	0	0	0	0	0	0	46779
16 STM	0	0	0	489	0	390	375	0	0	0	0	0	0	884	801	56591	2559	0	0	0	0	0	0	62089
17 CHS	0	715	546	3790	0	0	289	263	0	0	0	362	0	314	1124	3531	79172	0	0	0	0	348	0	90454
18 FAU	259	0	0	0	0	0	0	0	211	776	0	0	0	0	0	0	0	25929	231	0	0	179	0	27585
19 STA	399	0	594	0	298	164	0	905	0	2541	130	0	0	394	0	0	0	0	34668	0	4086	118	0	44296
20 CL/JF	0	0	0	0	0	0	0	0	0	0	590	0	0	0	0	0	0	0	0	21086	0	0	0	21675
21 SP/FB	0	0	0	0	0	0	0	349	0	1063	0	0	0	0	0	0	0	0	0	9788	617	69701	666	82184
22 KGEO	0	0	0	0	0	0	118	0	179	0	0	0	0	0	197	0	179	0	0	1164	2435	0	0	4272
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	126008	205031	520244	334228	9272	69292	89385	525581	120922	214887	129705	85752	128655	272154	45850	62458	92522	28525	50932	25296	76328	3745	0	3216771

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL   MODE: Transit

DESTINATION

ORIGIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	41875	22039	14577	9295	2154	9277	2933	5669	523	1233	234	0	533	991	495	0	1514	215	253	0	308	0	0	114119
2 DC NC	134963	86294	12760	18613	2770	6233	3022	4495	922	396	0	0	0	0	239	0	0	0	268	0	0	0	0	270974
3 MTG	93334	15555	48652	5246	3323	5060	2434	388	0	0	0	0	0	0	0	0	0	0	0	283	0	0	0	174274
4 PG	66466	18409	9949	35469	3116	3800	960	2427	0	636	0	0	608	0	0	0	348	0	0	0	0	0	0	142187
5 ARLCR	5964	909	621	614	468	3151	359	856	256	147	0	0	0	0	0	0	0	0	0	0	0	0	0	13345
6 ARNCR	40661	4148	2529	1568	4326	11179	1245	4119	204	0	0	0	0	0	0	0	0	0	105	0	0	0	0	70083
7 ALX	20698	3404	210	0	2372	3740	4547	1472	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36443
8 FFX	68982	7484	2673	1446	9966	17618	3532	9432	238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121372
9 LDN	4566	745	200	0	256	450	518	0	518	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7254
10 PW	12804	4398	0	417	1592	4489	380	1640	0	385	0	0	0	0	0	0	0	0	0	0	0	0	0	26104
11 FRD	3977	957	2934	447	0	360	0	0	0	0	1610	0	0	0	0	0	0	0	0	0	0	0	0	10286
12 CAR	551	417	0	0	417	0	0	0	0	0	0	639	0	0	0	0	0	0	0	0	0	0	0	2024
13 HOW	9524	1739	276	260	181	1358	537	0	0	0	0	0	570	0	0	0	0	0	0	0	0	0	0	14444
14 AAR	17934	2083	2005	0	1996	479	72	1145	0	0	0	0	0	4586	0	0	0	0	0	0	0	0	0	30301
15 CAL	3119	0	0	0	0	366	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3485
16 STM	459	0	0	1039	0	0	0	0	0	0	0	0	0	0	0	526	0	0	0	0	0	0	0	2025
17 CHS	3963	0	297	348	264	0	0	0	0	0	0	0	0	0	0	0	412	0	0	0	0	0	0	5283
18 FAU	1900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1900
19 STA	2231	731	0	0	262	3570	0	506	0	0	0	0	0	0	0	0	0	0	0	0	463	0	0	7763
20 CL/JF	1764	0	1106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2870
21 SP/FB	2415	0	0	0	418	0	1092	969	0	0	0	0	0	0	0	0	0	0	0	0	489	0	0	5383
22 KGEO	402	0	0	0	0	0	0	0	0	244	0	0	0	0	0	0	0	0	0	0	0	0	0	646
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	538552	169310	98789	74761	33882	71132	21631	33116	2661	3042	1844	639	1710	5577	733	526	2273	215	626	283	1260	0	0	1062563

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL   MODE: Auto Driver

ORIGIN	DESTINATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	43316	34799	11051	12335	868	10678	6400	12696	2420	785	0	0	382	2628	0	451	1097	0	131	0	0	164	0	140202
2 DC NC	104634	270470	81876	59515	3493	18664	6628	29801	4050	1302	0	322	883	5775	846	0	1554	0	122	0	316	0	0	590251
3 MTG	55578	906181	489936	72046	4180	15421	4559	51295	7668	1838	15250	2580	19087	14869	307	0	813	0	934	838	620	0	0	1848438
4 PG	61280	98694	116341	911744	2136	13738	6890	35035	3438	1516	387	1574	22213	53557	6376	286	27962	0	0	0	0	197	0	1363362
5 ARLCR	980	2248	1362	655	2601	5273	1805	6045	0	1274	0	0	210	225	0	0	0	0	0	0	0	0	0	22679
6 ARNCR	31235	17253	9616	2827	12257	170170	23788	76329	2551	1382	93	0	556	710	108	0	667	102	1200	0	0	0	0	350844
7 ALX	18955	8881	4056	4319	3658	22688	134972	58667	1249	2571	382	0	706	1104	0	0	511	266	298	0	0	0	0	263283
8 FFX	75104	38053	41667	16179	20911	89335	770651	726774	63733	65869	1591	0	2851	1372	772	236	1857	2366	3717	1401	2235	132	0	2233219
9 LDN	8169	3359	7905	1242	662	6101	2281	113553	334685	6035	883	0	0	853	0	0	0	2691	405	2198	0	0	0	491022
10 PW	5920	9516	4844	2394	3946	12511	11030	139796	10692	569285	0	0	0	0	0	590	463	6836	6305	0	1888	263	0	786279
11 FRD	1452	3771	41821	4218	491	260	819	2840	4099	595	393668	16491	8523	2916	0	0	0	0	0	1969	0	0	0	483934
12 CAR	583	290	10965	3702	0	0	165	265	0	0	6660	237191	17511	8145	0	0	0	0	0	0	0	0	0	285476
13 HOW	5549	4639	27095	35984	260	792	1466	3291	276	0	1967	5799	377314	48363	0	0	667	570	0	325	0	0	0	514355
14 AAR	10331	12144	18930	73882	1732	3585	2134	6235	0	769	765	3263	46614	826157	5802	424	1480	0	451	144	0	0	0	1014842
15 CAL	4270	2166	1101	12059	239	724	255	5202	0	362	0	0	1555	11640	119310	12705	4117	0	0	0	0	0	0	175703
16 STM	1997	3201	459	6000	0	781	0	1302	0	0	0	0	0	835	9754	200162	14356	0	459	0	0	0	0	239307
17 CHS	7118	7686	2488	32363	1752	3438	3568	5973	251	0	181	145	3868	4446	8620	210313	0	0	0	145	782	0	0	293137
18 FAU	808	577	900	0	215	883	431	12560	4694	13127	0	0	0	0	0	0	0	67380	577	1323	214	179	0	103871
19 STA	1637	2508	1285	131	131	1225	1285	10754	0	20833	130	0	0	394	0	0	0	0	112628	536	40363	1129	0	194969
20 CL/JF	534	0	719	0	0	0	0	4237	9933	79	5697	0	236	0	0	0	0	393	0	71111	541	297	0	93775
21 SP/FB	1955	1169	1084	1011	2269	1135	0	2038	0	7103	0	0	0	0	0	308	0	258	25573	2239	180507	5943	0	232593
22 KGEO	573	328	0	0	0	0	0	564	0	1326	0	0	0	489	0	343	1598	423	3145	0	5564	24647	0	39000
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

| TOTAL | 441979 | | 1875501 | | 61799 | | 285541 | | 449739 | | 427476 | | 498785 | | 147720 | | 267454 | | 155946 | | 232392 | | 0 | |
| | | 612371 | | 1252606 | | 377402 | | 2305251 | | 696051 | | 267402 | | 983900 | | 224124 | | 81284 | | 82085 | | 33732 | | 11760538 |

2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL   MODE: Auto Pax

ORIGIN	DESTINATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	TOTAL
1 DC CR	11996	11045	1420	1236	453	1950	1226	2825	1143	1141	0	0	325	414	0	263	486	0	604	0	0	0	0	36527
2 DC NC	33396	125633	33921	12422	806	3448	1078	7697	624	0	922	0	492	545	0	0	261	0	298	0	308	0	0	221853
3 MTG	6828	27129	627665	13896	919	548	0	7840	939	1860	4646	515	5435	2069	0	0	704	0	297	0	1240	0	0	702529
4 PG	10021	28580	40181	410376	0	3934	3542	3005	566	0	130	390	8650	17253	2215	230	13884	0	0	0	0	0	0	542956
5 ARLCR	547	0	0	0	435	1824	0	2034	0	1559	0	0	0	0	0	0	0	0	1800	0	0	0	0	8199
6 ARNCR	9010	3496	1312	606	4402	67021	6717	16433	564	845	0	0	0	204	0	0	0	0	295	0	0	0	0	110906
7 ALX	2938	2460	603	1154	873	6156	42039	18124	446	211	0	0	0	733	0	375	145	0	0	0	0	0	0	76255
8 FFX	11910	7835	5129	104	2991	20272	23568	717136	17875	21632	0	0	0	132	0	0	0	0	916	666	119	0	0	830282
9 LDN	1436	0	210	0	512	1267	0	26864	176683	1584	1171	99	0	0	0	0	0	0	144	1564	0	0	0	211534
10 PW	1894	833	1475	1054	1568	3764	4759	37277	1054	299461	0	0	0	0	0	98	0	2804	3344	0	491	98	0	359974
11 FRD	0	224	11572	260	0	0	0	0	322	0	146038	9360	2055	1695	0	0	0	0	0	327	260	0	0	171853
12 CAR	165	380	1247	779	0	0	0	0	99	0	3244	119415	3364	1533	0	0	0	0	0	0	0	0	0	130227
13 HOW	1009	138	5456	6722	0	276	0	0	0	0	318	2142	173707	8558	0	0	0	0	0	0	0	0	0	198326
14 AAR	1744	4700	9353	25718	0	0	0	1379	0	0	0	1372	17660	331614	662	0	0	0	0	0	0	0	0	394201
15 CAL	498	256	750	2420	0	724	0	2171	0	0	0	0	0	3179	59711	1464	2462	0	0	0	0	0	0	73634
16 STM	263	0	0	756	0	0	375	0	0	0	0	0	0	2031	4806	67543	5227	0	0	0	0	0	0	81001
17 CHS	962	1237	963	9555	0	222	1877	628	0	0	181	0	297	314	4072	86111	0	0	0	145	145	0	0	106708
18 FAU	275	0	0	0	0	0	0	276	2435	2254	0	0	0	0	0	0	0	26194	349	1323	0	0	0	33106
19 STA	1708	420	297	0	1502	563	0	2312	0	2956	0	0	0	0	0	0	0	118	65784	0	24435	0	0	100095
20 CL/JF	0	0	0	0	0	0	195	3573	0	542	0	0	0	0	0	0	0	0	0	27963	0	0	0	32272
21 SP/FB	0	308	0	0	0	0	546	0	0	3046	0	0	0	0	0	308	0	0	10060	617	80914	818	0	96617
22 KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98	0	0	1055	0	2438	6869	0	10459
23 EXTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

| TOTAL | 96598 | | 741554 | | 14460 | | 85728 | | 206323 | | 157011 | | 211688 | | 67708 | | 109280 | | 84945 | | 110088 | | 0 | |
| | | 214674 | | 487057 | | 111970 | | 846196 | | 336550 | | 133473 | | 370255 | | 74451 | | 29115 | | 32460 | | 7929 | | 4529514 |

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL    MODE: Walk

       DESTINATION
ORIGIN |    1       2       3       4       5       6       7       8       9      10      11      12      13      14      15      16      17      18      19      20      21      22      23 |   TOTAL
=====================================================================================================================================================================================================
 1 DC CR| 339128  12690     341       0     210       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |  352369
 2 DC NC|  27818 241736    3446    7091     368       0       0      93       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |  280552
 3 MTG  |    487    5617  246408      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |  252512
 4 PG   |      0     291     219  101005      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |  101514
 5 ARLCR|    630     382       0       0   10001    2041       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |   13054
 6 ARNCR|      0       0       0       0    4005  102838     642     553       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |  108038
 7 ALX  |    133       0       0       0       0     214   63456       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |   63802
 8 FFX  |    332      93       0       0       0     440     476  135065      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |  136406
 9 LDN  |      0       0       0       0       0       0       0       0   25231       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |   25231
10 PW   |      0       0       0       0       0       0       0       0       0   39327       0       0       0       0       0       0       0       0       0       0       0       0       0 |   39327
11 FRD  |      0       0       0       0       0       0       0       0       0       0   34807       0       0       0       0       0       0       0       0       0       0       0       0 |   34807
12 CAR  |      0       0       0       0       0       0       0       0       0       0       0   11549       0       0       0       0       0       0       0       0       0       0       0 |   11549
13 HOW  |      0       0       0       0       0       0       0       0       0       0       0       0   31590       0       0       0       0       0       0       0       0       0       0 |   31590
14 AAR  |      0       0       0       0       0       0       0       0       0       0       0       0       0   47516       0       0       0       0       0       0       0       0       0 |   47516
15 CAL  |      0       0       0       0       0       0       0       0       0       0       0       0       0       0    4908       0       0       0       0       0       0       0       0 |    4908
16 STM  |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0    3482       0       0       0       0       0       0       0 |    3482
17 CHS  |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0    9935       0       0       0       0       0       0 |    9935
18 FAU  |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0    1075       0       0       0       0       0 |    1075
19 STA  |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0     231    1503       0       0       0       0 |    1735
20 CL/JF|      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0    4459       0       0       0 |    4459
21 SP/FB|      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0    6480       0       0 |    6480
22 KGEO |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0     617       0 |     617
23 EXTL |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |       0
=====================================================================================================================================================================================================
 TOTAL  368528          250414          14584           64573           25231           34807           31590            4908            9935            1503            6480             0 |
             260808          108096          105532          135711           39327           11549           47516            3482            1306            4459             617    1530956


2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL    MODE: Bike

       DESTINATION
ORIGIN |    1       2       3       4       5       6       7       8       9      10      11      12      13      14      15      16      17      18      19      20      21      22      23 |   TOTAL
=====================================================================================================================================================================================================
 1 DC CR|   4609    2266     599     191       0       0     183       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |    7848
 2 DC NC|   8465   11833     485     529     430     183       0      92       0       0       0       0       0       0       0       0       0       0       0       0       0       0     183 |   22017
 3 MTG  |   2636     210   16619       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |   19466
 4 PG   |    560       0       0    8492       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |    9051
 5 ARLCR|    204       0       0       0       0     215       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |     419
 6 ARNCR|   1658     503       0       0     635    2632     659     125       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |    6211
 7 ALX  |   1263     183       0       0     420     393    1167     786       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |    4212
 8 FFX  |   1076     238       0       0       0     909       0    9367       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |   11590
 9 LDN  |      0       0       0       0       0       0       0     191    2577       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |    2768
10 PW   |      0       0       0       0       0       0       0       0       0     636       0       0       0       0       0       0       0       0       0       0       0       0       0 |     636
11 FRD  |      0       0       0       0       0       0       0       0       0       0    1285       0       0       0       0       0       0       0       0       0       0       0       0 |    1285
12 CAR  |      0       0       0       0       0       0       0       0       0       0       0     380       0       0       0       0       0       0       0       0       0       0       0 |     380
13 HOW  |      0       0     325       0       0       0       0       0       0       0       0       0     416       0       0       0       0       0       0       0       0       0       0 |     741
14 AAR  |      0       0       0       0       0       0       0       0       0       0       0       0       0    2372       0       0       0       0       0       0       0       0       0 |    2372
15 CAL  |      0       0       0       0       0       0       0       0       0       0       0       0       0       0    2250       0       0       0       0       0       0       0       0 |    2250
16 STM  |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |       0
17 CHS  |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0     453       0       0       0       0       0       0 |     453
18 FAU  |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |       0
19 STA  |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |       0
20 CL/JF|      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |       0
21 SP/FB|      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |       0
22 KGEO |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |       0
23 EXTL |      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 |       0
=====================================================================================================================================================================================================
 TOTAL   20470           18028            1484            2009            2577            1285             416            2250             453               0               0             0 |
             15233            9211            4332           10562             636             380            2372               0               0               0               0      91699
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL    MODE: Other (Non-Modeled)

        DESTINATION
ORIGIN |   1      2       3       4      5      6       7       8      9      10     11     12     13     14     15     16     17     18     19     20     21     22    23 |  TOTAL
=======================================================================================================================================================================================
 1 DC CR| 12853   3798    349     653    904    1475    0       1380   92     0      0      0      0      92     0      0      0      0      0      0      0      0     0 |  21597
 2 DC NC| 10063   16741   3315    1424   0      1080    112     588    185    238    0      0      0      355    0      0      0      0      253    0      0      0     0 |  34353
 3 MTG  | 662     2107    134683  1501   0      431     218     557    0      0      0      0      109    575    0      0      0      0      0      0      0      0     0 |  140844
 4 PG   | 1622    4850    4418    93702  0      927     0       335    0      0      0      0      0      1450   249    0      0      0      0      0      0      0     0 |  107554
 5 ARLCR| 1114    409     0       0      918    528     0       0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |  2969
 6 ARNCR| 2103    428     225     461    524    16901   416     1137   0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |  22195
 7 ALX  | 702     527     0       0      0      624     4442    0      0      0      0      0      0      0      0      0      0      0      0      0      546    0     0 |  6841
 8 FFX  | 3602    504     0       249    709    1381    650     138321 1302   0      0      0      0      0      0      522    0      0      0      0      132    0     0 |  147372
 9 LDN  | 0       0       662     0      0      0       0       1628   38421  293    0      0      0      0      0      0      0      0      0      0      0      0     0 |  41003
10 PW   | 0       98      0       0      0      98      0       247    0      61678  0      0      0      0      0      0      0      0      0      0      0      0     0 |  62121
11 FRD  | 0       0       0       0      0      0       0       0      0      0      32333  133    0      0      0      520    0      0      0      0      0      0     0 |  32985
12 CAR  | 0       0       0       0      0      0       0       0      0      0      133    23219  625    190    0      0      0      0      0      0      0      0     0 |  24167
13 HOW  | 0       0       579     479    0      0       0       0      0      0      0      208    40436  276    0      0      0      0      0      0      0      0     0 |  41978
14 AAR  | 0       0       0       1287   0      0       0       144    0      0      0      0      0      51849  562    2715   0      0      0      0      0      0     0 |  56557
15 CAL  | 0       0       0       0      0      0       0       249    0      0      0      0      0      0      13574  0      512    0      0      0      0      0     0 |  14335
16 STM  | 0       0       0       0      0      0       0       0      0      0      520    0      0      0      0      17922  0      0      0      0      0      0     0 |  18442
17 CHS  | 0       0       0       808    0      148     0       695    0      0      0      0      0      0      0      0      29622  0      0      0      0      0     0 |  31274
18 FAU  | 0       0       0       0      429    0       0       0      0      0      0      882    0      0      0      0      0      6811   0      0      0      0     0 |  8121
19 STA  | 451     0       0       0      0      0       0       0      0      0      0      0      0      0      0      0      0      0      25931  0      903    595   0 |  27880
20 CL/JF| 0       0       0       0      0      0       0       0      0      0      0      0      0      0      0      0      0      0      0      15932  0      0     0 |  15932
21 SP/FB| 0       0       0       0      0      0       0       0      0      0      0      0      0      0      0      0      0      0      0      0      24374  0     0 |  24374
22 KGEO | 0       0       0       0      0      0       0       0      0      0      0      0      0      0      0      0      0      0      0      0      118    4270  0 |  4388
23 EXTL | 0       0       0       0      0      0       0       0      0      0      0      0      0      0      0      0      0      0      0      0      0      0     0 |  0
=======================================================================================================================================================================================
 TOTAL  33172           144231         3484           5838           40000          32985          41170          14384          30135          26184          26072         0 |
                29463           100565         23594          145280         62209          24442          54787          21679          6811           15932          4865            887283
```

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL    MODE: Auto Person

        DESTINATION
ORIGIN |   1      2       3        4        5      6       7       8       9       10      11      12      13      14      15      16      17      18      19      20      21      22    23 |  TOTAL
=============================================================================================================================================================================================================
 1 DC CR| 55312   45845   12471    13571    1320   12628   7627    15521   3563    1926    0       0       707     3041    0       714     1583    0       735     0       0       164   0 |  176729
 2 DC NC| 138030  396103  115798   71937    4299   22112   7706    37498   4674    1302    922     322     1375    6321    846     0       1815    0       420     0       624     0     0 |  812104
 3 MTG  | 62406   1177472 117601   85943    5098   15969   4559    59134   8607    3698    19896   3096    24522   16938   307     0       1517    0       1231    838     1860    0     0 |  2550967
 4 PG   | 71301   127274  1565221  322119   2136   17672   10432   38039   4005    1516    517     1964    30862   70810   8590    515     41846   0       0       0       0       197   0 |  1906318
 5 ARLCR| 1528    2248    1362     0        3036   7097    1805    8079    0       2833    0       0       210     225     0       0       0       1800    0       0       0       0     0 |  30878
 6 ARNCR| 40245   20749   10928    3433     16659  237192  30505   92762   3114    2227    93      0       556     914     108     0       667     102     1496    0       0       0     0 |  461594
 7 ALX  | 21892   11341   4659     5473     4530   28844   177011  76791   1695    2782    382     0       706     1837    0       375     655     266     298     0       0       0     0 |  339538
 8 FFX  | 87014   45888   46796    16283    23902  109606  1006322 443910  81609   87501   1591    0       2851    1504    772     236     1857    2366    4633    2067    2354    132   0 |  3063502
 9 LDN  | 9605    3359    8115     1242     1174   7369    2281    140417  511367  7619    2055    99      0       853     0       0       0       2691    549     3763    0       0     0 |  702556
10 PW   | 7814    10349   6319     3448     5514   16276   15789   177073  11746   868746  0       0       0       0       0       689     463     9639    9649    0       2378    361   0 |  1146253
11 FRD  | 1452    3995    53394    4478     491    260     819     2840    4421    595     539707  25851   10578   4610    0       0       0       0       0       2296    0       0     0 |  655786
12 CAR  | 748     670     12212    4481     0      0       165     265     99      0       9904    356606  20875   9678    0       0       0       0       0       0       0       0     0 |  415703
13 HOW  | 6558    4776    32551    42706    260    1068    1466    3291    276     0       2286    7940    551021  56920   0       0       667     570     0       325     0       0     0 |  712681
14 AAR  | 12075   16844   28283    99600    1732   3585    2134    7614    0       769     765     4635    642731  157771  6463    424     1480    0       451     144     0       0     0 |  1409043
15 CAL  | 4767    2422    1851     14480    239    1447    255     7373    0       362     0       0       1555    14819   179021  14168   6579    0       0       0       0       0     0 |  249337
16 STM  | 2260    3201    459      6756     0      781     375     1302    0       0       0       0       0       2866    14561   267704  19583   0       459     0       0       0     0 |  320308
17 CHS  | 8080    8923    3451     41918    1752   3659    5445    6601    251     0       362     145     4165    4760    12692   296424  0       0       0       289     926     0     0 |  399845
18 FAU  | 1083    577     900      0        215    883     431     12836   7129    15381   0       0       0       0       0       0       0       93574   927     2646    214     179   0 |  136977
19 STA  | 3345    2928    1582     131      1633   1789    1285    13066   0       23789   130     0       0       394     0       0       0       118     178412  536     64798   1129  0 |  295064
20 CL/JF| 534     0       719      0        0      0       0       4431    13506   0       6239    0       236     0       0       0       393     0       99074   541     297     0     0 |  126047
21 SP/FB| 1955    1477    1084     1011     2269   1135    546     2038    0       10150   0       0       0       0       0       617     0       258     35632   2856    261421  6761  0 |  329210
22 KGEO | 573     328     0        0        0      0       0       564     0       1326    0       0       0       489     0       441     1598    423     4200    0       8002    31516 0 |  49459
23 EXTL | 0       0       0        0        0      0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0     0 |  0
=============================================================================================================================================================================================================
 TOTAL  538577          2617055           76259          371268          656062          584487          710473          215428          376734          240892          342480         0 |
                827045           1739663          489371          3151447         1032600         400875          1354155         298575          110400          114544         41661          16290052
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL   MODE: Total Motorized Person (Auto Person & Transit)

         DESTINATION
ORIGIN |   1       2       3       4      5      6      7       8       9      10     11     12     13      14      15      16      17      18     19     20     21     22   23 |  TOTAL
===================================================================================================================================================================================
 1 DC CR|  97187  67884  27048  22866  3475  21905  10560   21191   4087   3159    234      0   1239    4033    495    714   3097    215    988      0    308    164    0 | 290848
 2 DC NC| 272992 482397 128558  90550  7070  28345  10728   41992   5596   1699    922    322   1375    6321   1085      0   1815      0    688      0    624      0    0 |1083078
 3 MTG  | 155740 133302 2166253 91188  8421  21029   6993   59522   8607   3698  19896   3096  24522   16938    307      0   1517      0   1231   1121   1860      0    0 |2725241
 4 PG   | 137768 145683 1664711 357588 5253  21473  11391   40466   4005   2151    517   1964  31470   70810   8590    515  42193      0      0      0      0    197    0 |2048505
 5 ARLCR|   7492   3156   1983   1269  3504  10248   2164    8935    256   2981      0      0    210     225      0      0      0   1800      0      0      0      0    0 |  44222
 6 ARNCR|  80906  24897  13456   5001 20986 248371  31750   96881   3318   2227     93      0    556     914    108      0    667    102   1600      0      0      0    0 | 531832
 7 ALX  |  42590  14745   4869   5473  6902  32584 181558   78263   1695   2782    382      0    706    1837      0    375    655    266    298      0      0      0    0 | 375980
 8 FFX  | 155996  53372  49469  17729 33868 127224 1041652 453341  81846  87501   1591      0   2851    1504    772    236   1857   2366   4633   2067   2354    132    0 |3184873
 9 LDN  |  14171   4103   8314   1242  1430   7819   2799  140417 511886   7619   2055     99      0     853      0      0      0   2691    549   3763      0      0    0 | 709810
10 PW   |  20618  14747   6319   3865  7106  20764  16169  178712  11746 869132      0      0      0       0      0    689    463   9639   9649      0   2378    361    0 |1172356
11 FRD  |   5430   4952  56328   4925   491    620    819    2840   4421    595 541317  25851  10578    4610      0      0      0      0      0   2296      0      0    0 | 666073
12 CAR  |   1299   1087  12212   4481   417      0    165     265     99      0   9904 357245  20875    9678      0      0      0      0      0      0      0      0    0 | 417727
13 HOW  |  16082   6515  32826  42966   441   2426   2003    3291    276      0   2286   7940 551591   56920      0      0    667    570      0    325      0      0    0 | 727125
14 AAR  |  30010  18927  30289  99600  3728   4064   2206    8759      0    769    765   4635 642731 1162357   6463    424   1480      0    451    144      0      0    0 |1439345
15 CAL  |   7886   2422   1851  14480   239   1814    255    7373      0    362      0      0   1555   14819 179021  14168   6579      0      0      0      0      0    0 | 252821
16 STM  |   2720   3201    459   7795     0    781    375    1302      0      0      0      0      0    2866  14561 268231  19583      0    459      0      0      0    0 | 322332
17 CHS  |  12043   8923   3748  42266  2016   3659   5445    6601    251      0      0    362    145    4165   4760  12692 296836      0      0      0    289    926    0 | 405128
18 FAU  |   2983    577    900      0   215    883    431   12836   7129  15381      0      0      0       0      0      0      0  93574    927   2646    214    179    0 | 138876
19 STA  |   5576   3659   1582    131  1895   5359   1285   13572      0  23789    130      0      0     394      0      0      0    118 178412    536  65260   1129    0 | 302827
20 CL/JF|   2298      0   1825      0     0      0      0    4431  13506     79   6239      0    236       0      0      0      0    393      0  99074    541    297    0 | 128917
21 SP/FB|   4371   1477   1084   1011  2687   1135   1639    3007      0  10150      0      0      0       0      0    617      0    258  35632   2856 261909   6761    0 | 334593
22 KGEO |    974    328      0      0     0      0      0     564      0   1570      0      0      0     489      0    441   1598    423   4200      0   8002  31516    0 |  50105
23 EXTL |      0      0      0      0     0      0      0       0      0      0      0      0      0       0      0      0      0      0      0      0      0      0    0 |      0
===================================================================================================================================================================================
 TOTAL  1077129    2715844   110141      392899      658723      586331      712184      216162      379007      241517      343740        0 |
                996355    1814424    560504     3184563     1035642      401513     1359732      299101      110615      114827    41661    17352615
```

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL   MODE: Transit Percentage

         DESTINATION
ORIGIN |   1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22    23 |  TOTAL
===================================================================================================================================================================================
 1 DC CR|  43.1   32.5   53.9   40.7   62.0   42.4   27.8   26.8   12.8   39.0  100.0      0   43.0   24.6  100.0      0   48.9  100.0   25.6      0  100.0      0    0 |  39.2
 2 DC NC|  49.4   17.9    9.9   20.6   39.2   22.0   28.2   10.7   16.5   23.3      0      0      0   22.0      0      0      0   39.0      0      0      0      0    0 |  25.0
 3 MTG  |  59.9   11.7    2.2    5.8   39.5   24.1   34.8    0.7      0      0      0      0      0      0      0      0      0      0      0   25.3      0      0    0 |   6.4
 4 PG   |  48.2   12.6    6.0    2.6   59.3   17.7    8.4    6.0      0   29.5      0      0    1.9      0      0      0    0.8      0      0      0      0      0    0 |   6.9
 5 ARLCR|  79.6   28.8   31.3   48.4   13.4   30.7   16.6    9.6  100.0    4.9      0      0      0      0      0      0      0      0      0      0      0      0    0 |  30.2
 6 ARNCR|  50.3   16.7   18.8   31.3   20.6    4.5    3.9    4.3    6.1      0      0      0      0      0      0      0      0    6.5      0      0      0      0    0 |  13.2
 7 ALX  |  48.6   23.1    4.3      0   34.4   11.5    2.5    1.9      0      0      0      0      0      0      0      0      0      0      0      0      0      0    0 |   9.7
 8 FFX  |  44.2   14.0    5.4    8.2   29.4   13.8    3.4    0.4    0.3      0      0      0      0      0      0      0      0      0      0      0      0      0    0 |   3.8
 9 LDN  |  32.2   18.1    2.4      0   17.9    5.8   18.5      0    0.1      0      0      0      0      0      0      0      0      0      0      0      0      0    0 |   1.0
10 PW   |  62.1   29.8      0   10.8   22.4   21.6    2.3    0.9      0    0.0      0      0      0      0      0      0      0      0      0      0      0      0    0 |   2.2
11 FRD  |  73.3   19.3    5.2    9.1      0   58.1      0      0      0      0    0.3      0      0      0      0      0      0      0      0      0      0      0    0 |   1.5
12 CAR  |  42.4   38.4      0      0  100.0      0      0      0      0      0      0    0.2      0      0      0      0      0      0      0      0      0      0    0 |   0.5
13 HOW  |  59.2   26.7    0.8    0.6   41.1   56.0   26.8      0      0      0      0      0    0.1      0      0      0      0      0      0      0      0      0    0 |   2.0
14 AAR  |  59.8   11.0    6.6      0   53.6   11.8    3.3   13.1      0      0      0      0      0    0.4      0      0      0      0      0      0      0      0    0 |   2.1
15 CAL  |  39.5      0      0      0      0   20.2      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0    0 |   1.4
16 STM  |  16.9      0      0   13.3      0      0      0      0      0      0      0      0      0      0      0    0.2      0      0      0      0      0      0    0 |   0.6
17 CHS  |  32.9      0    7.9    0.8   13.1      0      0      0      0      0      0      0      0      0      0      0    0.1      0      0      0      0      0    0 |   1.3
18 FAU  |  63.7      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0    0 |   1.4
19 STA  |  40.0   20.0      0      0   13.8   66.6      0    3.7      0      0      0      0      0      0      0      0      0      0      0      0    0.7      0    0 |   2.6
20 CL/JF|  76.8      0   60.6      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0    0 |   2.2
21 SP/FB|  55.3      0      0      0   15.5      0   66.7   32.2      0      0      0      0      0      0      0      0      0      0      0      0    0.2      0    0 |   1.6
22 KGEO |  41.2      0      0      0      0      0      0      0      0   15.6      0      0      0      0      0      0      0      0      0      0      0      0    0 |   1.3
23 EXTL |     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0    0 |      0
===================================================================================================================================================================================
 TOTAL    50.0       3.6       30.8        5.5        0.4        0.3        0.2        0.3        0.6        0.3        0.4      0 |
                17.0       4.1       12.7        1.0        0.3        0.2        0.4        0.2        0.2        0.2      0      6.1
```

Appendix A 2007/2008 Household Travel Survey: jurisdiction-to-jurisdiction trip summaries by purpose and mode

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL    MODE: Avg. Auto Occupancy

          DESTINATION
ORIGIN |    1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17     18     19     20     21     22     23  | TOTAL
=================================================================================================================================================================================
 1 DC CR|  1.28   1.32   1.13   1.10   1.52   1.18   1.19   1.22   1.47   2.45     0      0     1.85   1.16     0     1.58   1.44     0     5.61     0      0     1.00     0  | 1.26
 2 DC NC|  1.32   1.46   1.41   1.21   1.23   1.18   1.16   1.26   1.15   1.00     0     1.00   1.56   1.09   1.00     0     1.17     0     3.44     0     1.98     0      0  | 1.38
 3 MTG  |  1.12   1.30   1.42   1.19   1.22   1.04   1.00   1.15   1.12   2.01   1.30   1.20   1.28   1.14   1.00     0     1.87     0     1.32   1.00   3.00     0      0  | 1.38
 4 PG   |  1.16   1.29   1.35   1.45   1.00   1.29   1.51   1.09   1.16   1.00   1.34   1.25   1.39   1.32   1.35   1.80   1.50     0      0      0      0     1.00     0  | 1.40
 5 ARLCR|  1.56   1.00   1.00   1.00   1.17   1.35   1.00   1.34     0     2.22     0      0     1.00   1.00     0      0      0      0      0      0      0      0      0  | 1.36
 6 ARNCR|  1.29   1.20   1.14   1.21   1.36   1.39   1.28   1.22   1.22   1.61   1.00     0     1.00   1.29   1.00     0     1.00   1.00   1.25     0      0      0      0  | 1.32
 7 ALX  |  1.15   1.28   1.15   1.27   1.24   1.27   1.31   1.31   1.36   1.08   1.00     0     1.00   1.66     0      0     1.28   1.00   1.00     0      0      0      0  | 1.29
 8 FFX  |  1.16   1.21   1.12   1.01   1.14   1.23   1.31   1.42   1.28   1.33   1.00     0     1.00   1.10   1.00   1.00   1.00   1.00   1.25   1.47   1.05   1.00     0  | 1.37
 9 LDN  |  1.18   1.00   1.03   1.00   1.77   1.21   1.00   1.24   1.53   1.26   2.33  99.39     0     1.00     0      0      0     1.00   1.36   1.71     0      0      0  | 1.43
10 PW   |  1.32   1.09   1.30   1.44   1.40   1.30   1.43   1.27   1.10   1.53     0      0      0      0      0     1.17   1.00   1.41   1.53     0     1.26   1.37     0  | 1.46
11 FRD  |  1.00   1.06   1.28   1.06   1.00   1.00   1.00   1.00   1.08   1.00   1.37   1.57   1.24   1.58     0      0      0      0      0     1.17     0      0      0  | 1.36
12 CAR  |  1.28   2.31   1.11   1.21     0      0     1.00   1.00  99.39     0     1.49   1.50   1.19   1.19     0      0      0      0      0      0      0      0      0  | 1.46
13 HOW  |  1.18   1.03   1.20   1.19   1.00   1.35   1.00   1.00   1.00     0     1.16   1.37   1.46   1.18     0     1.00   1.00     0     1.00     0      0      0      0  | 1.39
14 AAR  |  1.17   1.39   1.49   1.35   1.00   1.00   1.00   1.22     0     1.00   1.00   1.42   1.38   1.40   1.11   1.00   1.00     0     1.00   1.00     0      0      0  | 1.39
15 CAL  |  1.12   1.12   1.68   1.20   1.00   2.00   1.00   1.42     0     1.00     0      0     1.00   1.27   1.50   1.12   1.60     0      0      0      0      0      0  | 1.42
16 STM  |  1.13   1.00   1.00   1.13     0     1.00     0     1.00     0      0      0      0      0     3.43   1.49   1.34   1.36     0     1.00     0      0      0      0  | 1.34
17 CHS  |  1.14   1.16   1.39   1.30   1.00   1.06   1.53   1.11   1.00     0      0     2.00   1.00   1.08   1.07   1.47   1.41     0      0      0     2.00   1.19     0  | 1.36
18 FAU  |  1.34   1.00   1.00     0     1.00   1.00   1.00   1.02   1.52   1.17     0      0      0      0      0      0      0     1.39   1.61   2.00   1.00   1.00     0  | 1.32
19 STA  |  2.04   1.17   1.23   1.00  12.46   1.46   1.00   1.21     0     1.14   1.00     0      0     1.00     0      0      0      0     1.58   1.00   1.61   1.00     0  | 1.51
20 CL/JF|  1.00     0     1.00     0      0      0      0     1.05   1.36   1.00   1.10     0     1.00     0      0      0      0     1.00     0     1.39   1.00   1.00     0  | 1.34
21 SP/FB|  1.00   1.26   1.00   1.00   1.00   1.00     0     1.00     0     1.43     0      0      0      0      0     2.00     0     1.00   1.39   1.28   1.45   1.14     0  | 1.42
22 KGEO |  1.00   1.00     0      0      0      0      0     1.00     0     1.00     0      0      0     1.00     0     1.29   1.00   1.00   1.34     0     1.44   1.28     0  | 1.27
23 EXTL |    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0  |   0
=================================================================================================================================================================================
TOTAL     1.22          1.40          1.23          1.30          1.46          1.37          1.42          1.46          1.41          1.54          1.47           0  |
                 1.35          1.39          1.30          1.37          1.48          1.50          1.38          1.33          1.36          1.40          1.24          1.39
```

```
2007/08 HTS - Internal (I-I) Trips by Purpose and Mode
Purpose: ALL    MODE: Total Modeled Person (Motorized & NonMotorized)

          DESTINATION
ORIGIN |    1        2        3        4        5        6        7        8        9       10       11       12       13       14       15       16       17       18       19       20       21       22      23  | TOTAL
===========================================================================================================================================================================================================================
 1 DC CR| 440923   82839    27988    23057     3685    21905    10743    21191     4087     3159      234       0      1239     4033      495      714     3097      215      988       0       308      164       0 |  651065
 2 DC NC| 309276  735965   132488    98170     7867    28528    10728    42178     5596     1699      922      322     1375     6321     1085       0      1815       0       688       0       624       0        0 | 1385647
 3 MTG  | 158864 1391292  429280    91188     8421    21029     6993    59522     8607     3698    19896     3096    24522    16938      307       0      1517       0      1231     1121     1860       0        0 | 2997218
 4 PG   | 138327  145973 1666901  467084     5253    21473    11391    40466     4005     2151      517     1964    31470    70810     8590      515    42193       0        0       0        0       197       0 | 2159071
 5 ARLCR|   8325    3538     1269    13505     1983    12503     2164     8935      256     2981       0        0       210      225       0        0        0      1800       0       0        0        0        0 |   57694
 6 ARNCR|  82563   25399    13456     5001    25625   353841    33052    97559     3318     2227       93       0       556      914      108       0       667      102     1600       0        0        0        0 |  646081
 7 ALX  |  43987   14928     4869     5473     7322    33191   246180    79049     1695     2782      382       0       706     1837       0       375      655      266      298       0        0        0        0 |  443995
 8 FFX  | 157404   53704    49469    17729    33868   128573 1046402   597773    81846    87501     1591       0      2851     1504      772      236     1857     2366     4633     2067     2354      132       0 | 3332869
 9 LDN  |  14171    4103     8314     1242     1430     7819     2799   140608   539694     7619     2055       99       0       853       0        0        0      2691      549     3763       0        0        0 |  737809
10 PW   |  20618   14747     6319     3865     7106    20764    16169   178712    11746   909094       0        0        0        0        0       689      463     9639     9649       0      2378      361       0 | 1212319
11 FRD  |   5430    4952    56328     4925      491      620      819     2840     4421      595   577409    25851    10578     4610       0        0        0        0        0      2296       0        0        0 |  702165
12 CAR  |   1299    1087    12212     4481      417       0       165      265       99       0      9904   369174    20875     9678       0        0        0        0        0       0        0        0        0 |  429656
13 HOW  |  16082    6515    33151    42966      441     2426     2003     3291      276       0      2286     7940   583598    56920       0        0       667      570       0       325       0        0        0 |  759457
14 AAR  |  30010   18927    30289    99600     3728     4064     2206     8759       0       769      765     4635   642731   212244     6463      424     1480       0       451      144       0        0        0 | 1489232
15 CAL  |   7886    2422     1851    14480      239     1814      255     7373       0       362       0        0      1555    14819   186178    14168     6579       0        0       0        0        0        0 |  259979
16 STM  |   2720    3201      459     7795       0       781      375     1302       0        0        0        0        0      2866    14561   271712    19583       0       459       0        0        0        0 |  325814
17 CHS  |  12043    8923     3748    42266     2016     3659     5445     6601      251       0       362      145     4165     4760    12692   307224       0        0        0       289      926       0 |  415516
18 FAU  |   2983     577      900       0       215      883      431    12836     7129    15381       0        0        0        0        0        0        0     94648      927     2646      214      179       0 |  139951
19 STA  |   5576    3659     1582      131     1895     5359     1285    13572       0     23789      130       0        0       394       0        0        0       349   179916      536    65260     1129       0 |  304562
20 CL/JF|   2298       0      1825       0       0        0        0      4431    13506       79     6239       0       236       0        0        0        0       393       0    103532      541      297       0 |  133375
21 SP/FB|   4371    1477     1084     1011     2687     1135     1639     3007       0     10150       0        0        0        0        0       617       0       258    35632     2856   268390     6761       0 |  341073
22 KGEO |    974     328        0        0       0        0        0       564       0      1570       0        0        0       489       0       441     1598      423     4200       0      8002    32132       0 |   50722
23 EXTL |     0        0        0        0       0        0        0        0        0        0        0        0        0        0        0        0        0        0        0       0        0        0        0 |      0
===========================================================================================================================================================================================================================
TOTAL   1466128        2984286          126210           459482           686531           622423           744190           223319           389394           243021           350221            0 |
              1272396          1931731           670368          3330836          1075605           413443          1409620           302583           111921           119286            42278       18975270
```

A-33

Appendix B Weighted time of day summaries by purpose, mode, and direction

(Trips summarized by 30-minute increments by begin time, end time, and time in motion)

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBW	Transit	0:00	0	0	0	0	0	0	0	0	0
HBW	Transit	0:30	0	205	205	0	601	601	0	205	205
HBW	Transit	1:00	0	0	0	0	0	0	0	205	205
HBW	Transit	1:30	0	0	0	0	205	205	0	205	205
HBW	Transit	2:00	0	210	210	0	0	0	0	210	210
HBW	Transit	2:30	0	0	0	0	210	210	0	210	210
HBW	Transit	3:00	184	0	184	0	0	0	184	0	184
HBW	Transit	3:30	352	0	352	0	0	0	536	0	536
HBW	Transit	4:00	648	0	648	184	0	184	1184	0	1184
HBW	Transit	4:30	6592	0	6592	0	0	0	7592	0	7592
HBW	Transit	5:00	10709	562	11270	0	0	0	18301	562	18863
HBW	Transit	5:30	20928	0	20928	3151	0	3151	39229	562	39790
HBW	Transit	6:00	33805	232	34038	12549	562	13110	69884	794	70678
HBW	Transit	6:30	35665	0	35665	19093	0	19093	93000	232	93232
HBW	Transit	7:00	46385	0	46385	30317	0	30317	120292	232	120524
HBW	Transit	7:30	48044	0	48044	43682	232	43914	138019	232	138251
HBW	Transit	8:00	40264	0	40264	46603	0	46603	134601	0	134601
HBW	Transit	8:30	30733	0	30733	55294	0	55294	118730	0	118730
HBW	Transit	9:00	12807	0	12807	48959	0	48959	76243	0	76243
HBW	Transit	9:30	6276	215	6491	19800	0	19800	33560	215	33775
HBW	Transit	10:00	2679	104	2783	12349	0	12349	16439	319	16758
HBW	Transit	10:30	1028	191	1219	3298	510	3807	5118	510	5627
HBW	Transit	11:00	1395	133	1528	905	0	905	3215	133	3348
HBW	Transit	11:30	570	413	983	1664	205	1868	2880	546	3426
HBW	Transit	12:00	714	600	1314	524	238	762	1930	942	2871
HBW	Transit	12:30	1250	324	1574	770	437	1206	2656	1029	3684
HBW	Transit	13:00	698	2261	2958	762	399	1161	2584	2853	5436
HBW	Transit	13:30	518	1058	1576	1014	899	1912	2340	3512	5851
HBW	Transit	14:00	675	2060	2735	611	1518	2129	2002	4672	6674
HBW	Transit	14:30	501	4585	5086	1020	2394	3415	1891	7739	9630
HBW	Transit	15:00	575	11098	11674	871	1862	2733	1446	16443	17889
HBW	Transit	15:30	0	17485	17485	226	4735	4961	575	32066	32641
HBW	Transit	16:00	0	26194	26194	349	9022	9371	349	53525	53874
HBW	Transit	16:30	654	31124	31778	0	14301	14301	654	75628	76281
HBW	Transit	17:00	562	54709	55271	92	23521	23613	1216	116036	117252
HBW	Transit	17:30	109	39279	39388	0	33995	33995	1233	131795	133027
HBW	Transit	18:00	273	31673	31946	1123	56155	57279	1506	129472	130978
HBW	Transit	18:30	0	19694	19694	383	40791	41174	383	93011	93393
HBW	Transit	19:00	0	7708	7708	0	32198	32198	0	59927	59927
HBW	Transit	19:30	951	5161	6112	0	20279	20279	951	32890	33841
HBW	Transit	20:00	232	2420	2653	562	8065	8627	1183	15031	16215
HBW	Transit	20:30	168	2127	2295	0	4924	4924	789	9093	9883
HBW	Transit	21:00	0	2425	2425	389	2533	2923	789	6594	7384
HBW	Transit	21:30	0	441	441	400	2798	3198	400	4502	4902
HBW	Transit	22:00	0	1418	1418	0	441	441	0	3122	3122
HBW	Transit	22:30	0	585	585	0	1802	1802	0	3267	3267
HBW	Transit	23:00	0	210	210	0	1236	1236	0	1675	1675
HBW	Transit	23:30	0	601	601	0	439	439	0	1040	1040
HBW	Auto Driver	0:00	0	2922	2922	0	4997	4997	0	2922	2922
HBW	Auto Driver	0:30	0	4978	4978	0	1663	1663	0	6211	6211
HBW	Auto Driver	1:00	352	2435	2786	0	3434	3434	352	7169	7521
HBW	Auto Driver	1:30	0	3269	3269	352	5147	5498	352	7004	7356
HBW	Auto Driver	2:00	0	2461	2461	0	2929	2929	0	4318	4318
HBW	Auto Driver	2:30	0	756	756	0	2145	2145	0	2145	2145
HBW	Auto Driver	3:00	3296	0	3296	512	0	512	3296	0	3296
HBW	Auto Driver	3:30	3574	416	3990	2337	136	2472	6358	416	6774
HBW	Auto Driver	4:00	11020	1039	12059	3572	335	3906	15041	1320	16361
HBW	Auto Driver	4:30	23806	547	24352	9057	1085	10142	35275	1532	36807
HBW	Auto Driver	5:00	48668	1769	50436	18383	1050	19433	74886	2216	77101
HBW	Auto Driver	5:30	79329	1414	80743	46816	367	47182	135831	2580	138411
HBW	Auto Driver	6:00	117757	2358	120116	71241	2700	73942	206772	4572	211344
HBW	Auto Driver	6:30	195950	2771	198721	119101	1673	120774	331481	4643	336124
HBW	Auto Driver	7:00	222947	5025	227973	188131	2500	190631	435327	7995	443322
HBW	Auto Driver	7:30	217169	2475	219643	210077	4649	214726	464365	7969	472334
HBW	Auto Driver	8:00	191619	4155	195774	227393	3359	230752	445907	7476	453382
HBW	Auto Driver	8:30	127034	2007	129041	202539	2734	205273	345547	6124	351671
HBW	Auto Driver	9:00	82643	3330	85973	150668	5084	155752	225651	6720	232372
HBW	Auto Driver	9:30	41795	2485	44280	72429	3495	75925	116778	4121	120899
HBW	Auto Driver	10:00	32245	2670	34915	45412	1849	47261	76594	3296	79890
HBW	Auto Driver	10:30	14996	2430	17426	30149	2378	32527	46178	3877	50054
HBW	Auto Driver	11:00	14513	6188	20701	15571	4546	20117	30541	7688	38229
HBW	Auto Driver	11:30	10638	10074	20712	15145	9116	24261	25608	13216	38824
HBW	Auto Driver	12:00	11871	18362	30234	13195	15294	28489	22334	22462	44796
HBW	Auto Driver	12:30	16437	13048	29485	10605	12808	23413	25576	20216	45791
HBW	Auto Driver	13:00	13663	19303	32967	18584	16489	35073	28635	26711	55346
HBW	Auto Driver	13:30	16650	12305	28955	14970	11468	26438	26700	22527	49227
HBW	Auto Driver	14:00	10889	27747	38636	12142	17727	29869	22619	38806	61425
HBW	Auto Driver	14:30	11958	32206	44164	13519	21477	34997	22435	53285	75720
HBW	Auto Driver	15:00	10793	73167	83960	10673	35709	46382	19709	104975	124684
HBW	Auto Driver	15:30	9492	84635	94128	11074	59872	70945	18528	153901	172430
HBW	Auto Driver	16:00	10000	133774	143775	8076	96212	104288	17455	227804	245259

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBW	Auto Driver	16:30	9488	136744	146233	11315	102851	114165	18867	268336	287204
HBW	Auto Driver	17:00	8761	189207	197969	8970	151205	160175	16314	354693	371007
HBW	Auto Driver	17:30	7463	123034	130497	5849	151146	156995	14807	326522	341329
HBW	Auto Driver	18:00	7311	114979	122290	7363	149060	156424	16269	290355	306624
HBW	Auto Driver	18:30	8960	62793	71754	11326	109550	120877	17866	204088	221954
HBW	Auto Driver	19:00	3726	46328	50054	7561	84766	92327	10266	140866	151131
HBW	Auto Driver	19:30	2094	32101	34195	4161	51472	55633	4799	88201	93000
HBW	Auto Driver	20:00	629	29915	30544	754	39324	40078	1267	66644	67911
HBW	Auto Driver	20:30	1451	16598	18050	404	27269	27673	1964	43919	45883
HBW	Auto Driver	21:00	2175	26555	28730	1230	25529	26759	3735	43204	46940
HBW	Auto Driver	21:30	3910	14735	18645	3194	18940	22134	6415	32410	38825
HBW	Auto Driver	22:00	2185	13973	16158	3262	14743	18004	5406	27443	32850
HBW	Auto Driver	22:30	1643	10075	11717	2108	14003	16111	3787	22775	26563
HBW	Auto Driver	23:00	503	9658	10162	1738	10478	12216	2183	18431	20614
HBW	Auto Driver	23:30	328	6750	7078	773	11209	11981	773	14161	14933
HBW	Auto Pass.	0:00	0	0	0	0	0	0	0	0	0
HBW	Auto Pass.	0:30	0	0	0	0	0	0	0	0	0
HBW	Auto Pass.	1:00	0	0	0	0	0	0	0	0	0
HBW	Auto Pass.	1:30	0	195	195	0	0	0	0	195	195
HBW	Auto Pass.	2:00	0	473	473	0	667	667	0	667	667
HBW	Auto Pass.	2:30	0	0	0	0	0	0	0	0	0
HBW	Auto Pass.	3:00	0	0	0	0	0	0	0	0	0
HBW	Auto Pass.	3:30	289	0	289	0	0	0	289	0	289
HBW	Auto Pass.	4:00	92	0	92	382	0	382	382	0	382
HBW	Auto Pass.	4:30	1340	0	1340	326	0	326	1340	0	1340
HBW	Auto Pass.	5:00	3020	0	3020	363	0	363	4033	0	4033
HBW	Auto Pass.	5:30	4375	0	4375	2892	0	2892	8045	0	8045
HBW	Auto Pass.	6:00	7344	0	7344	3305	0	3305	12498	0	12498
HBW	Auto Pass.	6:30	13066	0	13066	7984	0	7984	22259	0	22259
HBW	Auto Pass.	7:00	11021	116	11137	11779	0	11779	25295	116	25412
HBW	Auto Pass.	7:30	13987	245	14233	12224	0	12224	27504	362	27866
HBW	Auto Pass.	8:00	8383	0	8383	15995	362	16357	23662	362	24024
HBW	Auto Pass.	8:30	5442	0	5442	7552	0	7552	13109	0	13109
HBW	Auto Pass.	9:00	6286	116	6403	6503	0	6503	11842	116	11959
HBW	Auto Pass.	9:30	4602	181	4783	5395	0	5395	9942	298	10239
HBW	Auto Pass.	10:00	992	176	1168	3067	181	3249	5539	474	6012
HBW	Auto Pass.	10:30	1239	0	1239	222	293	515	3710	293	4003
HBW	Auto Pass.	11:00	1585	187	1771	1588	0	1588	5073	187	5260
HBW	Auto Pass.	11:30	292	184	476	1795	370	2165	3777	370	4147
HBW	Auto Pass.	12:00	1360	1004	2365	876	448	1324	3342	1004	4346
HBW	Auto Pass.	12:30	1029	354	1383	1284	812	2095	3495	911	4406
HBW	Auto Pass.	13:00	552	1242	1794	229	402	632	2763	1342	4105
HBW	Auto Pass.	13:30	116	1300	1417	552	1105	1657	2650	2239	4890
HBW	Auto Pass.	14:00	0	2703	2703	0	1259	1259	2098	3838	5936
HBW	Auto Pass.	14:30	1312	1324	2635	1160	2497	3657	3410	3903	7312
HBW	Auto Pass.	15:00	146	3866	4012	413	2288	2702	2395	5272	7668
HBW	Auto Pass.	15:30	1166	4376	5542	1843	2668	4511	3148	7360	10508
HBW	Auto Pass.	16:00	533	6963	7496	1169	2542	3710	1838	11655	13493
HBW	Auto Pass.	16:30	1090	6990	8079	580	6580	7160	1759	16103	17862
HBW	Auto Pass.	17:00	1122	10614	11737	510	11132	11642	2302	20137	22439
HBW	Auto Pass.	17:30	434	7081	7515	1673	6352	8025	2226	16086	18312
HBW	Auto Pass.	18:00	230	6064	6294	116	9443	9560	783	15798	16581
HBW	Auto Pass.	18:30	0	2415	2415	666	4989	5655	666	8769	9436
HBW	Auto Pass.	19:00	724	1867	2591	527	3867	4394	724	5647	6371
HBW	Auto Pass.	19:30	0	1459	1459	197	2104	2301	197	3240	3437
HBW	Auto Pass.	20:00	0	1862	1862	0	2158	2158	0	2998	2998
HBW	Auto Pass.	20:30	99	2993	3092	99	2501	2601	99	3833	3933
HBW	Auto Pass.	21:00	165	2625	2790	0	2992	2992	165	3957	4122
HBW	Auto Pass.	21:30	473	1974	2446	0	1121	1121	638	2938	3576
HBW	Auto Pass.	22:00	0	2181	2181	638	2490	3128	638	3998	4636
HBW	Auto Pass.	22:30	0	188	188	0	1696	1696	0	1696	1696
HBW	Auto Pass.	23:00	0	1911	1911	0	1252	1252	0	1911	1911
HBW	Auto Pass.	23:30	0	206	206	0	865	865	0	865	865
HBW	Auto Person	0:00	0	2922	2922	0	4997	4997	0	2922	2922
HBW	Auto Person	0:30	0	4978	4978	0	1663	1663	0	6211	6211
HBW	Auto Person	1:00	352	2435	2786	0	3434	3434	352	7169	7521
HBW	Auto Person	1:30	0	3463	3463	352	5147	5498	352	7198	7550
HBW	Auto Person	2:00	0	2933	2933	0	3596	3596	0	4985	4985
HBW	Auto Person	2:30	0	756	756	0	2145	2145	0	2145	2145
HBW	Auto Person	3:00	3296	0	3296	512	0	512	3296	0	3296
HBW	Auto Person	3:30	3863	416	4280	2337	136	2472	6647	416	7063
HBW	Auto Person	4:00	11112	1039	12152	3953	335	4288	15423	1320	16743
HBW	Auto Person	4:30	25145	547	25692	9383	1085	10468	36615	1532	38147
HBW	Auto Person	5:00	51687	1769	53456	18746	1050	19796	78919	2216	81135
HBW	Auto Person	5:30	83704	1414	85118	49708	367	50075	143876	2580	146457
HBW	Auto Person	6:00	125101	2358	127460	74546	2700	77247	219270	4572	223842
HBW	Auto Person	6:30	209016	2771	211787	127085	1673	128758	353740	4643	358382
HBW	Auto Person	7:00	233968	5142	239110	199910	2500	202410	460623	8111	468734
HBW	Auto Person	7:30	231156	2720	233876	222301	4649	226950	491869	8331	500200
HBW	Auto Person	8:00	200002	4155	204157	243389	3721	247109	469569	7838	477407
HBW	Auto Person	8:30	132476	2007	134483	210092	2734	212826	358656	6124	364780

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBW	Auto Person	9:00	88930	3446	92376	157171	5084	162255	237494	6837	244330
HBW	Auto Person	9:30	46397	2666	49063	77825	3495	81320	126720	4419	131139
HBW	Auto Person	10:00	33237	2846	36083	48479	2030	50509	82133	3769	85902
HBW	Auto Person	10:30	16235	2430	18665	30371	2670	33041	49888	4169	54057
HBW	Auto Person	11:00	16098	6375	22473	17159	4546	21705	35615	7874	43489
HBW	Auto Person	11:30	10930	10258	21187	16941	9486	26426	29385	13586	42971
HBW	Auto Person	12:00	13231	19367	32598	14071	15742	29813	25676	23466	49142
HBW	Auto Person	12:30	17466	13402	30868	11888	13620	25508	29070	21127	50197
HBW	Auto Person	13:00	14215	20546	34761	18814	16891	35705	31398	28053	59450
HBW	Auto Person	13:30	16767	13605	30372	15522	12573	28095	29350	24767	54117
HBW	Auto Person	14:00	10889	30450	41339	12142	18986	31128	24717	42644	67361
HBW	Auto Person	14:30	13270	33530	46799	14679	23974	38653	25845	57188	83032
HBW	Auto Person	15:00	10939	77033	87973	11087	37997	49084	22104	110247	132351
HBW	Auto Person	15:30	10659	89011	99669	12917	62539	75456	21676	161261	182937
HBW	Auto Person	16:00	10533	140737	151270	9244	98754	107998	19292	239459	258751
HBW	Auto Person	16:30	10578	143734	154312	11894	109431	121325	20626	284439	305066
HBW	Auto Person	17:00	9884	199821	209705	9480	162337	171816	18616	374830	393446
HBW	Auto Person	17:30	7897	130114	138011	7522	157498	165019	17033	342608	359640
HBW	Auto Person	18:00	7541	121043	128584	7480	158503	165983	17052	306153	323205
HBW	Auto Person	18:30	8960	65208	74168	11993	114539	126532	18532	212857	231390
HBW	Auto Person	19:00	4450	48195	52645	8088	88632	96720	10990	146513	157503
HBW	Auto Person	19:30	2094	33560	35654	4358	53576	57934	4996	91441	96436
HBW	Auto Person	20:00	629	31777	32406	754	41481	42235	1267	69642	70909
HBW	Auto Person	20:30	1551	19591	21142	503	29771	30274	2064	47752	49815
HBW	Auto Person	21:00	2340	29180	31520	1230	28521	29752	3901	47161	51062
HBW	Auto Person	21:30	4383	16709	21092	3194	20061	23255	7053	35348	42402
HBW	Auto Person	22:00	2185	16154	18339	3900	17233	21133	6045	31442	37486
HBW	Auto Person	22:30	1643	10263	11905	2108	15699	17807	3787	24471	28259
HBW	Auto Person	23:00	503	11569	12073	1738	11731	13468	2183	20342	22525
HBW	Auto Person	23:30	328	6956	7284	773	12074	12846	773	15025	15798
HBW	Drive Alone	0:00	0	2922	2922	0	4997	4997	0	2922	2922
HBW	Drive Alone	0:30	0	4978	4978	0	1663	1663	0	6211	6211
HBW	Drive Alone	1:00	352	2240	2592	0	3434	3434	352	6975	7326
HBW	Drive Alone	1:30	0	3078	3078	352	4956	5307	352	6618	6970
HBW	Drive Alone	2:00	0	1988	1988	0	2261	2261	0	3651	3651
HBW	Drive Alone	2:30	0	756	756	0	2145	2145	0	2145	2145
HBW	Drive Alone	3:00	2609	0	2609	130	0	130	2609	0	2609
HBW	Drive Alone	3:30	3369	416	3785	2337	136	2472	5849	416	6265
HBW	Drive Alone	4:00	11020	1039	12059	3268	335	3602	14532	1320	15852
HBW	Drive Alone	4:30	22571	547	23117	8852	1085	9937	33835	1532	35367
HBW	Drive Alone	5:00	46367	1769	48136	17935	1050	18985	71350	2216	73566
HBW	Drive Alone	5:30	75542	1414	76956	45835	367	46202	128958	2580	131538
HBW	Drive Alone	6:00	110028	2358	112387	68271	2700	70971	193151	4572	197722
HBW	Drive Alone	6:30	187899	2771	190670	112545	1673	114219	312779	4643	317421
HBW	Drive Alone	7:00	212638	5025	217663	179641	2500	182141	412871	7995	420866
HBW	Drive Alone	7:30	206259	2475	208734	198152	4649	202801	439489	7969	447459
HBW	Drive Alone	8:00	184270	4155	188425	215808	3359	219167	425607	7476	433083
HBW	Drive Alone	8:30	123903	1727	125630	194696	2734	197430	333703	5843	339546
HBW	Drive Alone	9:00	78992	2862	81854	147257	4567	151825	217999	5972	223970
HBW	Drive Alone	9:30	39164	2485	41649	69997	3263	73260	109905	3889	113794
HBW	Drive Alone	10:00	31443	2254	33696	42579	1849	44428	71351	2880	74231
HBW	Drive Alone	10:30	13000	1954	14954	29122	1486	30609	41772	2986	44757
HBW	Drive Alone	11:00	14044	5956	20000	14222	4546	18768	26693	7455	34149
HBW	Drive Alone	11:30	10009	9956	19965	14000	9116	23116	22480	12865	35345
HBW	Drive Alone	12:00	11015	17088	28103	12530	14453	26984	19494	20838	40332
HBW	Drive Alone	12:30	15228	11618	26846	9300	11774	21075	22192	18002	40194
HBW	Drive Alone	13:00	12745	17526	30271	17823	14573	32396	25637	23754	49391
HBW	Drive Alone	13:30	16227	10978	27205	13914	10410	24324	24041	20159	44200
HBW	Drive Alone	14:00	10474	24635	35109	12142	15661	27804	20601	34384	54986
HBW	Drive Alone	14:30	11571	28256	39827	12755	19995	32750	20030	46979	67009
HBW	Drive Alone	15:00	10661	66322	76982	10218	32534	42752	17936	93306	111242
HBW	Drive Alone	15:30	8989	75495	84484	10141	54749	64890	16706	136267	152974
HBW	Drive Alone	16:00	9447	115437	124885	7740	87890	95630	16013	196955	212968
HBW	Drive Alone	16:30	8227	121083	129310	10205	90396	100601	16500	230148	246648
HBW	Drive Alone	17:00	7404	172616	180020	8265	135856	144121	13699	312368	326067
HBW	Drive Alone	17:30	6900	110772	117672	4448	136296	140744	12334	287284	299618
HBW	Drive Alone	18:00	6280	107542	113826	6292	131803	138095	14165	258535	272700
HBW	Drive Alone	18:30	7615	60481	68096	9770	99277	109048	15488	187213	202701
HBW	Drive Alone	19:00	2982	45126	48108	6691	79493	86183	8700	133062	141761
HBW	Drive Alone	19:30	2094	28593	30687	3466	49067	52532	4103	82162	86265
HBW	Drive Alone	20:00	629	28443	29072	754	36226	36980	1267	61539	62805
HBW	Drive Alone	20:30	1451	14797	16248	404	24898	25302	1964	40110	42074
HBW	Drive Alone	21:00	2175	25369	27544	1230	23866	25096	3735	40581	44316
HBW	Drive Alone	21:30	3438	13797	17235	3194	18681	21875	5943	30512	36455
HBW	Drive Alone	22:00	2185	13287	15472	2789	13473	16262	4934	25118	30051
HBW	Drive Alone	22:30	1643	9659	11301	2108	12948	15056	3787	21304	25091
HBW	Drive Alone	23:00	503	9024	9527	1738	9733	11471	2183	17379	19562
HBW	Drive Alone	23:30	328	6750	7078	773	10902	11675	773	13854	14626
HBW	Carpool	0:00	0	0	0	0	0	0	0	0	0
HBW	Carpool	0:30	0	0	0	0	0	0	0	0	0
HBW	Carpool	1:00	0	195	195	0	0	0	0	195	195

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBW	Carpool	1:30	0	385	385	0	191	191	0	580	580
HBW	Carpool	2:00	0	946	946	0	1335	1335	0	1335	1335
HBW	Carpool	2:30	0	0	0	0	0	0	0	0	0
HBW	Carpool	3:00	687	0	687	383	0	383	687	0	687
HBW	Carpool	3:30	494	0	494	0	0	0	798	0	798
HBW	Carpool	4:00	92	0	92	686	0	686	891	0	891
HBW	Carpool	4:30	2575	0	2575	531	0	531	2779	0	2779
HBW	Carpool	5:00	5321	0	5321	811	0	811	7569	0	7569
HBW	Carpool	5:30	8162	0	8162	3873	0	3873	14919	0	14919
HBW	Carpool	6:00	15073	0	15073	6276	0	6276	26120	0	26120
HBW	Carpool	6:30	21117	0	21117	14540	0	14540	40961	0	40961
HBW	Carpool	7:00	21330	116	21447	20270	0	20270	47752	116	47868
HBW	Carpool	7:30	24897	245	25142	24149	0	24149	52379	362	52741
HBW	Carpool	8:00	15732	0	15732	27581	362	27943	43962	362	44324
HBW	Carpool	8:30	8572	281	8853	15396	0	15396	24953	281	25234
HBW	Carpool	9:00	9938	584	10522	9914	516	10430	19495	865	20360
HBW	Carpool	9:30	7233	181	7414	7828	232	8060	16815	530	17345
HBW	Carpool	10:00	1795	592	2387	5900	181	6081	10782	889	11671
HBW	Carpool	10:30	3235	476	3710	1249	1184	2433	8117	1184	9300
HBW	Carpool	11:00	2053	419	2472	2937	0	2937	8921	419	9340
HBW	Carpool	11:30	921	302	1223	2940	370	3311	6905	720	7625
HBW	Carpool	12:00	2217	2279	4495	1541	1288	2829	6181	2629	8810
HBW	Carpool	12:30	2238	1784	4022	2588	1845	4433	6878	3124	10003
HBW	Carpool	13:00	1470	3019	4490	991	2318	3309	5761	4299	10059
HBW	Carpool	13:30	540	2627	3167	1608	2163	3771	5310	4607	9917
HBW	Carpool	14:00	415	5815	6229	0	3325	3325	4116	8259	12375
HBW	Carpool	14:30	1698	5274	6972	1924	3979	5904	5814	10209	16023
HBW	Carpool	15:00	279	10712	10990	869	5463	6332	4168	16941	21110
HBW	Carpool	15:30	1670	13515	15185	2776	7790	10566	4970	24994	29963
HBW	Carpool	16:00	1086	25300	26385	1504	10863	12367	3279	42503	45783
HBW	Carpool	16:30	2351	22651	25003	1689	19035	20724	4127	54291	58418
HBW	Carpool	17:00	2480	27205	29685	1215	26480	27695	4917	62462	67379
HBW	Carpool	17:30	997	19342	20339	3073	21202	24275	4699	55324	60023
HBW	Carpool	18:00	1261	13497	14758	1188	26700	27888	2887	47618	50505
HBW	Carpool	18:30	1346	4726	6072	2222	15262	17484	3044	25645	28689
HBW	Carpool	19:00	1468	3069	4537	1397	9140	10537	2290	13451	15741
HBW	Carpool	19:30	0	4967	4967	893	4509	5402	893	9278	10171
HBW	Carpool	20:00	0	3334	3334	0	5255	5255	0	8103	8103
HBW	Carpool	20:30	99	4794	4894	99	4873	4972	99	7642	7742
HBW	Carpool	21:00	165	3811	3976	0	4656	4656	165	6580	6746
HBW	Carpool	21:30	946	2911	3857	0	1380	1380	1111	4836	5947
HBW	Carpool	22:00	0	2867	2867	1111	3760	4871	1111	6324	7435
HBW	Carpool	22:30	0	604	604	0	2750	2750	0	3168	3168
HBW	Carpool	23:00	0	2545	2545	0	1997	1997	0	2963	2963
HBW	Carpool	23:30	0	206	206	0	1171	1171	0	1171	1171
HBW	All Persons	0:00	0	2922	2922	0	4997	4997	0	2922	2922
HBW	All Persons	0:30	0	5531	5531	0	2264	2264	0	6764	6764
HBW	All Persons	1:00	352	2672	3024	0	4019	4019	352	7960	8312
HBW	All Persons	1:30	0	3463	3463	352	5352	5704	352	7404	7756
HBW	All Persons	2:00	0	3143	3143	0	3596	3596	0	5195	5195
HBW	All Persons	2:30	0	962	962	0	2561	2561	0	2561	2561
HBW	All Persons	3:00	3480	0	3480	512	0	512	3480	0	3480
HBW	All Persons	3:30	4639	416	5056	2337	136	2472	7607	416	8023
HBW	All Persons	4:00	11760	1249	13010	4561	545	5105	17030	1530	18560
HBW	All Persons	4:30	32108	547	32655	9383	1085	10468	44577	1532	46109
HBW	All Persons	5:00	63313	2538	65851	19065	1258	20323	98507	2986	101492
HBW	All Persons	5:30	106237	1675	107912	54061	367	54428	185678	3403	189081
HBW	All Persons	6:00	163430	3041	166470	88620	3973	92593	295047	6077	301124
HBW	All Persons	6:30	251194	2981	254175	149562	1883	151445	457621	5085	462706
HBW	All Persons	7:00	284998	5142	290139	237736	2500	240235	593057	8343	601400
HBW	All Persons	7:30	287391	3295	290686	271732	5324	277056	642713	9138	651851
HBW	All Persons	8:00	250751	4259	255010	298828	3956	302785	621732	8073	629805
HBW	All Persons	8:30	176819	2007	178827	279567	2734	282301	499723	6124	505847
HBW	All Persons	9:00	109147	3446	112594	217574	5084	222658	329303	6837	336140
HBW	All Persons	9:30	54959	3434	58393	102203	4048	106251	166688	5187	171875
HBW	All Persons	10:00	38236	3104	41339	63110	2092	65202	102721	4242	106964
HBW	All Persons	10:30	18074	3702	21776	35632	4353	39985	57685	5852	63537
HBW	All Persons	11:00	18124	6765	24889	18946	4804	23750	40177	8265	48441
HBW	All Persons	11:30	11604	12350	23954	19070	10454	29524	32835	15811	48646
HBW	All Persons	12:00	15338	22278	37616	15436	18340	33776	29103	27635	56738
HBW	All Persons	12:30	20648	15018	35666	13268	15667	28935	34315	24312	58628
HBW	All Persons	13:00	15841	23612	39453	21738	18148	39886	36888	32257	69145
HBW	All Persons	13:30	18206	14663	32869	17617	13966	31583	33356	28772	62128
HBW	All Persons	14:00	12241	33437	45678	13632	20608	34240	27980	48244	76224
HBW	All Persons	14:30	13961	39613	53574	16083	27679	43762	28309	67249	95558
HBW	All Persons	15:00	12041	90584	102625	12447	41958	54405	24268	130153	154421
HBW	All Persons	15:30	11456	109202	120658	14064	68280	82344	23277	197397	220674
HBW	All Persons	16:00	11493	172499	183992	10184	112628	122812	20705	301617	322322
HBW	All Persons	16:30	11787	180190	191977	12576	129177	141752	22308	369179	391487
HBW	All Persons	17:00	10929	263493	274422	10403	192773	203176	20662	503495	524157
HBW	All Persons	17:30	8099	178167	186266	7614	197137	204751	18358	488889	507247

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBW	All Persons	18:00	8086	160636	168722	8875	224372	233247	18830	452388	471217
HBW	All Persons	18:30	8960	87373	96333	12375	161636	174011	18915	315388	334304
HBW	All Persons	19:00	4450	58992	63442	8088	124921	133009	10990	212745	223734
HBW	All Persons	19:30	3045	39562	42607	4358	75586	79944	5947	127386	133333
HBW	All Persons	20:00	1099	37162	38262	1316	51610	52926	2688	88962	91650
HBW	All Persons	20:30	1927	22344	24271	741	36890	37631	3299	59696	62995
HBW	All Persons	21:00	3155	31955	35111	2382	31710	34092	5713	54762	60474
HBW	All Persons	21:30	4383	17732	22115	3855	23357	27212	7714	40783	48498
HBW	All Persons	22:00	2185	18432	20617	3900	18968	22868	6045	35858	41903
HBW	All Persons	22:30	1849	12355	14204	2108	18535	20643	3994	29245	33239
HBW	All Persons	23:00	503	12263	12766	1944	13713	15657	2389	22974	25362
HBW	All Persons	23:30	490	8064	8554	935	13229	14164	935	16782	17717
HBS	Transit	0:00	0	0	0	0	0	0	0	0	0
HBS	Transit	0:30	0	215	215	0	0	0	0	215	215
HBS	Transit	1:00	0	0	0	0	0	0	0	215	215
HBS	Transit	1:30	0	0	0	0	215	215	0	215	215
HBS	Transit	2:00	0	0	0	0	0	0	0	0	0
HBS	Transit	2:30	0	0	0	0	0	0	0	0	0
HBS	Transit	3:00	0	0	0	0	0	0	0	0	0
HBS	Transit	3:30	0	0	0	0	0	0	0	0	0
HBS	Transit	4:00	0	0	0	0	0	0	0	0	0
HBS	Transit	4:30	80	0	80	0	0	0	80	0	80
HBS	Transit	5:00	109	0	109	0	0	0	189	0	189
HBS	Transit	5:30	582	0	582	0	0	0	771	0	771
HBS	Transit	6:00	541	0	541	80	0	80	1312	0	1312
HBS	Transit	6:30	1848	0	1848	776	0	776	3080	0	3080
HBS	Transit	7:00	1647	0	1647	1407	0	1407	3951	0	3951
HBS	Transit	7:30	2143	233	2376	1819	233	2052	4686	233	4919
HBS	Transit	8:00	2860	0	2860	1965	0	1965	5728	0	5728
HBS	Transit	8:30	2245	148	2392	3127	0	3127	6007	148	6155
HBS	Transit	9:00	1503	326	1830	2197	148	2344	4383	474	4857
HBS	Transit	9:30	1330	441	1771	2059	0	2059	3516	768	4284
HBS	Transit	10:00	2210	272	2482	759	768	1527	3667	1040	4707
HBS	Transit	10:30	1010	1093	2103	1630	650	2280	3919	1365	5283
HBS	Transit	11:00	1446	890	2336	1517	896	2412	3735	1604	5339
HBS	Transit	11:30	666	946	1612	1695	758	2453	2884	1654	4538
HBS	Transit	12:00	1160	1170	2330	1183	1028	2211	2349	2066	4415
HBS	Transit	12:30	350	1708	2058	1118	423	1541	1516	2746	4263
HBS	Transit	13:00	1419	1571	2990	939	1130	2070	1817	3894	5712
HBS	Transit	13:30	319	1596	1915	687	1421	2108	1197	4360	5557
HBS	Transit	14:00	0	1054	1054	104	2506	2610	510	3993	4503
HBS	Transit	14:30	319	1354	1673	406	915	1321	725	2841	3566
HBS	Transit	15:00	429	1247	1676	423	1294	1716	748	3172	3920
HBS	Transit	15:30	249	702	950	470	793	1262	574	2581	3154
HBS	Transit	16:00	706	2671	3377	104	1433	1537	810	4459	5269
HBS	Transit	16:30	969	766	1735	503	1094	1597	1676	3792	5468
HBS	Transit	17:00	529	4042	4571	1015	794	1809	1702	6741	8442
HBS	Transit	17:30	739	1581	2319	498	4352	4851	1425	7527	8953
HBS	Transit	18:00	386	3217	3603	585	2764	3349	1313	6392	7705
HBS	Transit	18:30	1155	2154	3308	448	2304	2752	1883	5782	7665
HBS	Transit	19:00	104	2784	2888	495	2945	3440	1539	6262	7801
HBS	Transit	19:30	215	4000	4215	943	2141	3084	1258	7317	8575
HBS	Transit	20:00	0	1204	1204	100	2620	2720	315	6380	6696
HBS	Transit	20:30	0	785	785	215	2003	2218	215	4546	4761
HBS	Transit	21:00	0	998	998	0	1035	1035	0	3541	3541
HBS	Transit	21:30	215	529	744	0	1546	1546	215	3035	3249
HBS	Transit	22:00	0	759	759	215	1010	1225	215	2247	2462
HBS	Transit	22:30	0	315	315	0	731	731	0	1552	1552
HBS	Transit	23:00	0	0	0	0	697	697	0	821	821
HBS	Transit	23:30	0	0	0	0	124	124	0	124	124
HBS	Auto Driver	0:00	0	240	240	303	243	547	0	240	240
HBS	Auto Driver	0:30	352	668	1020	352	820	1172	352	908	1260
HBS	Auto Driver	1:00	0	0	0	0	215	215	0	215	215
HBS	Auto Driver	1:30	191	938	1129	0	319	319	191	938	1129
HBS	Auto Driver	2:00	0	867	867	0	619	619	191	1486	1677
HBS	Auto Driver	2:30	0	178	178	191	1045	1235	191	1045	1235
HBS	Auto Driver	3:00	249	0	249	249	0	249	249	0	249
HBS	Auto Driver	3:30	122	0	122	122	0	122	122	0	122
HBS	Auto Driver	4:00	471	0	471	0	0	0	471	0	471
HBS	Auto Driver	4:30	2771	0	2771	1955	0	1955	3242	0	3242
HBS	Auto Driver	5:00	5731	853	6585	4509	231	4741	7019	853	7872
HBS	Auto Driver	5:30	5282	138	5420	5049	760	5808	7791	760	8551
HBS	Auto Driver	6:00	12443	345	12788	7697	226	7923	15186	345	15531
HBS	Auto Driver	6:30	14926	1645	16571	13639	1413	15052	22415	1764	24179
HBS	Auto Driver	7:00	21942	2529	24471	18109	1830	19939	30718	2880	33598
HBS	Auto Driver	7:30	22189	2761	24950	20345	2657	23002	34797	3812	38609
HBS	Auto Driver	8:00	24458	5179	29638	25482	4104	29586	38911	6334	45245
HBS	Auto Driver	8:30	23878	9499	33376	21578	7932	29510	37307	11728	49035
HBS	Auto Driver	9:00	19885	10353	30238	25678	9896	35574	35614	14149	49763
HBS	Auto Driver	9:30	27952	11962	39914	22979	11587	34566	37888	16215	54103
HBS	Auto Driver	10:00	38313	19278	57591	38083	14399	52482	53222	23906	77128

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBS	Auto Driver	10:30	28280	27862	56142	25621	25512	51133	43419	37369	80788
HBS	Auto Driver	11:00	40511	33111	73622	41290	30014	71304	58309	44967	103276
HBS	Auto Driver	11:30	24369	39788	64157	27697	33580	61277	41388	54741	96129
HBS	Auto Driver	12:00	28714	42891	71605	29400	43828	73228	42405	64053	106457
HBS	Auto Driver	12:30	22006	46307	68313	23941	40843	64784	35010	66531	101542
HBS	Auto Driver	13:00	26175	44556	70731	22736	46188	68924	37244	70244	107488
HBS	Auto Driver	13:30	19160	39592	58753	21999	40277	62276	33668	63649	97317
HBS	Auto Driver	14:00	25774	35653	61427	25576	37712	63288	37444	59025	96468
HBS	Auto Driver	14:30	17601	44639	62239	20156	41781	61936	29468	65951	95419
HBS	Auto Driver	15:00	22471	47643	70114	20129	42514	62643	31783	71814	103597
HBS	Auto Driver	15:30	19621	48822	68443	20543	50862	71405	31275	78121	109396
HBS	Auto Driver	16:00	23873	50092	73965	23404	51680	75084	34605	77351	111956
HBS	Auto Driver	16:30	24487	52579	77066	23646	46286	69932	35688	78250	113938
HBS	Auto Driver	17:00	23529	59373	82903	23152	54862	78014	35571	91338	126909
HBS	Auto Driver	17:30	32350	61543	93893	27172	66903	94075	44769	98019	142788
HBS	Auto Driver	18:00	38060	67379	105439	37516	63967	101483	55657	98496	154152
HBS	Auto Driver	18:30	40016	63501	103518	41760	62360	104120	58157	98029	156187
HBS	Auto Driver	19:00	36916	70496	107412	39027	75333	114360	53313	106166	159479
HBS	Auto Driver	19:30	24623	52653	77276	31458	57264	88722	38909	83486	122395
HBS	Auto Driver	20:00	18833	56457	75290	21135	58567	79702	26284	82679	108962
HBS	Auto Driver	20:30	6753	44712	51464	9168	43767	52935	11901	68824	80725
HBS	Auto Driver	21:00	6135	32505	38640	7267	38212	45479	8868	57562	66430
HBS	Auto Driver	21:30	2983	23713	26696	3051	30193	33244	4585	43063	47647
HBS	Auto Driver	22:00	1733	17233	18965	1971	20872	22843	3266	30102	33368
HBS	Auto Driver	22:30	942	7346	8288	1842	9717	11558	2238	16575	18813
HBS	Auto Driver	23:00	694	5028	5722	745	9730	10475	1090	11887	12976
HBS	Auto Driver	23:30	303	1007	1310	345	2793	3137	648	3036	3684
HBS	Auto Pass.	0:00	0	0	0	0	243	243	0	0	0
HBS	Auto Pass.	0:30	0	102	102	0	102	102	0	102	102
HBS	Auto Pass.	1:00	0	418	418	0	207	207	0	418	418
HBS	Auto Pass.	1:30	191	560	750	0	425	425	191	770	961
HBS	Auto Pass.	2:00	0	0	0	0	345	345	191	345	536
HBS	Auto Pass.	2:30	0	0	0	191	0	191	191	0	191
HBS	Auto Pass.	3:00	0	0	0	0	0	0	0	0	0
HBS	Auto Pass.	3:30	0	0	0	0	0	0	0	0	0
HBS	Auto Pass.	4:00	0	0	0	0	0	0	0	0	0
HBS	Auto Pass.	4:30	253	0	253	253	0	253	253	0	253
HBS	Auto Pass.	5:00	411	0	411	411	0	411	411	0	411
HBS	Auto Pass.	5:30	558	211	769	211	0	211	558	211	769
HBS	Auto Pass.	6:00	1481	0	1481	383	0	383	1829	211	2040
HBS	Auto Pass.	6:30	1569	0	1569	1996	0	1996	3015	211	3226
HBS	Auto Pass.	7:00	3991	116	4107	2068	116	2184	5009	327	5336
HBS	Auto Pass.	7:30	1711	512	2223	2688	613	3301	4652	722	5375
HBS	Auto Pass.	8:00	5487	716	6204	5130	598	5728	7452	826	8277
HBS	Auto Pass.	8:30	9901	167	10068	6408	0	6408	12222	394	12617
HBS	Auto Pass.	9:00	7593	2182	9775	7314	1305	8619	13407	2577	15984
HBS	Auto Pass.	9:30	11007	2834	13841	9649	2797	12445	17100	4105	21205
HBS	Auto Pass.	10:00	18566	4589	23154	17705	2614	20319	26016	5897	31914
HBS	Auto Pass.	10:30	8660	11276	19936	10342	8467	18809	16971	14559	31531
HBS	Auto Pass.	11:00	23877	15834	39711	20136	13540	33677	30507	21926	52433
HBS	Auto Pass.	11:30	6363	21457	27819	11745	17977	29723	16733	29843	46576
HBS	Auto Pass.	12:00	9187	12441	21628	9574	15960	25534	14175	24307	38481
HBS	Auto Pass.	12:30	9751	23140	32891	9369	18787	28155	14351	31487	45838
HBS	Auto Pass.	13:00	8786	16295	25081	8102	17897	25999	13769	28995	42764
HBS	Auto Pass.	13:30	7770	15205	22974	8552	16592	25144	13436	26302	39739
HBS	Auto Pass.	14:00	9300	13897	23197	9213	16785	25998	14185	23607	37792
HBS	Auto Pass.	14:30	8199	21019	29217	8555	13834	22389	13171	27840	41011
HBS	Auto Pass.	15:00	11943	22603	34546	8666	21036	29702	16559	36610	53168
HBS	Auto Pass.	15:30	7801	20520	28321	7884	22460	30344	15694	36093	51787
HBS	Auto Pass.	16:00	13772	24466	38239	15415	25001	40416	21582	38100	59682
HBS	Auto Pass.	16:30	15646	16480	32126	14656	20566	35222	21813	29579	51393
HBS	Auto Pass.	17:00	12940	25390	38331	11507	20187	31694	20098	34404	54502
HBS	Auto Pass.	17:30	25343	28125	53469	18015	29376	47392	33934	42342	76276
HBS	Auto Pass.	18:00	34829	24867	59696	28692	22155	50847	50748	37833	88580
HBS	Auto Pass.	18:30	32141	29238	61379	42514	29229	71742	54197	44916	99113
HBS	Auto Pass.	19:00	24467	37152	61619	22876	34885	57761	36150	52839	88989
HBS	Auto Pass.	19:30	11151	28624	39775	18377	31712	50089	24425	46578	71003
HBS	Auto Pass.	20:00	7186	39171	46358	10322	32896	43218	13234	54037	67271
HBS	Auto Pass.	20:30	3225	26209	29434	4497	30798	35295	6137	47351	53488
HBS	Auto Pass.	21:00	2414	20470	22884	3263	24896	28159	4055	37023	41077
HBS	Auto Pass.	21:30	358	12894	13251	863	15674	16537	1149	25021	26169
HBS	Auto Pass.	22:00	215	9560	9775	0	13950	13950	500	18907	19407
HBS	Auto Pass.	22:30	418	3249	3667	919	5477	6395	919	8205	9124
HBS	Auto Pass.	23:00	0	1923	1923	0	3629	3629	0	4652	4652
HBS	Auto Pass.	23:30	0	453	453	0	1233	1233	0	1477	1477
HBS	Auto Person	0:00	0	240	240	303	487	790	0	240	240
HBS	Auto Person	0:30	352	770	1122	352	922	1274	352	1010	1362
HBS	Auto Person	1:00	0	418	418	0	422	422	0	633	633
HBS	Auto Person	1:30	382	1497	1879	0	744	744	382	1708	2090
HBS	Auto Person	2:00	0	867	867	0	964	964	382	1831	2213
HBS	Auto Person	2:30	0	178	178	382	1045	1426	382	1045	1426

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBS	Auto Person	3:00	249	0	249	249	0	249	249	0	249
HBS	Auto Person	3:30	122	0	122	122	0	122	122	0	122
HBS	Auto Person	4:00	471	0	471	0	0	0	471	0	471
HBS	Auto Person	4:30	3024	0	3024	2208	0	2208	3495	0	3495
HBS	Auto Person	5:00	6142	853	6996	4920	231	5152	7429	853	8283
HBS	Auto Person	5:30	5840	349	6189	5259	760	6019	8350	970	9320
HBS	Auto Person	6:00	13925	345	14269	8080	226	8305	17015	555	17570
HBS	Auto Person	6:30	16495	1645	18140	15636	1413	17049	25430	1975	27405
HBS	Auto Person	7:00	25932	2646	28578	20177	1946	22123	35726	3207	38934
HBS	Auto Person	7:30	23900	3273	27173	23033	3271	26303	39450	4534	43984
HBS	Auto Person	8:00	29946	5896	35841	30612	4703	35315	46363	7159	53522
HBS	Auto Person	8:30	33778	9666	43444	27986	7932	35918	49529	12122	61651
HBS	Auto Person	9:00	27478	12535	40013	32993	11201	44194	49021	16726	65746
HBS	Auto Person	9:30	38959	14795	53755	32628	14384	47011	54988	20320	75308
HBS	Auto Person	10:00	56878	23867	80745	55789	17013	72802	79239	29803	109042
HBS	Auto Person	10:30	36941	39138	76079	35963	33979	69942	60390	51928	112319
HBS	Auto Person	11:00	64388	48945	113333	61426	43555	104981	88816	66894	155709
HBS	Auto Person	11:30	30731	61245	91976	39442	51557	91000	58121	84584	142705
HBS	Auto Person	12:00	37901	55333	93233	38975	59788	98763	56579	88359	144939
HBS	Auto Person	12:30	31757	69447	101204	33310	59629	92939	49362	98018	147380
HBS	Auto Person	13:00	34961	60851	95812	30838	64085	94923	51013	99239	150252
HBS	Auto Person	13:30	26930	54792	81722	30551	56870	87420	47104	89951	137056
HBS	Auto Person	14:00	35075	49550	84624	34789	54497	89286	51629	82631	134260
HBS	Auto Person	14:30	25799	65657	91457	28711	55615	84325	42639	93791	136431
HBS	Auto Person	15:00	34413	70246	104660	28795	63551	92345	48342	108423	156765
HBS	Auto Person	15:30	27422	69342	96764	28427	73322	101749	46969	114214	161184
HBS	Auto Person	16:00	37646	74558	112204	38819	76680	115500	56187	115451	171638
HBS	Auto Person	16:30	40133	69059	109192	38302	66852	105153	57501	107830	165331
HBS	Auto Person	17:00	36469	84764	121233	34659	75049	109708	55669	125742	181411
HBS	Auto Person	17:30	57693	89669	147362	45187	96279	141467	78703	140362	219065
HBS	Auto Person	18:00	72889	92246	165134	66207	86122	152329	106404	136328	242733
HBS	Auto Person	18:30	72158	92739	164897	84274	91588	175862	112355	142945	255300
HBS	Auto Person	19:00	61383	107648	169031	61904	110218	172121	89464	159004	248468
HBS	Auto Person	19:30	35774	81277	117051	49836	88976	138811	63334	130064	193397
HBS	Auto Person	20:00	26020	95628	121648	31457	91462	122919	39518	136716	176234
HBS	Auto Person	20:30	9978	70921	80899	13665	74565	88230	18039	116175	134213
HBS	Auto Person	21:00	8549	52975	61524	10530	63108	73638	12923	94585	107508
HBS	Auto Person	21:30	3341	36607	39947	3915	45867	49781	5734	68083	73817
HBS	Auto Person	22:00	1947	26793	28740	1971	34823	36793	3766	49009	52775
HBS	Auto Person	22:30	1360	10595	11955	2760	15193	17954	3156	24781	27937
HBS	Auto Person	23:00	694	6951	7645	745	13359	14104	1090	16539	17628
HBS	Auto Person	23:30	303	1460	1763	345	4026	4371	648	4513	5161
HBS	Drive Alone	0:00	0	240	240	303	0	303	0	240	240
HBS	Drive Alone	0:30	352	567	918	352	719	1070	352	806	1158
HBS	Drive Alone	1:00	0	0	0	0	215	215	0	215	215
HBS	Drive Alone	1:30	0	378	378	0	104	104	0	378	378
HBS	Drive Alone	2:00	0	867	867	0	275	275	0	1141	1141
HBS	Drive Alone	2:30	0	178	178	0	1045	1045	0	1045	1045
HBS	Drive Alone	3:00	249	0	249	249	0	249	249	0	249
HBS	Drive Alone	3:30	122	0	122	122	0	122	122	0	122
HBS	Drive Alone	4:00	471	0	471	0	0	0	471	0	471
HBS	Drive Alone	4:30	2518	0	2518	1702	0	1702	2989	0	2989
HBS	Drive Alone	5:00	5258	853	6111	4304	231	4535	6545	853	7398
HBS	Drive Alone	5:30	4520	138	4658	4570	760	5329	6761	760	7521
HBS	Drive Alone	6:00	10519	345	10864	6762	226	6988	12711	345	13056
HBS	Drive Alone	6:30	12749	1645	14394	11786	1413	13199	18698	1764	20462
HBS	Drive Alone	7:00	19100	2232	21332	15707	1713	17420	26012	2584	28595
HBS	Drive Alone	7:30	20275	2359	22634	17940	2255	20195	30580	3229	33809
HBS	Drive Alone	8:00	19976	4860	24835	20921	3898	24819	32616	5834	38449
HBS	Drive Alone	8:30	16866	9335	26200	18180	7752	25932	28560	11270	39830
HBS	Drive Alone	9:00	14892	7951	22843	18871	8702	27573	25273	11469	36742
HBS	Drive Alone	9:30	21044	9465	30509	16927	8452	25380	27446	12232	39678
HBS	Drive Alone	10:00	22960	15075	38035	24849	12567	37416	33479	18855	52334
HBS	Drive Alone	10:30	20297	20801	41098	17015	18640	35656	28926	27089	56015
HBS	Drive Alone	11:00	23644	21403	45047	26778	21081	47858	35555	29852	65407
HBS	Drive Alone	11:30	17294	23855	41149	18361	20621	38983	26071	32626	58697
HBS	Drive Alone	12:00	19313	32269	51582	18525	30808	49333	27023	44274	71297
HBS	Drive Alone	12:30	14157	28877	43034	16351	25791	42142	22656	42343	64998
HBS	Drive Alone	13:00	17794	31302	49096	14997	31393	46389	24098	47855	71953
HBS	Drive Alone	13:30	11984	27029	39012	14769	27898	42666	21085	43491	64576
HBS	Drive Alone	14:00	17252	23910	41163	17878	24908	42786	23568	39504	63072
HBS	Drive Alone	14:30	10040	31793	41834	11576	30832	42408	15731	46389	62120
HBS	Drive Alone	15:00	14583	30845	45428	13287	28679	41966	18738	46402	65139
HBS	Drive Alone	15:30	12232	32951	45183	13259	34003	47261	17683	50674	68357
HBS	Drive Alone	16:00	12599	34261	46859	11649	33725	45374	17022	50932	67954
HBS	Drive Alone	16:30	13847	36000	49847	13357	31361	44718	19220	53207	72427
HBS	Drive Alone	17:00	13586	40228	53815	14010	37703	51712	19449	62075	81524
HBS	Drive Alone	17:30	14597	43082	57678	13997	45592	59588	20036	67454	87490
HBS	Drive Alone	18:00	17116	48400	65516	17630	46396	64026	23155	70263	93418
HBS	Drive Alone	18:30	17075	43387	60462	15423	41492	56914	22600	67254	89854
HBS	Drive Alone	19:00	16661	42795	59457	19774	50093	69867	23839	68557	92396

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBS	Drive Alone	19:30	15682	32209	47892	16861	35105	51966	19747	50674	70421
HBS	Drive Alone	20:00	13083	31235	44317	13112	35372	48484	15968	46804	62773
HBS	Drive Alone	20:30	4707	24609	29316	6329	23282	29610	7564	36042	43605
HBS	Drive Alone	21:00	3687	20156	23843	4408	20969	25377	4921	32916	37838
HBS	Drive Alone	21:30	2442	14723	17165	2188	20550	22738	2955	26670	29625
HBS	Drive Alone	22:00	1414	11094	12508	1683	11298	12981	2181	17215	19395
HBS	Drive Alone	22:30	942	5014	5956	1225	6560	7785	1440	10930	12370
HBS	Drive Alone	23:00	694	3343	4036	564	6666	7230	909	7713	8622
HBS	Drive Alone	23:30	303	554	857	345	1473	1817	648	1473	2121
HBS	Carpool	0:00	0	0	0	0	487	487	0	0	0
HBS	Carpool	0:30	0	204	204	0	204	204	0	204	204
HBS	Carpool	1:00	0	418	418	0	207	207	0	418	418
HBS	Carpool	1:30	382	1119	1501	0	640	640	382	1330	1711
HBS	Carpool	2:00	0	0	0	0	690	690	382	690	1071
HBS	Carpool	2:30	0	0	0	382	0	382	382	0	382
HBS	Carpool	3:00	0	0	0	0	0	0	0	0	0
HBS	Carpool	3:30	0	0	0	0	0	0	0	0	0
HBS	Carpool	4:00	0	0	0	0	0	0	0	0	0
HBS	Carpool	4:30	506	0	506	506	0	506	506	0	506
HBS	Carpool	5:00	884	0	884	616	0	616	884	0	884
HBS	Carpool	5:30	1320	211	1531	690	0	690	1588	211	1799
HBS	Carpool	6:00	3405	0	3405	1318	0	1318	4304	211	4515
HBS	Carpool	6:30	3746	0	3746	3850	0	3850	6732	211	6943
HBS	Carpool	7:00	6833	413	7246	4470	233	4703	9715	624	10339
HBS	Carpool	7:30	3625	914	4539	5093	1015	6108	8870	1305	10175
HBS	Carpool	8:00	9970	1036	11006	9691	805	10495	13747	1326	15073
HBS	Carpool	8:30	16912	331	17244	9806	180	9987	20969	852	21821
HBS	Carpool	9:00	12585	4584	17170	14122	2499	16621	23748	5257	29004
HBS	Carpool	9:30	17916	5330	23246	15700	5931	21632	27542	8088	35630
HBS	Carpool	10:00	33918	8792	42710	30939	4446	35385	45760	10948	56708
HBS	Carpool	10:30	16644	18337	34981	18948	15339	34286	31465	24839	56303
HBS	Carpool	11:00	40744	27542	68285	34648	22474	57122	53261	37042	90302
HBS	Carpool	11:30	13437	37390	50827	21081	30936	52017	32049	51958	84007
HBS	Carpool	12:00	18587	23064	41651	20450	28981	49430	29556	44086	73642
HBS	Carpool	12:30	17600	40570	58170	16959	33839	50798	26706	55675	82381
HBS	Carpool	13:00	17167	29548	46715	15842	32692	48534	26915	51384	78299
HBS	Carpool	13:30	14947	27768	42715	15782	28972	44754	26020	46461	72480
HBS	Carpool	14:00	17823	25639	43462	16911	29589	46500	28061	43128	71188
HBS	Carpool	14:30	15759	33864	49623	17135	24782	41917	26909	47402	74311
HBS	Carpool	15:00	19830	39402	59232	15507	34872	50379	29604	62022	91626
HBS	Carpool	15:30	15190	36390	51580	15168	39319	54487	29287	63540	92827
HBS	Carpool	16:00	25047	40298	65345	27171	42955	70126	39165	64519	103684
HBS	Carpool	16:30	26286	33059	59345	24944	35490	60435	38281	54622	92903
HBS	Carpool	17:00	22883	44535	67418	20649	37346	57995	36220	63667	99887
HBS	Carpool	17:30	43096	46587	89683	31191	50688	81878	58667	72908	131575
HBS	Carpool	18:00	55773	43845	99618	48577	39726	88304	83249	66066	149315
HBS	Carpool	18:30	55083	49352	104435	68851	50097	118948	89755	75692	165446
HBS	Carpool	19:00	44722	64852	109574	42130	60125	102255	65625	90447	156072
HBS	Carpool	19:30	20092	49067	69159	32974	53871	86846	43587	79389	122976
HBS	Carpool	20:00	12937	64393	77331	18345	56091	74436	23550	89912	113461
HBS	Carpool	20:30	5270	46312	51582	7336	51284	58620	10475	80133	90608
HBS	Carpool	21:00	4862	32819	37682	6122	42139	48261	8002	61668	69670
HBS	Carpool	21:30	899	21884	22783	1727	25317	27043	2779	41413	44192
HBS	Carpool	22:00	533	15698	16232	288	23524	23812	1586	31794	33380
HBS	Carpool	22:30	418	5581	5999	1535	8633	10169	1716	13850	15567
HBS	Carpool	23:00	0	3609	3609	181	6692	6873	181	8826	9007
HBS	Carpool	23:30	0	907	907	0	2553	2553	0	3040	3040
HBS	All Persons	0:00	0	240	240	303	487	790	0	240	240
HBS	All Persons	0:30	352	985	1337	352	922	1274	352	1225	1576
HBS	All Persons	1:00	0	512	512	0	516	516	0	941	941
HBS	All Persons	1:30	382	1497	1879	0	959	959	382	1923	2305
HBS	All Persons	2:00	0	867	867	0	964	964	382	1831	2213
HBS	All Persons	2:30	0	178	178	382	1045	1426	382	1045	1426
HBS	All Persons	3:00	249	0	249	249	0	249	249	0	249
HBS	All Persons	3:30	122	0	122	122	0	122	122	0	122
HBS	All Persons	4:00	471	0	471	0	0	0	471	0	471
HBS	All Persons	4:30	3103	0	3103	2208	0	2208	3574	0	3574
HBS	All Persons	5:00	6467	853	7320	5135	231	5367	7833	853	8687
HBS	All Persons	5:30	6603	349	6952	5440	760	6200	9301	970	10272
HBS	All Persons	6:00	15104	768	15872	8583	545	9128	18965	979	19944
HBS	All Persons	6:30	18576	1749	20325	16751	1621	18372	28959	2183	31141
HBS	All Persons	7:00	29412	3215	32627	22684	2516	25200	41619	3777	45397
HBS	All Persons	7:30	29098	4268	33366	26629	3557	30186	48034	5529	53563
HBS	All Persons	8:00	35333	6785	42118	36080	5478	41558	56737	8757	65494
HBS	All Persons	8:30	38134	13550	51684	33917	9570	43487	58791	16829	75620
HBS	All Persons	9:00	31573	14463	46036	37293	14986	52279	56447	21721	78168
HBS	All Persons	9:30	42487	16736	59224	37180	15895	53075	61642	23471	85113
HBS	All Persons	10:00	63232	27288	90519	60815	20504	81319	87694	34863	122557
HBS	All Persons	10:30	39491	43870	83361	39356	37254	76611	66369	58229	124598
HBS	All Persons	11:00	71317	51644	122961	67135	47005	114139	98330	72619	170949
HBS	All Persons	11:30	34515	64817	99332	44793	55314	100106	65711	90431	156142

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBS	All Persons	12:00	41989	61077	103066	42745	65318	108063	62907	96194	159102
HBS	All Persons	12:30	32304	75471	107775	36016	63981	99997	52466	106347	158813
HBS	All Persons	13:00	37818	64601	102419	32557	68162	100719	54268	106967	161235
HBS	All Persons	13:30	29387	59390	88776	33911	61075	94986	51098	98195	149293
HBS	All Persons	14:00	37698	54534	92231	36877	60267	97144	54885	91653	146538
HBS	All Persons	14:30	27622	69505	97126	30579	59235	89813	45630	100891	146520
HBS	All Persons	15:00	37592	75539	113132	32468	68087	100556	52643	117195	169839
HBS	All Persons	15:30	30290	71882	102172	29895	77092	106987	50465	120990	171455
HBS	All Persons	16:00	40359	81294	121654	41946	81029	122976	60929	125193	186122
HBS	All Persons	16:30	42319	73597	115915	40364	71952	112316	61301	117760	179061
HBS	All Persons	17:00	39740	94080	133820	37686	80627	118314	60677	139888	200566
HBS	All Persons	17:30	61071	94582	155653	48568	103979	152547	84062	153843	237905
HBS	All Persons	18:00	79696	101243	180940	73648	94222	167870	115190	151107	266298
HBS	All Persons	18:30	78831	104797	183628	88819	105081	193900	120374	161682	282056
HBS	All Persons	19:00	67603	118122	185725	69386	119990	189376	99157	174723	273881
HBS	All Persons	19:30	41506	92239	133745	54907	97726	152633	71278	146972	218250
HBS	All Persons	20:00	27130	103952	131082	34700	102475	137175	43500	153198	196699
HBS	All Persons	20:30	12167	76727	88894	16054	81209	97263	20968	127450	148417
HBS	All Persons	21:00	9677	55953	65630	12094	67215	79309	14591	102193	116784
HBS	All Persons	21:30	4221	39508	43730	4452	49984	54436	6718	74486	81205
HBS	All Persons	22:00	2390	29896	32286	2861	37872	40733	4657	54398	59055
HBS	All Persons	22:30	1360	12399	13759	2760	17519	20279	3156	28925	32081
HBS	All Persons	23:00	909	7116	8025	745	15218	15963	1305	18522	19827
HBS	All Persons	23:30	303	1675	1978	560	4365	4924	863	4852	5714
HBO	Transit	0:00	0	191	191	0	984	984	0	191	191
HBO	Transit	0:30	0	662	662	0	328	328	0	853	853
HBO	Transit	1:00	0	105	105	0	730	730	0	958	958
HBO	Transit	1:30	0	0	0	0	233	233	0	337	337
HBO	Transit	2:00	0	0	0	0	105	105	0	105	105
HBO	Transit	2:30	0	0	0	0	0	0	0	0	0
HBO	Transit	3:00	0	0	0	0	0	0	0	0	0
HBO	Transit	3:30	0	0	0	0	0	0	0	0	0
HBO	Transit	4:00	232	0	232	0	0	0	232	0	232
HBO	Transit	4:30	0	0	0	0	0	0	232	0	232
HBO	Transit	5:00	0	0	0	0	0	0	232	0	232
HBO	Transit	5:30	1911	0	1911	0	0	0	2143	0	2143
HBO	Transit	6:00	568	0	568	657	0	657	2710	0	2710
HBO	Transit	6:30	6904	0	6904	288	0	288	8957	0	8957
HBO	Transit	7:00	15566	406	15972	3278	0	3278	24235	406	24640
HBO	Transit	7:30	11431	124	11555	8536	215	8750	32388	530	32918
HBO	Transit	8:00	9786	191	9977	11761	315	12076	33639	506	34144
HBO	Transit	8:30	6456	0	6456	11617	0	11617	28334	191	28524
HBO	Transit	9:00	6825	746	7572	10757	0	10757	23543	937	24480
HBO	Transit	9:30	3973	534	4507	7525	722	8248	16759	1471	18230
HBO	Transit	10:00	10844	779	11623	5524	319	5843	20078	1527	21605
HBO	Transit	10:30	2697	1080	3776	10187	969	11157	17250	2288	19538
HBO	Transit	11:00	2326	1780	4106	4369	1046	5415	9389	3099	12488
HBO	Transit	11:30	2484	3402	5886	2268	216	2484	7505	5455	12960
HBO	Transit	12:00	1698	2693	4391	2777	1880	4657	6935	7931	14867
HBO	Transit	12:30	3197	2426	5622	1754	3057	4811	7355	8477	15832
HBO	Transit	13:00	1745	2112	3857	3525	1776	5301	7346	7532	14878
HBO	Transit	13:30	1101	2832	3933	2534	3217	5750	4922	8587	13509
HBO	Transit	14:00	2242	4925	7167	1658	2587	4245	4631	10296	14927
HBO	Transit	14:30	1369	6341	7710	2045	4175	6221	4341	14051	18392
HBO	Transit	15:00	3419	10180	13599	1177	4015	5192	5715	20055	25770
HBO	Transit	15:30	541	5277	5818	2345	5300	7646	5079	21317	26396
HBO	Transit	16:00	1885	4099	5984	2335	9882	12218	4619	20116	24735
HBO	Transit	16:30	2059	4587	6646	1158	5046	6204	4342	14820	19163
HBO	Transit	17:00	1928	5535	7462	1361	5455	6815	5112	15309	20421
HBO	Transit	17:30	2227	4253	6480	2097	2741	4838	5978	14108	20086
HBO	Transit	18:00	2239	5312	7552	3049	7842	10890	6121	16679	22800
HBO	Transit	18:30	1626	2500	4127	1298	6041	7339	4699	11337	16036
HBO	Transit	19:00	925	2646	3571	3329	2880	6209	4325	7943	12268
HBO	Transit	19:30	762	2435	3197	887	1594	2480	1758	7498	9256
HBO	Transit	20:00	858	4276	5134	324	4822	5146	1729	10180	11909
HBO	Transit	20:30	0	3555	3555	957	2262	3219	1405	8913	10318
HBO	Transit	21:00	0	6044	6044	238	3919	4157	448	12696	13144
HBO	Transit	21:30	215	5269	5484	210	4010	4220	425	14046	14471
HBO	Transit	22:00	215	4309	4524	215	3421	3635	430	14345	14775
HBO	Transit	22:30	0	1165	1165	215	5108	5323	215	11980	12195
HBO	Transit	23:00	0	941	941	0	5087	5087	0	7575	7575
HBO	Transit	23:30	0	543	543	0	1957	1957	0	2499	2499
HBO	Auto Driver	0:00	106	3839	3945	391	6902	7294	106	3839	3945
HBO	Auto Driver	0:30	0	3467	3467	236	3924	4160	0	5433	5433
HBO	Auto Driver	1:00	0	4206	4206	0	3770	3770	0	5984	5984
HBO	Auto Driver	1:30	181	875	1056	0	3045	3045	181	3988	4169
HBO	Auto Driver	2:00	298	2567	2865	734	1124	1858	479	3510	3989
HBO	Auto Driver	2:30	0	309	309	298	2695	2992	298	2695	2992
HBO	Auto Driver	3:00	305	682	987	0	351	351	305	682	987
HBO	Auto Driver	3:30	248	610	857	437	941	1378	553	941	1494
HBO	Auto Driver	4:00	2196	425	2621	806	92	898	2313	425	2737

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBO	Auto Driver	4:30	5224	439	5662	2254	332	2587	6731	771	7502
HBO	Auto Driver	5:00	13239	891	14130	10733	534	11267	17715	1329	19045
HBO	Auto Driver	5:30	24243	2838	27081	17517	1386	18903	31226	3633	34859
HBO	Auto Driver	6:00	30134	7820	37954	22835	7274	30109	43843	10068	53910
HBO	Auto Driver	6:30	62890	13411	76302	42754	10551	53305	83898	16205	100103
HBO	Auto Driver	7:00	86234	27667	113901	76153	22790	98943	127378	33321	160698
HBO	Auto Driver	7:30	104402	28559	132961	87723	23097	110820	155626	39090	194716
HBO	Auto Driver	8:00	108291	33743	142034	103684	29666	133350	176195	49736	225931
HBO	Auto Driver	8:30	128906	45867	174774	120233	42542	162776	201417	65938	267355
HBO	Auto Driver	9:00	106919	40244	147164	119316	46249	165566	188103	63639	251743
HBO	Auto Driver	9:30	81651	32704	114355	85167	34211	119378	150437	50095	200532
HBO	Auto Driver	10:00	76641	30848	107488	89546	31133	120679	141911	46731	188642
HBO	Auto Driver	10:30	61746	38845	100592	69730	30814	100544	114111	54443	168554
HBO	Auto Driver	11:00	59970	43530	103500	72775	42454	115229	104351	67159	171510
HBO	Auto Driver	11:30	52200	47771	99971	55161	41508	96669	83776	72476	156252
HBO	Auto Driver	12:00	50788	53936	104724	51678	48451	100129	79403	84904	164307
HBO	Auto Driver	12:30	43165	46501	89666	41447	54947	96394	70889	82955	153844
HBO	Auto Driver	13:00	53009	44254	97264	52312	44829	97141	82451	72262	154714
HBO	Auto Driver	13:30	49893	42997	92890	51271	40767	92038	80032	70431	150463
HBO	Auto Driver	14:00	45305	58230	103535	50939	51976	102914	74066	87894	161960
HBO	Auto Driver	14:30	65355	60338	125693	47891	59285	107175	88483	96256	184738
HBO	Auto Driver	15:00	55650	79572	135222	65686	68299	133986	96242	116543	212786
HBO	Auto Driver	15:30	53009	81953	134961	54833	70191	125025	83565	130196	213761
HBO	Auto Driver	16:00	54142	79279	133421	54100	85661	139761	82874	139284	222157
HBO	Auto Driver	16:30	55767	82083	137851	53789	72397	126186	84541	135706	220247
HBO	Auto Driver	17:00	60616	95936	156552	55637	93926	149564	91368	159245	250613
HBO	Auto Driver	17:30	73680	93877	167557	62496	94347	156843	109411	159196	268606
HBO	Auto Driver	18:00	84546	75691	160237	79723	86432	166155	131461	140540	272001
HBO	Auto Driver	18:30	89111	62303	151414	86276	75141	161417	140849	116411	257260
HBO	Auto Driver	19:00	65799	71634	137434	85718	68654	154372	120373	112904	233277
HBO	Auto Driver	19:30	37275	63198	100473	55344	66024	121368	71930	107449	179378
HBO	Auto Driver	20:00	28107	80003	108110	31341	72991	104332	44693	121428	166120
HBO	Auto Driver	20:30	16047	73583	89630	19552	70876	90427	29398	122020	151418
HBO	Auto Driver	21:00	11828	73936	85764	15811	76647	92458	21675	125081	146755
HBO	Auto Driver	21:30	7091	59041	66131	7778	67581	75359	12401	107475	119876
HBO	Auto Driver	22:00	4504	46353	50858	6935	57674	64610	9128	86247	95375
HBO	Auto Driver	22:30	4008	21972	25980	3717	28935	32653	6200	49647	55847
HBO	Auto Driver	23:00	1621	15504	17125	3142	23610	26752	4103	35934	40038
HBO	Auto Driver	23:30	1873	9187	11060	2313	16493	18806	2834	21412	24246
HBO	Auto Pass.	0:00	0	1174	1174	0	2629	2629	0	1174	1174
HBO	Auto Pass.	0:30	0	1097	1097	236	1197	1433	0	2036	2036
HBO	Auto Pass.	1:00	0	866	866	0	1101	1101	0	1798	1798
HBO	Auto Pass.	1:30	0	848	848	480	697	1177	0	1545	1545
HBO	Auto Pass.	2:00	0	1044	1044	0	1063	1063	0	1892	1892
HBO	Auto Pass.	2:30	0	165	165	0	994	994	0	994	994
HBO	Auto Pass.	3:00	187	0	187	0	0	0	187	0	187
HBO	Auto Pass.	3:30	116	610	726	187	610	796	303	610	913
HBO	Auto Pass.	4:00	665	332	997	449	0	449	781	332	1113
HBO	Auto Pass.	4:30	522	0	522	854	332	1186	854	332	1186
HBO	Auto Pass.	5:00	3227	0	3227	1351	0	1351	3227	0	3227
HBO	Auto Pass.	5:30	8363	722	9085	2359	169	2528	10239	722	10961
HBO	Auto Pass.	6:00	11005	709	11715	8111	959	9070	18886	1262	20148
HBO	Auto Pass.	6:30	48663	1795	50459	23574	1047	24621	59438	2098	61536
HBO	Auto Pass.	7:00	106856	3052	109908	86512	2525	89037	142720	4103	146823
HBO	Auto Pass.	7:30	123581	2965	126547	112321	2216	114537	179789	4543	184333
HBO	Auto Pass.	8:00	124780	6808	131587	127777	5374	133151	192248	9134	201382
HBO	Auto Pass.	8:30	132052	12278	144330	132539	10644	143183	196523	16038	212561
HBO	Auto Pass.	9:00	76278	15268	91546	105240	17794	123034	140262	20662	160924
HBO	Auto Pass.	9:30	37364	12115	49479	44715	10366	55081	72386	14983	87369
HBO	Auto Pass.	10:00	28994	6925	35919	31695	7650	39345	56665	11542	68207
HBO	Auto Pass.	10:30	30366	9573	39939	35645	7142	42787	55337	13464	68801
HBO	Auto Pass.	11:00	32014	16332	48346	33647	14387	48034	51706	22654	74360
HBO	Auto Pass.	11:30	20259	26114	46373	24205	18886	43091	38318	34381	72699
HBO	Auto Pass.	12:00	17917	32704	50621	21753	31020	52773	32030	48199	80229
HBO	Auto Pass.	12:30	17590	31309	48898	11861	35555	47416	27867	48488	76355
HBO	Auto Pass.	13:00	20855	24055	44910	23068	24649	47717	36861	36988	73849
HBO	Auto Pass.	13:30	18997	22939	41935	21149	21174	42323	32790	35278	68068
HBO	Auto Pass.	14:00	16876	30953	47829	17382	26926	44307	28517	45057	73574
HBO	Auto Pass.	14:30	23351	40957	64308	21406	37218	58625	34487	59088	93575
HBO	Auto Pass.	15:00	34309	80804	115113	26505	54767	81273	47390	102673	150063
HBO	Auto Pass.	15:30	24776	61363	86139	28929	70206	99135	45660	109269	154929
HBO	Auto Pass.	16:00	40272	63320	103593	35700	67776	103476	57004	102383	159386
HBO	Auto Pass.	16:30	31067	67866	98933	33824	57700	91524	52370	102473	154843
HBO	Auto Pass.	17:00	37830	79532	117362	31348	76358	107706	56376	124305	180681
HBO	Auto Pass.	17:30	46504	72860	119365	38999	70336	109335	71533	120807	192340
HBO	Auto Pass.	18:00	56987	66537	123524	54555	79561	134116	89521	117008	206529
HBO	Auto Pass.	18:30	60248	36384	96632	53708	54070	107778	95213	73832	169045
HBO	Auto Pass.	19:00	40796	41262	82058	61975	39460	101434	82302	61024	143326
HBO	Auto Pass.	19:30	18905	41104	60009	29389	39070	68460	39232	62668	101900
HBO	Auto Pass.	20:00	8782	59181	67963	11909	55211	67119	18625	82778	101403
HBO	Auto Pass.	20:30	7164	44987	52151	6519	52881	59400	13400	72555	85955

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBO	Auto Pass.	21:00	2629	42785	45414	6927	37518	44445	9511	62458	71969
HBO	Auto Pass.	21:30	2275	28598	30873	2599	33465	36064	4859	53538	58396
HBO	Auto Pass.	22:00	672	21367	22039	1732	30667	32399	2932	41440	44371
HBO	Auto Pass.	22:30	163	7523	7686	646	10177	10823	1363	18296	19658
HBO	Auto Pass.	23:00	301	6262	6563	145	9754	9898	1018	14100	15117
HBO	Auto Pass.	23:30	789	4626	5414	1426	6766	8192	1661	8972	10634
HBO	Auto Person	0:00	106	5013	5119	391	9531	9923	106	5013	5119
HBO	Auto Person	0:30	0	4564	4564	471	5121	5592	0	7469	7469
HBO	Auto Person	1:00	0	5072	5072	0	4871	4871	0	7783	7783
HBO	Auto Person	1:30	181	1723	1904	480	3742	4222	181	5533	5714
HBO	Auto Person	2:00	298	3611	3909	734	2187	2921	479	5402	5881
HBO	Auto Person	2:30	0	474	474	298	3689	3987	298	3689	3987
HBO	Auto Person	3:00	492	682	1174	0	351	351	492	682	1174
HBO	Auto Person	3:30	364	1220	1584	623	1551	2174	856	1551	2407
HBO	Auto Person	4:00	2861	757	3618	1255	92	1347	3094	757	3851
HBO	Auto Person	4:30	5745	439	6184	3108	665	3773	7585	1103	8688
HBO	Auto Person	5:00	16466	891	17357	12083	534	12618	20942	1329	22272
HBO	Auto Person	5:30	32606	3560	36166	19876	1554	21431	41465	4355	45820
HBO	Auto Person	6:00	41139	8529	49669	30946	8233	39179	62728	11330	74058
HBO	Auto Person	6:30	111554	15206	126760	66328	11598	77926	143336	18303	161639
HBO	Auto Person	7:00	193090	30719	223808	162666	25314	187980	270098	37423	307521
HBO	Auto Person	7:30	227983	31524	259508	200044	25313	225357	335415	43634	379049
HBO	Auto Person	8:00	233071	40550	273621	231461	35040	266501	368442	58871	427313
HBO	Auto Person	8:30	260959	58145	319104	252772	53187	305959	397940	81975	479916
HBO	Auto Person	9:00	183197	55512	238710	224556	64043	288599	328365	84301	412666
HBO	Auto Person	9:30	119014	44819	163833	129762	44577	174459	222823	65078	287901
HBO	Auto Person	10:00	105635	37772	143407	121241	38784	160025	198576	58273	256849
HBO	Auto Person	10:30	92113	48418	140531	105375	37957	143331	169447	67907	237355
HBO	Auto Person	11:00	91984	59863	151846	106422	56841	163263	156056	89813	245869
HBO	Auto Person	11:30	72459	73886	146344	79365	60394	139760	122094	106857	228951
HBO	Auto Person	12:00	68705	86641	155345	73431	79471	152902	111433	133104	244537
HBO	Auto Person	12:30	60755	77809	138564	53308	90502	143809	98756	131442	230199
HBO	Auto Person	13:00	73864	68309	142174	75380	69478	144858	119313	109250	228563
HBO	Auto Person	13:30	68889	65936	134825	72420	61941	134361	112822	105708	218531
HBO	Auto Person	14:00	62181	89183	151365	68320	78901	147222	102583	132951	235534
HBO	Auto Person	14:30	88706	101294	190001	69297	96503	165800	122970	155344	278313
HBO	Auto Person	15:00	89959	160335	250335	92192	123067	215258	143632	219217	362869
HBO	Auto Person	15:30	77784	143315	221100	83762	140398	224160	129225	239465	368690
HBO	Auto Person	16:00	94415	142599	237014	89801	153437	243238	139877	241667	381544
HBO	Auto Person	16:30	86834	149949	236784	87613	130097	217710	136911	238179	375090
HBO	Auto Person	17:00	98446	175468	273914	86985	170285	257270	147744	283550	431294
HBO	Auto Person	17:30	120184	166738	286922	101495	164683	266178	180943	280003	460946
HBO	Auto Person	18:00	141533	142228	283761	134278	165993	300270	220982	257548	478529
HBO	Auto Person	18:30	149359	98688	248046	139983	129211	269195	236063	190243	426305
HBO	Auto Person	19:00	106595	112896	219492	147693	108114	255806	202675	173928	376602
HBO	Auto Person	19:30	56180	104302	160482	84733	105094	189828	111162	170116	281278
HBO	Auto Person	20:00	36889	139184	176073	43250	128202	171452	63318	204206	267524
HBO	Auto Person	20:30	23211	118570	141781	26010	123757	149827	42798	194575	237373
HBO	Auto Person	21:00	14457	116721	131179	22738	114165	136903	31185	187539	218724
HBO	Auto Person	21:30	9366	87638	97004	10377	101046	111423	17260	161013	178273
HBO	Auto Person	22:00	5176	67720	72896	8667	88342	97009	12059	127687	139746
HBO	Auto Person	22:30	4170	29496	33666	4363	39112	43475	7562	67943	75505
HBO	Auto Person	23:00	1922	21765	23687	3287	33363	36650	5121	50034	55155
HBO	Auto Person	23:30	2662	13813	16474	3739	23259	26998	4496	30384	34880
HBO	Drive Alone	0:00	106	2847	2953	106	4453	4559	106	2847	2953
HBO	Drive Alone	0:30	0	2659	2659	0	2667	2667	0	4093	4093
HBO	Drive Alone	1:00	0	3200	3200	0	3210	3210	0	4626	4626
HBO	Drive Alone	1:30	0	402	402	0	2246	2246	0	2716	2716
HBO	Drive Alone	2:00	298	2231	2528	553	651	1204	298	2701	2999
HBO	Drive Alone	2:30	0	309	309	298	2358	2656	298	2358	2656
HBO	Drive Alone	3:00	119	351	469	0	351	351	119	351	469
HBO	Drive Alone	3:30	131	0	131	250	0	250	250	0	250
HBO	Drive Alone	4:00	1772	92	1864	265	92	357	1772	92	1864
HBO	Drive Alone	4:30	4491	439	4930	1621	0	1621	5998	439	6437
HBO	Drive Alone	5:00	10952	891	11843	9827	534	10361	15330	1329	16659
HBO	Drive Alone	5:30	16904	2117	19021	13669	1217	14886	22407	2911	25318
HBO	Drive Alone	6:00	20395	7111	27506	16249	6315	22564	29133	8805	37938
HBO	Drive Alone	6:30	38324	11552	49876	24188	9564	33751	51208	14042	65251
HBO	Drive Alone	7:00	44868	25088	69956	39606	20544	60151	71888	29567	101455
HBO	Drive Alone	7:30	54643	26089	80732	44887	20660	65547	86926	35111	122036
HBO	Drive Alone	8:00	53366	28392	81758	54173	25172	79345	95404	42843	138247
HBO	Drive Alone	8:30	64652	34881	99533	59322	33993	93316	105884	52552	158435
HBO	Drive Alone	9:00	65212	30007	95219	68648	34394	103042	111773	48565	160339
HBO	Drive Alone	9:30	57755	22235	79990	55383	25288	80670	100880	36407	137286
HBO	Drive Alone	10:00	53045	24335	77380	63954	23519	87473	98542	35454	133996
HBO	Drive Alone	10:30	42602	30106	72708	47739	24943	72682	77191	42040	119231
HBO	Drive Alone	11:00	36887	29907	66794	47186	31389	78576	66339	47003	113342
HBO	Drive Alone	11:30	35626	30864	66490	36368	29614	65982	54778	46479	101257
HBO	Drive Alone	12:00	34224	35367	69591	34640	28865	63505	52635	52231	104866
HBO	Drive Alone	12:30	30917	28916	59832	30641	32971	63611	48912	52282	101194
HBO	Drive Alone	13:00	35706	28401	64107	35581	29607	65188	53977	47713	101690

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBO	Drive Alone	13:30	34515	28551	63066	36998	27002	64001	52911	46656	99567
HBO	Drive Alone	14:00	34045	38829	72874	35262	34332	69593	49957	58483	108440
HBO	Drive Alone	14:30	45853	38398	84251	34896	40154	75051	60549	62549	123098
HBO	Drive Alone	15:00	33680	39706	73386	42290	37256	79546	59333	62101	121434
HBO	Drive Alone	15:30	34347	46277	80624	35109	36438	71547	51390	71122	122511
HBO	Drive Alone	16:00	29417	44901	74318	32785	46898	79683	45697	79585	125282
HBO	Drive Alone	16:30	30513	45814	76327	29102	42143	71245	43426	78501	121927
HBO	Drive Alone	17:00	31700	52570	84270	29623	50766	80389	46024	88927	134951
HBO	Drive Alone	17:30	43058	54187	97245	33976	58186	92162	59459	92348	151807
HBO	Drive Alone	18:00	45544	40588	86132	44567	43372	87939	71027	74751	145778
HBO	Drive Alone	18:30	49747	41812	91559	48917	44457	93374	76207	73191	149398
HBO	Drive Alone	19:00	39068	43342	82410	47601	45073	92674	66359	72075	138433
HBO	Drive Alone	19:30	25294	36996	62290	34045	38403	72448	44052	63998	108050
HBO	Drive Alone	20:00	19715	42408	62123	20853	39505	60358	29721	68003	97725
HBO	Drive Alone	20:30	10063	43581	53644	13285	37950	51235	18931	72079	91010
HBO	Drive Alone	21:00	8184	44257	52441	10624	48586	59209	13829	78386	92216
HBO	Drive Alone	21:30	4376	41774	46150	4643	44677	49320	7029	71575	78604
HBO	Drive Alone	22:00	3114	30186	33300	4392	36606	40997	5501	57083	62584
HBO	Drive Alone	22:30	3428	13993	17421	2655	20541	23196	4537	33572	38109
HBO	Drive Alone	23:00	1621	11432	13053	2829	15779	18608	3504	24463	27967
HBO	Drive Alone	23:30	799	5153	5953	1474	10798	12272	1474	13738	15212
HBO	Carpool	0:00	0	2166	2166	286	5078	5364	0	2166	2166
HBO	Carpool	0:30	0	1905	1905	471	2455	2926	0	3376	3376
HBO	Carpool	1:00	0	1872	1872	0	1660	1660	0	3157	3157
HBO	Carpool	1:30	181	1321	1502	480	1496	1976	181	2817	2998
HBO	Carpool	2:00	0	1380	1380	181	1536	1717	181	2701	2882
HBO	Carpool	2:30	0	165	165	0	1331	1331	0	1331	1331
HBO	Carpool	3:00	373	331	704	0	0	0	373	331	704
HBO	Carpool	3:30	233	1220	1453	373	1551	1924	606	1551	2157
HBO	Carpool	4:00	1089	665	1754	990	0	990	1322	665	1987
HBO	Carpool	4:30	1254	0	1254	1487	665	2152	1587	665	2251
HBO	Carpool	5:00	5513	0	5513	2256	0	2256	5613	0	5613
HBO	Carpool	5:30	15702	1444	17145	6207	338	6544	19058	1444	20502
HBO	Carpool	6:00	20744	1418	22163	14697	1918	16616	33596	2524	36120
HBO	Carpool	6:30	73229	3655	76884	42140	2035	44175	92128	4261	96388
HBO	Carpool	7:00	148222	5631	153853	123059	4770	127829	198209	7857	206066
HBO	Carpool	7:30	173340	5436	178775	155157	4654	159810	248490	8523	257012
HBO	Carpool	8:00	179705	12158	191864	177288	9868	187156	273038	16028	289066
HBO	Carpool	8:30	196307	23264	219571	193450	19193	212643	292057	29424	321480
HBO	Carpool	9:00	117985	25506	143491	155908	29649	185557	216592	35736	252328
HBO	Carpool	9:30	61259	22584	83844	74499	19290	93789	121944	28671	150615
HBO	Carpool	10:00	52590	13437	66027	57288	15264	72552	100034	22819	122853
HBO	Carpool	10:30	49510	18313	67823	57636	13013	70649	92257	25867	118124
HBO	Carpool	11:00	55097	29956	85052	59235	25452	84687	89718	42810	132527
HBO	Carpool	11:30	36833	43021	79854	42998	30780	73778	67315	60379	127694
HBO	Carpool	12:00	34480	51274	85754	38791	50606	89397	58798	80872	139670
HBO	Carpool	12:30	29838	48894	78732	22667	57531	80198	49845	79160	129005
HBO	Carpool	13:00	38158	39909	78067	39799	39871	79669	65336	61538	126873
HBO	Carpool	13:30	34374	37385	71759	35422	34939	70360	59911	59052	118963
HBO	Carpool	14:00	28136	50354	78490	33059	44570	77628	52626	74468	127094
HBO	Carpool	14:30	42853	62896	105749	34401	56349	90749	62421	92794	155215
HBO	Carpool	15:00	56279	120670	176949	49901	85810	135712	84299	157116	241415
HBO	Carpool	15:30	43437	97038	140476	48653	103960	152613	77835	168344	246179
HBO	Carpool	16:00	64998	97698	162696	57016	106539	163555	94180	162082	256262
HBO	Carpool	16:30	56321	104135	160456	58511	87954	146464	93485	159678	253163
HBO	Carpool	17:00	66745	122898	189644	57362	119519	176881	101720	194622	296342
HBO	Carpool	17:30	77126	112551	189677	67519	106497	174016	121484	187655	309139
HBO	Carpool	18:00	95989	101639	197629	89710	122621	212331	149954	182797	332752
HBO	Carpool	18:30	99611	56876	156487	91067	84754	175821	159856	117052	276908
HBO	Carpool	19:00	67527	69555	137082	100092	63040	163133	136316	101853	238169
HBO	Carpool	19:30	30886	67306	98192	50688	66692	117380	67110	106119	173228
HBO	Carpool	20:00	17174	96776	113950	22397	88697	111094	33596	136203	169799
HBO	Carpool	20:30	13148	74990	88138	12785	85807	98592	23867	122495	146363
HBO	Carpool	21:00	6273	72465	78738	12115	65579	77694	17356	109153	126509
HBO	Carpool	21:30	4990	45864	50854	5734	56369	62103	10231	89438	99669
HBO	Carpool	22:00	2062	37534	39596	4276	51736	56011	6558	70604	77162
HBO	Carpool	22:30	742	15503	16245	1709	18571	20280	3025	34371	37396
HBO	Carpool	23:00	301	10333	10634	458	17584	18042	1617	25571	27188
HBO	Carpool	23:30	1863	8659	10522	2265	12461	14726	3022	16646	19668
HBO	All Persons	0:00	106	5204	5310	391	10897	11288	106	5204	5310
HBO	All Persons	0:30	0	5638	5638	471	5664	6135	0	8733	8733
HBO	All Persons	1:00	0	5705	5705	0	6222	6222	0	9465	9465
HBO	All Persons	1:30	273	2412	2685	572	4767	5340	273	6663	6936
HBO	All Persons	2:00	298	3611	3909	734	2292	3026	479	5507	5986
HBO	All Persons	2:30	0	991	991	298	4206	4504	298	4206	4504
HBO	All Persons	3:00	492	682	1174	0	351	351	492	682	1174
HBO	All Persons	3:30	364	1453	1817	623	1784	2407	856	1784	2640
HBO	All Persons	4:00	3325	757	4081	1255	92	1347	3557	757	4314
HBO	All Persons	4:30	6841	439	7280	3340	665	4004	9144	1103	10247
HBO	All Persons	5:00	17166	1211	18377	13879	534	14414	22970	1649	24620
HBO	All Persons	5:30	36653	3560	40213	20514	1802	22316	45744	4675	50419

B-12

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
HBO	All Persons	6:00	57905	8786	66691	33924	8366	42290	83135	11659	94794
HBO	All Persons	6:30	202079	16378	218458	85882	12614	98496	251290	19671	270961
HBO	All Persons	7:00	306701	35325	342025	257367	28080	285447	472108	42382	514490
HBO	All Persons	7:30	324342	34858	359200	304208	28995	333203	539084	49161	588244
HBO	All Persons	8:00	354210	51318	405529	356784	45127	401912	589086	71483	660569
HBO	All Persons	8:30	349985	67971	417956	371954	61121	433075	582286	94327	676613
HBO	All Persons	9:00	207019	61202	268220	293881	71945	365826	417350	94408	511758
HBO	All Persons	9:30	136216	48746	184962	152955	49018	201974	259686	71208	330894
HBO	All Persons	10:00	123386	43842	167228	134199	43190	177388	230116	66032	296149
HBO	All Persons	10:30	106944	53005	159949	127546	42764	170310	202862	75848	278709
HBO	All Persons	11:00	106136	67698	173834	120244	62048	182292	181452	100781	282234
HBO	All Persons	11:30	79794	89767	169560	91831	72786	164618	141002	128500	269502
HBO	All Persons	12:00	73842	103953	177794	80015	92253	172268	123012	159667	282679
HBO	All Persons	12:30	68917	89102	158019	59513	105153	164666	111914	156516	268430
HBO	All Persons	13:00	82459	78851	161310	86119	79970	166088	134859	130214	265073
HBO	All Persons	13:30	75355	86562	161917	78681	72429	151110	124096	136806	260902
HBO	All Persons	14:00	69472	172088	241560	75488	118338	193825	114887	236465	351352
HBO	All Persons	14:30	102518	207438	309955	81695	184520	266215	141917	325565	467481
HBO	All Persons	15:00	107594	282886	390481	109744	230100	339845	167816	423931	591747
HBO	All Persons	15:30	89732	267806	357539	95384	269421	364804	147804	461637	609442
HBO	All Persons	16:00	111355	180649	292004	108093	248286	356378	163776	372865	536641
HBO	All Persons	16:30	95497	170647	266144	96469	163942	260411	151181	295227	446407
HBO	All Persons	17:00	107933	197480	305413	95320	195050	290370	162645	328765	491410
HBO	All Persons	17:30	130787	181550	312337	112081	183127	295207	198112	315266	513377
HBO	All Persons	18:00	152484	161460	313944	147126	189192	336319	238515	293599	532114
HBO	All Persons	18:30	157228	113013	270241	147178	145008	292186	248617	217420	466037
HBO	All Persons	19:00	112353	120834	233187	155649	119535	275184	213792	193246	407038
HBO	All Persons	19:30	61056	114250	175306	91421	113993	205414	119199	187961	307160
HBO	All Persons	20:00	41028	150329	191356	46528	140608	187136	68805	224297	293102
HBO	All Persons	20:30	24434	126711	151145	29055	131104	160160	46231	210400	256631
HBO	All Persons	21:00	15103	127730	142833	23621	123417	147039	32278	207026	239305
HBO	All Persons	21:30	9796	98156	107951	10802	109551	120353	17900	181765	199665
HBO	All Persons	22:00	5720	74419	80140	9078	95145	104223	12818	146633	159452
HBO	All Persons	22:30	4435	33233	37669	4976	46456	51432	8175	83715	91890
HBO	All Persons	23:00	2351	23143	25495	3717	40444	44161	5551	59602	65153
HBO	All Persons	23:30	2867	15052	17918	3944	25530	29474	4701	33580	38280
NHW	Transit	0:00	0	0	0	0	0	0	0	0	0
NHW	Transit	0:30	0	0	0	0	0	0	0	0	0
NHW	Transit	1:00	0	0	0	0	0	0	0	0	0
NHW	Transit	1:30	0	0	0	0	0	0	0	0	0
NHW	Transit	2:00	0	0	0	0	0	0	0	0	0
NHW	Transit	2:30	0	0	0	0	0	0	0	0	0
NHW	Transit	3:00	0	0	0	0	0	0	0	0	0
NHW	Transit	3:30	0	0	0	0	0	0	0	0	0
NHW	Transit	4:00	0	0	0	0	0	0	0	0	0
NHW	Transit	4:30	0	0	0	0	0	0	0	0	0
NHW	Transit	5:00	405	405	810	0	0	0	405	405	810
NHW	Transit	5:30	682	682	1364	0	0	0	1087	1087	2174
NHW	Transit	6:00	775	775	1550	331	331	662	1862	1862	3724
NHW	Transit	6:30	1369	1369	2738	326	326	652	2900	2900	5799
NHW	Transit	7:00	2143	2143	4286	1221	1221	2441	4717	4717	9434
NHW	Transit	7:30	2983	2983	5966	1524	1524	3048	6479	6479	12959
NHW	Transit	8:00	3144	3144	6288	2582	2582	5165	8099	8099	16198
NHW	Transit	8:30	3025	3025	6050	4248	4248	8497	8542	8542	17084
NHW	Transit	9:00	1598	1598	3196	3131	3131	6263	5892	5892	11783
NHW	Transit	9:30	1376	1376	2751	2310	2310	4620	4136	4136	8272
NHW	Transit	10:00	1098	1098	2197	1065	1065	2131	2924	2924	5849
NHW	Transit	10:30	1507	1507	3014	1553	1553	3106	3366	3366	6731
NHW	Transit	11:00	1388	1388	2776	1363	1363	2726	3201	3201	6402
NHW	Transit	11:30	1637	1637	3273	1463	1463	2926	3475	3475	6949
NHW	Transit	12:00	1419	1419	2839	1514	1514	3028	3431	3431	6862
NHW	Transit	12:30	1515	1515	3031	1359	1359	2718	3432	3432	6864
NHW	Transit	13:00	1765	1765	3530	1627	1627	3254	3838	3838	7676
NHW	Transit	13:30	2380	2380	4760	2517	2517	5034	4591	4591	9182
NHW	Transit	14:00	2029	2029	4059	1477	1477	2954	4104	4104	8207
NHW	Transit	14:30	1385	1385	2770	1046	1046	2091	4012	4012	8023
NHW	Transit	15:00	1862	1862	3724	2616	2616	5233	4828	4828	9657
NHW	Transit	15:30	3045	3045	6090	1335	1335	2670	5257	5257	10514
NHW	Transit	16:00	4674	4674	9348	1441	1441	2881	8596	8596	17192
NHW	Transit	16:30	5920	5920	11840	2296	2296	4593	13075	13075	26151
NHW	Transit	17:00	7425	7425	14851	5545	5545	11089	18204	18204	36409
NHW	Transit	17:30	6289	6289	12578	5835	5835	11671	18949	18949	37897
NHW	Transit	18:00	3272	3272	6543	7416	7416	14832	16385	16385	32770
NHW	Transit	18:30	1680	1680	3359	6848	6848	13696	10649	10649	21297
NHW	Transit	19:00	1229	1229	2459	3134	3134	6267	5030	5030	10060
NHW	Transit	19:30	864	864	1728	1352	1352	2704	2760	2760	5520
NHW	Transit	20:00	107	107	213	877	877	1753	1515	1515	3030
NHW	Transit	20:30	102	102	204	638	638	1277	741	741	1481
NHW	Transit	21:00	102	102	205	148	148	297	205	205	409
NHW	Transit	21:30	323	323	645	56	56	113	379	379	758
NHW	Transit	22:00	46	46	92	46	46	92	369	369	738

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
NHW	Transit	22:30	0	0	0	276	276	553	323	323	645
NHW	Transit	23:00	0	0	0	46	46	92	46	46	92
NHW	Transit	23:30	0	0	0	0	0	0	0	0	0
NHW	Auto Driver	0:00	30	30	61	0	0	0	30	30	61
NHW	Auto Driver	0:30	0	0	0	308	308	616	30	30	61
NHW	Auto Driver	1:00	235	235	471	52	52	104	235	235	471
NHW	Auto Driver	1:30	398	398	796	183	183	367	582	582	1163
NHW	Auto Driver	2:00	206	206	413	605	605	1209	605	605	1209
NHW	Auto Driver	2:30	0	0	0	0	0	0	0	0	0
NHW	Auto Driver	3:00	325	325	649	0	0	0	325	325	649
NHW	Auto Driver	3:30	61	61	122	325	325	649	386	386	771
NHW	Auto Driver	4:00	220	220	440	0	0	0	281	281	562
NHW	Auto Driver	4:30	1195	1195	2391	220	220	440	1476	1476	2953
NHW	Auto Driver	5:00	1916	1916	3832	667	667	1335	3172	3172	6345
NHW	Auto Driver	5:30	3194	3194	6387	2821	2821	5642	5699	5699	11397
NHW	Auto Driver	6:00	5322	5322	10644	2890	2890	5781	8199	8199	16399
NHW	Auto Driver	6:30	9103	9103	18205	6639	6639	13277	14411	14411	28823
NHW	Auto Driver	7:00	14118	14118	28235	8803	8803	17606	21891	21891	43781
NHW	Auto Driver	7:30	14706	14706	29413	14563	14563	29125	27794	27794	55588
NHW	Auto Driver	8:00	22972	22972	45944	18397	18397	36793	36203	36203	72406
NHW	Auto Driver	8:30	22091	22091	44183	20287	20287	40574	39898	39898	79795
NHW	Auto Driver	9:00	15416	15416	30832	21086	21086	42173	35027	35027	70054
NHW	Auto Driver	9:30	17442	17442	34885	18948	18948	37897	31383	31383	62766
NHW	Auto Driver	10:00	15301	15301	30601	17272	17272	34545	27735	27735	55470
NHW	Auto Driver	10:30	17698	17698	35397	16127	16127	32255	28161	28161	56322
NHW	Auto Driver	11:00	22224	22224	44449	20849	20849	41698	34258	34258	68516
NHW	Auto Driver	11:30	36361	36361	72722	30118	30118	60235	49770	49770	99540
NHW	Auto Driver	12:00	41373	41373	82745	44395	44395	88790	61025	61025	122050
NHW	Auto Driver	12:30	45197	45197	90393	41007	41007	82014	61827	61827	123653
NHW	Auto Driver	13:00	38442	38442	76883	40787	40787	81575	59261	59261	118523
NHW	Auto Driver	13:30	29183	29183	58366	33507	33507	67014	47657	47657	95314
NHW	Auto Driver	14:00	26665	26665	53329	25095	25095	50189	40815	40815	81629
NHW	Auto Driver	14:30	26868	26868	53737	23253	23253	46505	42588	42588	85177
NHW	Auto Driver	15:00	30032	30032	60063	27333	27333	54666	49368	49368	98735
NHW	Auto Driver	15:30	30695	30695	61390	25840	25840	51679	52730	52730	105460
NHW	Auto Driver	16:00	36977	36977	73954	32489	32489	64977	63868	63868	127735
NHW	Auto Driver	16:30	37990	37990	75980	35394	35394	70789	69369	69369	138738
NHW	Auto Driver	17:00	45017	45017	90034	38941	38941	77882	78992	78992	157983
NHW	Auto Driver	17:30	30414	30414	60828	40741	40741	81482	70465	70465	140929
NHW	Auto Driver	18:00	20059	20059	40118	31752	31752	63504	49783	49783	99566
NHW	Auto Driver	18:30	14749	14749	29498	19184	19184	38368	32780	32780	65560
NHW	Auto Driver	19:00	9112	9112	18223	15136	15136	30271	22708	22708	45415
NHW	Auto Driver	19:30	4531	4531	9062	8196	8196	16392	12103	12103	24206
NHW	Auto Driver	20:00	2826	2826	5653	4902	4902	9803	6733	6733	13466
NHW	Auto Driver	20:30	2505	2505	5011	2443	2443	4887	4337	4337	8673
NHW	Auto Driver	21:00	2355	2355	4710	3192	3192	6384	4248	4248	8497
NHW	Auto Driver	21:30	1761	1761	3522	1672	1672	3344	2818	2818	5635
NHW	Auto Driver	22:00	574	574	1147	1382	1382	2765	1719	1719	3438
NHW	Auto Driver	22:30	267	267	535	498	498	997	604	604	1208
NHW	Auto Driver	23:00	605	605	1209	441	441	881	710	710	1420
NHW	Auto Driver	23:30	330	330	660	322	322	643	433	433	867
NHW	Auto Pass.	0:00	0	0	0	0	0	0	0	0	0
NHW	Auto Pass.	0:30	0	0	0	0	0	0	0	0	0
NHW	Auto Pass.	1:00	0	0	0	0	0	0	0	0	0
NHW	Auto Pass.	1:30	0	0	0	0	0	0	0	0	0
NHW	Auto Pass.	2:00	0	0	0	0	0	0	0	0	0
NHW	Auto Pass.	2:30	0	0	0	0	0	0	0	0	0
NHW	Auto Pass.	3:00	140	140	281	0	0	0	140	140	281
NHW	Auto Pass.	3:30	0	0	0	0	0	0	140	140	281
NHW	Auto Pass.	4:00	198	198	396	140	140	281	338	338	677
NHW	Auto Pass.	4:30	127	127	253	0	0	0	324	324	649
NHW	Auto Pass.	5:00	433	433	865	235	235	470	757	757	1514
NHW	Auto Pass.	5:30	1569	1569	3137	192	192	384	2090	2090	4181
NHW	Auto Pass.	6:00	1849	1849	3698	384	384	769	3747	3747	7495
NHW	Auto Pass.	6:30	1603	1603	3206	2185	2185	4371	4966	4966	9932
NHW	Auto Pass.	7:00	1212	1212	2425	2155	2155	4311	3993	3993	7986
NHW	Auto Pass.	7:30	2131	2131	4262	1831	1831	3661	3969	3969	7937
NHW	Auto Pass.	8:00	1529	1529	3059	1728	1728	3457	3667	3667	7334
NHW	Auto Pass.	8:30	1270	1270	2540	2446	2446	4891	3209	3209	6417
NHW	Auto Pass.	9:00	1134	1134	2267	1090	1090	2180	1897	1897	3793
NHW	Auto Pass.	9:30	960	960	1919	907	907	1815	1766	1766	3533
NHW	Auto Pass.	10:00	521	521	1041	927	927	1853	1380	1380	2760
NHW	Auto Pass.	10:30	456	456	912	607	607	1214	909	909	1818
NHW	Auto Pass.	11:00	1761	1761	3522	1064	1064	2128	2063	2063	4127
NHW	Auto Pass.	11:30	5490	5490	10979	4693	4693	9387	6489	6489	12978
NHW	Auto Pass.	12:00	6421	6421	12842	5318	5318	10637	8216	8216	16433
NHW	Auto Pass.	12:30	5388	5388	10777	6153	6153	12306	8286	8286	16573
NHW	Auto Pass.	13:00	5326	5326	10651	5615	5615	11229	7459	7459	14918
NHW	Auto Pass.	13:30	4206	4206	8411	3807	3807	7614	6050	6050	12100
NHW	Auto Pass.	14:00	1545	1545	3090	2026	2026	4051	3788	3788	7577
NHW	Auto Pass.	14:30	1823	1823	3646	2065	2065	4129	3586	3586	7171

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
NHW	Auto Pass.	15:00	2896	2896	5792	2204	2204	4407	4417	4417	8835
NHW	Auto Pass.	15:30	3389	3389	6779	2001	2001	4003	5603	5603	11206
NHW	Auto Pass.	16:00	4381	4381	8762	3955	3955	7910	7983	7983	15965
NHW	Auto Pass.	16:30	3124	3124	6247	2747	2747	5495	7152	7152	14303
NHW	Auto Pass.	17:00	5073	5073	10146	4321	4321	8641	9477	9477	18954
NHW	Auto Pass.	17:30	3327	3327	6655	4835	4835	9671	8484	8484	16967
NHW	Auto Pass.	18:00	1948	1948	3896	3933	3933	7867	5596	5596	11193
NHW	Auto Pass.	18:30	929	929	1857	2063	2063	4127	2592	2592	5184
NHW	Auto Pass.	19:00	356	356	711	530	530	1060	884	884	1768
NHW	Auto Pass.	19:30	490	490	981	508	508	1015	845	845	1689
NHW	Auto Pass.	20:00	600	600	1199	522	522	1044	937	937	1873
NHW	Auto Pass.	20:30	407	407	815	435	435	870	822	822	1643
NHW	Auto Pass.	21:00	504	504	1008	604	604	1208	891	891	1781
NHW	Auto Pass.	21:30	271	271	542	557	557	1115	557	557	1115
NHW	Auto Pass.	22:00	364	364	727	218	218	437	364	364	727
NHW	Auto Pass.	22:30	0	0	0	55	55	109	145	145	290
NHW	Auto Pass.	23:00	0	0	0	91	91	181	91	91	181
NHW	Auto Pass.	23:30	0	0	0	0	0	0	0	0	0
NHW	Auto Person	0:00	30	30	61	0	0	0	30	30	61
NHW	Auto Person	0:30	0	0	0	308	308	616	30	30	61
NHW	Auto Person	1:00	235	235	471	52	52	104	235	235	471
NHW	Auto Person	1:30	398	398	796	183	183	367	582	582	1163
NHW	Auto Person	2:00	206	206	413	605	605	1209	605	605	1209
NHW	Auto Person	2:30	0	0	0	0	0	0	0	0	0
NHW	Auto Person	3:00	465	465	930	0	0	0	465	465	930
NHW	Auto Person	3:30	61	61	122	325	325	649	526	526	1052
NHW	Auto Person	4:00	418	418	836	140	140	281	619	619	1239
NHW	Auto Person	4:30	1322	1322	2644	220	220	440	1801	1801	3602
NHW	Auto Person	5:00	2348	2348	4697	902	902	1805	3929	3929	7859
NHW	Auto Person	5:30	4762	4762	9524	3013	3013	6026	7789	7789	15578
NHW	Auto Person	6:00	7171	7171	14341	3275	3275	6549	11947	11947	23893
NHW	Auto Person	6:30	10706	10706	21411	8824	8824	17648	19378	19378	38755
NHW	Auto Person	7:00	15330	15330	30660	10959	10959	21917	25884	25884	51767
NHW	Auto Person	7:30	16837	16837	33675	16393	16393	32787	31762	31762	63525
NHW	Auto Person	8:00	24501	24501	49003	20125	20125	40250	39870	39870	79740
NHW	Auto Person	8:30	23361	23361	46722	22733	22733	45465	43106	43106	86213
NHW	Auto Person	9:00	16550	16550	33099	22176	22176	44352	36924	36924	73847
NHW	Auto Person	9:30	18402	18402	36804	19856	19856	39711	33150	33150	66299
NHW	Auto Person	10:00	15821	15821	31642	18199	18199	36398	29115	29115	58230
NHW	Auto Person	10:30	18154	18154	36308	16734	16734	33469	29070	29070	58140
NHW	Auto Person	11:00	23985	23985	47971	21913	21913	43826	36321	36321	72643
NHW	Auto Person	11:30	41851	41851	83701	34811	34811	69622	56259	56259	112518
NHW	Auto Person	12:00	47794	47794	95587	49713	49713	99427	69242	69242	138483
NHW	Auto Person	12:30	50585	50585	101170	47160	47160	94320	70113	70113	140226
NHW	Auto Person	13:00	43767	43767	87534	46402	46402	92804	66720	66720	133441
NHW	Auto Person	13:30	33389	33389	66777	37314	37314	74627	53707	53707	107414
NHW	Auto Person	14:00	28210	28210	56419	27120	27120	54241	44603	44603	89206
NHW	Auto Person	14:30	28691	28691	57383	25317	25317	50634	46174	46174	92348
NHW	Auto Person	15:00	32928	32928	65856	29537	29537	59073	53785	53785	107570
NHW	Auto Person	15:30	34085	34085	68169	27841	27841	55682	58333	58333	116666
NHW	Auto Person	16:00	41358	41358	82716	36443	36443	72887	71850	71850	143701
NHW	Auto Person	16:30	41114	41114	82227	38142	38142	76284	76521	76521	153041
NHW	Auto Person	17:00	50090	50090	100180	43262	43262	86523	88469	88469	176938
NHW	Auto Person	17:30	33741	33741	67482	45576	45576	91153	78948	78948	157897
NHW	Auto Person	18:00	22007	22007	44015	35685	35685	71370	55379	55379	110758
NHW	Auto Person	18:30	15678	15678	31356	21247	21247	42495	35372	35372	70744
NHW	Auto Person	19:00	9467	9467	18934	15666	15666	31331	23592	23592	47183
NHW	Auto Person	19:30	5021	5021	10043	8704	8704	17408	12947	12947	25895
NHW	Auto Person	20:00	3426	3426	6852	5424	5424	10848	7670	7670	15339
NHW	Auto Person	20:30	2913	2913	5825	2879	2879	5757	5158	5158	10316
NHW	Auto Person	21:00	2859	2859	5719	3796	3796	7592	5139	5139	10278
NHW	Auto Person	21:30	2032	2032	4064	2229	2229	4459	3375	3375	6750
NHW	Auto Person	22:00	937	937	1874	1601	1601	3201	2083	2083	4165
NHW	Auto Person	22:30	267	267	535	553	553	1106	749	749	1499
NHW	Auto Person	23:00	605	605	1209	531	531	1062	801	801	1601
NHW	Auto Person	23:30	330	330	660	322	322	643	433	433	867
NHW	Drive Alone	0:00	30	30	61	0	0	0	30	30	61
NHW	Drive Alone	0:30	0	0	0	142	142	284	30	30	61
NHW	Drive Alone	1:00	235	235	471	52	52	104	235	235	471
NHW	Drive Alone	1:30	398	398	796	183	183	367	582	582	1163
NHW	Drive Alone	2:00	206	206	413	605	605	1209	605	605	1209
NHW	Drive Alone	2:30	0	0	0	0	0	0	0	0	0
NHW	Drive Alone	3:00	325	325	649	0	0	0	325	325	649
NHW	Drive Alone	3:30	61	61	122	325	325	649	386	386	771
NHW	Drive Alone	4:00	220	220	440	0	0	0	281	281	562
NHW	Drive Alone	4:30	1069	1069	2138	220	220	440	1350	1350	2700
NHW	Drive Alone	5:00	1716	1716	3431	667	667	1335	2846	2846	5691
NHW	Drive Alone	5:30	2827	2827	5654	2605	2605	5209	5005	5005	10010
NHW	Drive Alone	6:00	5019	5019	10038	2600	2600	5200	7419	7419	14839
NHW	Drive Alone	6:30	8533	8533	17067	5945	5945	11891	13353	13353	26706
NHW	Drive Alone	7:00	12515	12515	25030	7950	7950	15901	19922	19922	39845

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
NHW	Drive Alone	7:30	13476	13476	26952	14012	14012	28024	25448	25448	50896
NHW	Drive Alone	8:00	20941	20941	41881	16858	16858	33715	32376	32376	64753
NHW	Drive Alone	8:30	21470	21470	42940	17921	17921	35843	36989	36989	73978
NHW	Drive Alone	9:00	14433	14433	28865	20662	20662	41324	33500	33500	67000
NHW	Drive Alone	9:30	16763	16763	33526	17914	17914	35828	29601	29601	59202
NHW	Drive Alone	10:00	14385	14385	28770	16298	16298	32596	26072	26072	52145
NHW	Drive Alone	10:30	15701	15701	31401	15244	15244	30489	25475	25475	50950
NHW	Drive Alone	11:00	18069	18069	36137	17698	17698	35396	28299	28299	56598
NHW	Drive Alone	11:30	28093	28093	56186	23311	23311	46622	38694	38694	77388
NHW	Drive Alone	12:00	34364	34364	68728	35106	35106	70212	49747	49747	99494
NHW	Drive Alone	12:30	38934	38934	77868	34871	34871	69743	53575	53575	107150
NHW	Drive Alone	13:00	32449	32449	64899	35351	35351	70703	51153	51153	102306
NHW	Drive Alone	13:30	24099	24099	48199	28015	28015	56031	39901	39901	79802
NHW	Drive Alone	14:00	24669	24669	49338	22559	22559	45117	36555	36555	73110
NHW	Drive Alone	14:30	22130	22130	44260	20354	20354	40707	36126	36126	72253
NHW	Drive Alone	15:00	25537	25537	51074	23840	23840	47680	41310	41310	82620
NHW	Drive Alone	15:30	25800	25800	51600	22259	22259	44517	43270	43270	86540
NHW	Drive Alone	16:00	33332	33332	66664	26939	26939	53878	54343	54343	108687
NHW	Drive Alone	16:30	34925	34925	69849	32822	32822	65643	62329	62329	124658
NHW	Drive Alone	17:00	40012	40012	80023	35095	35095	70190	69519	69519	139038
NHW	Drive Alone	17:30	26238	26238	52476	36166	36166	72332	60662	60662	121325
NHW	Drive Alone	18:00	17569	17569	35138	26737	26737	53475	42065	42065	84131
NHW	Drive Alone	18:30	13171	13171	26342	16936	16936	33872	28499	28499	56998
NHW	Drive Alone	19:00	8517	8517	17035	12962	12962	25924	20080	20080	40160
NHW	Drive Alone	19:30	4042	4042	8084	7613	7613	15226	11160	11160	22320
NHW	Drive Alone	20:00	2555	2555	5110	4317	4317	8633	6102	6102	12204
NHW	Drive Alone	20:30	2246	2246	4493	2138	2138	4277	4032	4032	8063
NHW	Drive Alone	21:00	2067	2067	4134	3192	3192	6384	3960	3960	7920
NHW	Drive Alone	21:30	1476	1476	2951	1384	1384	2768	2244	2244	4488
NHW	Drive Alone	22:00	355	355	711	998	998	1996	1215	1215	2431
NHW	Drive Alone	22:30	178	178	357	290	290	581	396	396	792
NHW	Drive Alone	23:00	379	379	758	381	381	762	485	485	969
NHW	Drive Alone	23:30	330	330	660	322	322	643	433	433	867
NHW	Carpool	0:00	0	0	0	0	0	0	0	0	0
NHW	Carpool	0:30	0	0	0	166	166	332	0	0	0
NHW	Carpool	1:00	0	0	0	0	0	0	0	0	0
NHW	Carpool	1:30	0	0	0	0	0	0	0	0	0
NHW	Carpool	2:00	0	0	0	0	0	0	0	0	0
NHW	Carpool	2:30	0	0	0	0	0	0	0	0	0
NHW	Carpool	3:00	140	140	281	0	0	0	140	140	281
NHW	Carpool	3:30	0	0	0	0	0	0	140	140	281
NHW	Carpool	4:00	198	198	396	140	140	281	338	338	677
NHW	Carpool	4:30	253	253	506	0	0	0	451	451	902
NHW	Carpool	5:00	633	633	1266	235	235	470	1084	1084	2167
NHW	Carpool	5:30	1935	1935	3871	409	409	817	2784	2784	5568
NHW	Carpool	6:00	2152	2152	4303	675	675	1349	4527	4527	9054
NHW	Carpool	6:30	2172	2172	4344	2879	2879	5757	6025	6025	12049
NHW	Carpool	7:00	2815	2815	5630	3008	3008	6016	5961	5961	11922
NHW	Carpool	7:30	3362	3362	6723	2382	2382	4763	6315	6315	12629
NHW	Carpool	8:00	3561	3561	7121	3267	3267	6535	7494	7494	14988
NHW	Carpool	8:30	1891	1891	3782	4811	4811	9622	6117	6117	12235
NHW	Carpool	9:00	2117	2117	4234	1514	1514	3028	3423	3423	6847
NHW	Carpool	9:30	1639	1639	3279	1942	1942	3884	3549	3549	7097
NHW	Carpool	10:00	1436	1436	2872	1901	1901	3802	3043	3043	6086
NHW	Carpool	10:30	2454	2454	4907	1490	1490	2980	3595	3595	7191
NHW	Carpool	11:00	5917	5917	11833	4215	4215	8430	8022	8022	16045
NHW	Carpool	11:30	13758	13758	27516	11500	11500	23000	17565	17565	35130
NHW	Carpool	12:00	13429	13429	26859	14607	14607	29215	19495	19495	38989
NHW	Carpool	12:30	11651	11651	23302	12289	12289	24577	16538	16538	33076
NHW	Carpool	13:00	11318	11318	22636	11051	11051	22101	15567	15567	31135
NHW	Carpool	13:30	9289	9289	18578	9298	9298	18597	13806	13806	27612
NHW	Carpool	14:00	3541	3541	7081	4562	4562	9123	8048	8048	16097
NHW	Carpool	14:30	6561	6561	13123	4964	4964	9927	10048	10048	20096
NHW	Carpool	15:00	7391	7391	14782	5697	5697	11393	12475	12475	24950
NHW	Carpool	15:30	8285	8285	16569	5582	5582	11164	15063	15063	30126
NHW	Carpool	16:00	8026	8026	16052	9505	9505	19009	17507	17507	35014
NHW	Carpool	16:30	6189	6189	12378	5320	5320	10640	14191	14191	28383
NHW	Carpool	17:00	10078	10078	20157	8167	8167	16334	18950	18950	37899
NHW	Carpool	17:30	7503	7503	15006	9410	9410	18821	18286	18286	36572
NHW	Carpool	18:00	4438	4438	8876	8948	8948	17896	13314	13314	26628
NHW	Carpool	18:30	2507	2507	5014	4311	4311	8623	6873	6873	13746
NHW	Carpool	19:00	950	950	1900	2704	2704	5407	3511	3511	7023
NHW	Carpool	19:30	980	980	1959	1091	1091	2182	1787	1787	3575
NHW	Carpool	20:00	871	871	1743	1107	1107	2214	1568	1568	3135
NHW	Carpool	20:30	666	666	1332	740	740	1481	1127	1127	2253
NHW	Carpool	21:00	792	792	1585	604	604	1208	1179	1179	2358
NHW	Carpool	21:30	556	556	1113	846	846	1691	1131	1131	2262
NHW	Carpool	22:00	582	582	1164	603	603	1206	867	867	1735
NHW	Carpool	22:30	89	89	178	263	263	526	353	353	707
NHW	Carpool	23:00	226	226	451	150	150	300	316	316	632
NHW	Carpool	23:30	0	0	0	0	0	0	0	0	0

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
NHW	All Persons	0:00	30	30	61	0	0	0	30	30	61
NHW	All Persons	0:30	0	0	0	308	308	616	30	30	61
NHW	All Persons	1:00	235	235	471	52	52	104	235	235	471
NHW	All Persons	1:30	398	398	796	183	183	367	582	582	1163
NHW	All Persons	2:00	206	206	413	605	605	1209	605	605	1209
NHW	All Persons	2:30	0	0	0	0	0	0	0	0	0
NHW	All Persons	3:00	465	465	930	0	0	0	465	465	930
NHW	All Persons	3:30	61	61	122	325	325	649	526	526	1052
NHW	All Persons	4:00	418	418	836	140	140	281	619	619	1239
NHW	All Persons	4:30	1322	1322	2644	220	220	440	1801	1801	3602
NHW	All Persons	5:00	2871	2871	5743	902	902	1805	4452	4452	8904
NHW	All Persons	5:30	5705	5705	11410	3265	3265	6530	9254	9254	18509
NHW	All Persons	6:00	8690	8690	17380	4382	4382	8764	14679	14679	29359
NHW	All Persons	6:30	13224	13224	26448	9660	9660	19320	23521	23521	47043
NHW	All Persons	7:00	19727	19727	39454	13524	13524	27048	33589	33589	67177
NHW	All Persons	7:30	24173	24173	48347	21527	21527	43054	44238	44238	88476
NHW	All Persons	8:00	31981	31981	63961	27673	27673	55345	54691	54691	109383
NHW	All Persons	8:30	32188	32188	64376	31501	31501	63002	59207	59207	118414
NHW	All Persons	9:00	24319	24319	48637	32557	32557	65114	52025	52025	104049
NHW	All Persons	9:30	25208	25208	50415	27738	27738	55475	44675	44675	89350
NHW	All Persons	10:00	20381	20381	40763	23257	23257	46514	37319	37319	74637
NHW	All Persons	10:30	25465	25465	50930	24017	24017	48034	39527	39527	79054
NHW	All Persons	11:00	31042	31042	62084	28408	28408	56816	46552	46552	93104
NHW	All Persons	11:30	57872	57872	115743	48484	48484	96969	76015	76015	152031
NHW	All Persons	12:00	77984	77984	155967	78737	78737	157475	105515	105515	211029
NHW	All Persons	12:30	84863	84863	169725	80513	80513	161027	111640	111640	223280
NHW	All Persons	13:00	68827	68827	137655	72955	72955	145910	99954	99954	199908
NHW	All Persons	13:30	53237	53237	106474	57402	57402	114805	80236	80236	160471
NHW	All Persons	14:00	40687	40687	81373	41327	41327	82655	63520	63520	127040
NHW	All Persons	14:30	36489	36489	72978	32765	32765	65531	58681	58681	117363
NHW	All Persons	15:00	40303	40303	80606	37906	37906	75812	66219	66219	132438
NHW	All Persons	15:30	42480	42480	84959	34481	34481	68963	70792	70792	141585
NHW	All Persons	16:00	50975	50975	101949	43475	43475	86951	87285	87285	174571
NHW	All Persons	16:30	51495	51495	102990	45040	45040	90081	95305	95305	190610
NHW	All Persons	17:00	63324	63324	126648	54099	54099	108199	113588	113588	227177
NHW	All Persons	17:30	44546	44546	89091	55379	55379	110757	104035	104035	208069
NHW	All Persons	18:00	30842	30842	61684	48687	48687	97374	79498	79498	158996
NHW	All Persons	18:30	20221	20221	40443	32069	32069	64139	51032	51032	102064
NHW	All Persons	19:00	12504	12504	25008	20731	20731	41463	31467	31467	62933
NHW	All Persons	19:30	7439	7439	14879	12304	12304	24608	18175	18175	36349
NHW	All Persons	20:00	3997	3997	7995	6984	6984	13968	9868	9868	19736
NHW	All Persons	20:30	3314	3314	6628	3816	3816	7633	6198	6198	12396
NHW	All Persons	21:00	3577	3577	7153	4341	4341	8682	5959	5959	11917
NHW	All Persons	21:30	2582	2582	5164	2677	2677	5353	4199	4199	8399
NHW	All Persons	22:00	1329	1329	2658	1748	1748	3495	2852	2852	5704
NHW	All Persons	22:30	318	318	637	1180	1180	2360	1422	1422	2845
NHW	All Persons	23:00	725	725	1449	697	697	1394	967	967	1934
NHW	All Persons	23:30	382	382	764	374	374	747	485	485	971
NHO	Transit	0:00	0	0	0	47	47	93	0	0	0
NHO	Transit	0:30	0	0	0	105	105	210	0	0	0
NHO	Transit	1:00	0	0	0	0	0	0	0	0	0
NHO	Transit	1:30	0	0	0	0	0	0	0	0	0
NHO	Transit	2:00	0	0	0	0	0	0	0	0	0
NHO	Transit	2:30	0	0	0	0	0	0	0	0	0
NHO	Transit	3:00	0	0	0	0	0	0	0	0	0
NHO	Transit	3:30	0	0	0	0	0	0	0	0	0
NHO	Transit	4:00	0	0	0	0	0	0	0	0	0
NHO	Transit	4:30	0	0	0	0	0	0	0	0	0
NHO	Transit	5:00	0	0	0	0	0	0	0	0	0
NHO	Transit	5:30	0	0	0	0	0	0	0	0	0
NHO	Transit	6:00	0	0	0	0	0	0	0	0	0
NHO	Transit	6:30	159	159	319	0	0	0	159	159	319
NHO	Transit	7:00	890	890	1781	159	159	319	1050	1050	2099
NHO	Transit	7:30	170	170	340	146	146	293	1060	1060	2120
NHO	Transit	8:00	644	644	1287	810	810	1620	1557	1557	3115
NHO	Transit	8:30	646	646	1292	696	696	1391	1393	1393	2787
NHO	Transit	9:00	1179	1179	2359	560	560	1121	1877	1877	3754
NHO	Transit	9:30	1565	1565	3130	995	995	1989	2882	2882	5764
NHO	Transit	10:00	575	575	1150	1347	1347	2693	2462	2462	4925
NHO	Transit	10:30	1217	1217	2435	954	954	1908	2333	2333	4666
NHO	Transit	11:00	1820	1820	3640	925	925	1849	3199	3199	6398
NHO	Transit	11:30	1280	1280	2560	2104	2104	4208	3554	3554	7108
NHO	Transit	12:00	919	919	1838	768	768	1536	2369	2369	4738
NHO	Transit	12:30	1489	1489	2979	1292	1292	2585	3091	3091	6182
NHO	Transit	13:00	1496	1496	2992	1255	1255	2509	3294	3294	6588
NHO	Transit	13:30	1279	1279	2557	1470	1470	2940	3318	3318	6637
NHO	Transit	14:00	1426	1426	2851	1066	1066	2132	3274	3274	6548
NHO	Transit	14:30	1216	1216	2432	1057	1057	2115	3424	3424	6848
NHO	Transit	15:00	1611	1611	3223	1700	1700	3400	3978	3978	7956
NHO	Transit	15:30	1381	1381	2762	1273	1273	2546	3659	3659	7317
NHO	Transit	16:00	1230	1230	2460	1482	1482	2963	3616	3616	7231

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
NHO	Transit	16:30	4325	4325	8649	1211	1211	2421	6459	6459	12917
NHO	Transit	17:00	1364	1364	2728	1735	1735	3471	6612	6612	13223
NHO	Transit	17:30	1210	1210	2420	761	761	1522	6086	6086	12173
NHO	Transit	18:00	1562	1562	3125	4518	4518	9036	6888	6888	13775
NHO	Transit	18:30	405	405	811	1487	1487	2974	2775	2775	5550
NHO	Transit	19:00	344	344	687	752	752	1504	1631	1631	3263
NHO	Transit	19:30	374	374	747	775	775	1549	1253	1253	2506
NHO	Transit	20:00	415	415	830	271	271	543	893	893	1787
NHO	Transit	20:30	209	209	419	242	242	484	832	832	1663
NHO	Transit	21:00	59	59	119	107	107	215	649	649	1299
NHO	Transit	21:30	355	355	710	259	259	517	897	897	1794
NHO	Transit	22:00	154	154	308	276	276	552	793	793	1585
NHO	Transit	22:30	0	0	0	415	415	830	517	517	1033
NHO	Transit	23:00	47	47	93	102	102	204	149	149	297
NHO	Transit	23:30	105	105	210	0	0	0	105	105	210
NHO	Auto Driver	0:00	182	182	363	417	417	835	182	182	363
NHO	Auto Driver	0:30	382	382	764	186	186	372	382	382	764
NHO	Auto Driver	1:00	227	227	454	518	518	1036	518	518	1036
NHO	Auto Driver	1:30	272	272	544	0	0	0	272	272	544
NHO	Auto Driver	2:00	513	513	1025	657	657	1313	785	785	1569
NHO	Auto Driver	2:30	309	309	618	437	437	874	437	437	874
NHO	Auto Driver	3:00	0	0	0	0	0	0	0	0	0
NHO	Auto Driver	3:30	256	256	512	128	128	256	256	256	512
NHO	Auto Driver	4:00	72	72	145	128	128	256	200	200	401
NHO	Auto Driver	4:30	230	230	460	175	175	349	302	302	605
NHO	Auto Driver	5:00	722	722	1443	128	128	256	849	849	1699
NHO	Auto Driver	5:30	616	616	1232	960	960	1920	1338	1338	2675
NHO	Auto Driver	6:00	1493	1493	2986	796	796	1592	1871	1871	3742
NHO	Auto Driver	6:30	3263	3263	6526	2480	2480	4959	4338	4338	8676
NHO	Auto Driver	7:00	3473	3473	6946	2475	2475	4951	5331	5331	10662
NHO	Auto Driver	7:30	7091	7091	14181	4924	4924	9847	9947	9947	19893
NHO	Auto Driver	8:00	11019	11019	22038	9124	9124	18249	16042	16042	32084
NHO	Auto Driver	8:30	17857	17857	35714	13957	13957	27914	24775	24775	49549
NHO	Auto Driver	9:00	24233	24233	48466	22317	22317	44634	35050	35050	70101
NHO	Auto Driver	9:30	30985	30985	61971	26989	26989	53978	43719	43719	87437
NHO	Auto Driver	10:00	41097	41097	82194	37545	37545	75091	57827	57827	115653
NHO	Auto Driver	10:30	49308	49308	98616	44185	44185	88370	69589	69589	139178
NHO	Auto Driver	11:00	55550	55550	111101	54221	54221	108442	80955	80955	161909
NHO	Auto Driver	11:30	57828	57828	115657	56072	56072	112144	84562	84562	169124
NHO	Auto Driver	12:00	60140	60140	120280	61023	61023	122046	88630	88630	177260
NHO	Auto Driver	12:30	54666	54666	109333	56090	56090	112181	82274	82274	164547
NHO	Auto Driver	13:00	50708	50708	101416	50137	50137	100275	76891	76891	153783
NHO	Auto Driver	13:30	50796	50796	101592	48837	48837	97674	77550	77550	155100
NHO	Auto Driver	14:00	46502	46502	93004	47908	47908	95817	75215	75215	150430
NHO	Auto Driver	14:30	47160	47160	94320	49396	49396	98792	74467	74467	148934
NHO	Auto Driver	15:00	48144	48144	96287	46763	46763	93526	73215	73215	146430
NHO	Auto Driver	15:30	39431	39431	78861	41673	41673	83346	65882	65882	131764
NHO	Auto Driver	16:00	37808	37808	75616	40106	40106	80213	62017	62017	124034
NHO	Auto Driver	16:30	34737	34737	69474	32949	32949	65897	56647	56647	113295
NHO	Auto Driver	17:00	33207	33207	66413	34932	34932	69864	56906	56906	113811
NHO	Auto Driver	17:30	29336	29336	58671	32121	32121	64242	51309	51309	102619
NHO	Auto Driver	18:00	28136	28136	56273	31890	31890	63780	47325	47325	94649
NHO	Auto Driver	18:30	28703	28703	57406	28234	28234	56468	44138	44138	88275
NHO	Auto Driver	19:00	24984	24984	49968	28887	28887	57774	40888	40888	81775
NHO	Auto Driver	19:30	21361	21361	42722	22931	22931	45862	33362	33362	66723
NHO	Auto Driver	20:00	14014	14014	28028	16731	16731	33461	24445	24445	48889
NHO	Auto Driver	20:30	14109	14109	28218	14467	14467	28934	21823	21823	43646
NHO	Auto Driver	21:00	7973	7973	15945	10884	10884	21768	15329	15329	30657
NHO	Auto Driver	21:30	5987	5987	11974	6940	6940	13880	10432	10432	20863
NHO	Auto Driver	22:00	3934	3934	7869	5118	5118	10236	7330	7330	14661
NHO	Auto Driver	22:30	747	747	1495	2219	2219	4439	2960	2960	5920
NHO	Auto Driver	23:00	706	706	1412	1041	1041	2081	1447	1447	2893
NHO	Auto Driver	23:30	381	381	761	551	551	1101	605	605	1211
NHO	Auto Pass.	0:00	260	260	521	211	211	423	260	260	521
NHO	Auto Pass.	0:30	184	184	369	425	425	851	445	445	889
NHO	Auto Pass.	1:00	0	0	0	207	207	413	207	207	413
NHO	Auto Pass.	1:30	0	0	0	0	0	0	0	0	0
NHO	Auto Pass.	2:00	0	0	0	0	0	0	0	0	0
NHO	Auto Pass.	2:30	0	0	0	0	0	0	0	0	0
NHO	Auto Pass.	3:00	0	0	0	0	0	0	0	0	0
NHO	Auto Pass.	3:30	0	0	0	0	0	0	0	0	0
NHO	Auto Pass.	4:00	0	0	0	0	0	0	0	0	0
NHO	Auto Pass.	4:30	116	116	231	0	0	0	116	116	231
NHO	Auto Pass.	5:00	432	432	864	116	116	231	547	547	1095
NHO	Auto Pass.	5:30	149	149	298	366	366	732	581	581	1161
NHO	Auto Pass.	6:00	298	298	596	214	214	429	513	513	1025
NHO	Auto Pass.	6:30	1863	1863	3725	642	642	1283	2161	2161	4321
NHO	Auto Pass.	7:00	3817	3817	7634	2380	2380	4759	5336	5336	10672
NHO	Auto Pass.	7:30	3841	3841	7683	4057	4057	8113	6798	6798	13595
NHO	Auto Pass.	8:00	4686	4686	9372	3740	3740	7480	7427	7427	14855
NHO	Auto Pass.	8:30	8181	8181	16363	5873	5873	11747	11869	11869	23737

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
NHO	Auto Pass.	9:00	7039	7039	14079	8663	8663	17326	13034	13034	26069
NHO	Auto Pass.	9:30	11405	11405	22810	8877	8877	17753	15776	15776	31552
NHO	Auto Pass.	10:00	14750	14750	29499	15261	15261	30522	21649	21649	43298
NHO	Auto Pass.	10:30	19793	19793	39585	16129	16129	32259	26181	26181	52362
NHO	Auto Pass.	11:00	21777	21777	43553	21656	21656	43312	31828	31828	63656
NHO	Auto Pass.	11:30	28845	28845	57689	24588	24588	49177	39017	39017	78034
NHO	Auto Pass.	12:00	26286	26286	52572	27362	27362	54723	40715	40715	81429
NHO	Auto Pass.	12:30	21764	21764	43527	26597	26597	53194	35117	35117	70233
NHO	Auto Pass.	13:00	20073	20073	40147	17309	17309	34618	28593	28593	57186
NHO	Auto Pass.	13:30	16374	16374	32748	18483	18483	36966	27658	27658	55317
NHO	Auto Pass.	14:00	17055	17055	34110	17059	17059	34119	26230	26230	52461
NHO	Auto Pass.	14:30	20449	20449	40897	19036	19036	38071	29620	29620	59240
NHO	Auto Pass.	15:00	30321	30321	60642	26163	26163	52327	40905	40905	81810
NHO	Auto Pass.	15:30	23433	23433	46866	26846	26846	53692	38175	38175	76349
NHO	Auto Pass.	16:00	22917	22917	45834	23674	23674	47348	34245	34245	68490
NHO	Auto Pass.	16:30	20597	20597	41194	19512	19512	39024	31168	31168	62336
NHO	Auto Pass.	17:00	20529	20529	41058	16648	16648	33295	32185	32185	64370
NHO	Auto Pass.	17:30	24056	24056	48112	27152	27152	54303	39593	39593	79187
NHO	Auto Pass.	18:00	19944	19944	39889	22353	22353	44707	32386	32386	64772
NHO	Auto Pass.	18:30	17566	17566	35133	18120	18120	36240	27599	27599	55198
NHO	Auto Pass.	19:00	16578	16578	33157	20406	20406	40812	26057	26057	52115
NHO	Auto Pass.	19:30	16809	16809	33619	14237	14237	28474	22461	22461	44921
NHO	Auto Pass.	20:00	10095	10095	20189	14334	14334	28667	18318	18318	36637
NHO	Auto Pass.	20:30	6664	6664	13329	7442	7442	14884	10649	10649	21299
NHO	Auto Pass.	21:00	2661	2661	5322	3859	3859	7718	5868	5868	11737
NHO	Auto Pass.	21:30	3359	3359	6718	3494	3494	6988	5368	5368	10736
NHO	Auto Pass.	22:00	3114	3114	6229	2537	2537	5073	4989	4989	9977
NHO	Auto Pass.	22:30	390	390	781	1984	1984	3968	2843	2843	5685
NHO	Auto Pass.	23:00	670	670	1340	1102	1102	2204	1529	1529	3057
NHO	Auto Pass.	23:30	399	399	798	426	426	853	825	825	1650
NHO	Auto Person	0:00	442	442	884	629	629	1257	442	442	884
NHO	Auto Person	0:30	566	566	1132	611	611	1223	826	826	1653
NHO	Auto Person	1:00	227	227	454	725	725	1450	725	725	1450
NHO	Auto Person	1:30	272	272	544	0	0	0	272	272	544
NHO	Auto Person	2:00	513	513	1025	657	657	1313	785	785	1569
NHO	Auto Person	2:30	309	309	618	437	437	874	437	437	874
NHO	Auto Person	3:00	0	0	0	0	0	0	0	0	0
NHO	Auto Person	3:30	256	256	512	128	128	256	256	256	512
NHO	Auto Person	4:00	72	72	145	128	128	256	200	200	401
NHO	Auto Person	4:30	346	346	692	175	175	349	418	418	836
NHO	Auto Person	5:00	1153	1153	2307	244	244	487	1397	1397	2794
NHO	Auto Person	5:30	765	765	1530	1326	1326	2652	1918	1918	3836
NHO	Auto Person	6:00	1791	1791	3582	1010	1010	2020	2383	2383	4767
NHO	Auto Person	6:30	5126	5126	10251	3121	3121	6242	6499	6499	12997
NHO	Auto Person	7:00	7290	7290	14579	4855	4855	9710	10667	10667	21334
NHO	Auto Person	7:30	10932	10932	21864	8980	8980	17960	16744	16744	33489
NHO	Auto Person	8:00	15705	15705	31410	12864	12864	25729	23469	23469	46939
NHO	Auto Person	8:30	26038	26038	52077	19831	19831	39661	36643	36643	73286
NHO	Auto Person	9:00	31272	31272	62544	30980	30980	61961	48085	48085	96170
NHO	Auto Person	9:30	42390	42390	84780	35866	35866	71731	59495	59495	118989
NHO	Auto Person	10:00	55847	55847	111693	52806	52806	105612	79476	79476	158951
NHO	Auto Person	10:30	69100	69100	138201	60314	60314	120628	95770	95770	191540
NHO	Auto Person	11:00	77327	77327	154654	75877	75877	151753	112783	112783	225566
NHO	Auto Person	11:30	86673	86673	173346	80660	80660	161321	123579	123579	247159
NHO	Auto Person	12:00	86426	86426	172852	88384	88384	176769	129345	129345	258689
NHO	Auto Person	12:30	76430	76430	152860	82687	82687	165375	117390	117390	234781
NHO	Auto Person	13:00	70781	70781	141563	67446	67446	134892	105484	105484	210969
NHO	Auto Person	13:30	67170	67170	134340	67320	67320	134640	105208	105208	210416
NHO	Auto Person	14:00	63557	63557	127115	64968	64968	129935	101446	101446	202891
NHO	Auto Person	14:30	67609	67609	135218	68431	68431	136863	104087	104087	208173
NHO	Auto Person	15:00	78465	78465	156929	72927	72927	145853	114120	114120	228240
NHO	Auto Person	15:30	62863	62863	125727	68519	68519	137039	104057	104057	208113
NHO	Auto Person	16:00	60725	60725	121450	63781	63781	127561	96262	96262	192524
NHO	Auto Person	16:30	55334	55334	110668	52460	52460	104921	87815	87815	175631
NHO	Auto Person	17:00	53736	53736	107471	51580	51580	103159	89091	89091	178181
NHO	Auto Person	17:30	53392	53392	106783	59273	59273	118546	90903	90903	181805
NHO	Auto Person	18:00	48081	48081	96161	54243	54243	108487	79711	79711	159421
NHO	Auto Person	18:30	46269	46269	92539	46354	46354	92708	71737	71737	143473
NHO	Auto Person	19:00	41563	41563	83125	49293	49293	98586	66945	66945	133890
NHO	Auto Person	19:30	38170	38170	76341	37168	37168	74336	55822	55822	111644
NHO	Auto Person	20:00	24109	24109	48217	31064	31064	62128	42763	42763	85526
NHO	Auto Person	20:30	20773	20773	41547	21909	21909	43818	32472	32472	64945
NHO	Auto Person	21:00	10633	10633	21267	14743	14743	29487	21197	21197	42394
NHO	Auto Person	21:30	9346	9346	18693	10434	10434	20868	15800	15800	31600
NHO	Auto Person	22:00	7049	7049	14098	7654	7654	15309	12319	12319	24638
NHO	Auto Person	22:30	1138	1138	2276	4203	4203	8407	5803	5803	11605
NHO	Auto Person	23:00	1376	1376	2752	2143	2143	4286	2975	2975	5950
NHO	Auto Person	23:30	779	779	1559	977	977	1954	1431	1431	2861
NHO	Drive Alone	0:00	119	119	238	264	264	528	119	119	238
NHO	Drive Alone	0:30	291	291	582	0	0	0	291	291	582
NHO	Drive Alone	1:00	175	175	350	466	466	932	466	466	932

Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
NHO	Drive Alone	1:30	64	64	127	0	0	0	0	64	64	127
NHO	Drive Alone	2:00	513	513	1025	448	448	897	576	576	1152
NHO	Drive Alone	2:30	309	309	618	437	437	874	437	437	874
NHO	Drive Alone	3:00	0	0	0	0	0	0	0	0	0
NHO	Drive Alone	3:30	256	256	512	128	128	256	256	256	512
NHO	Drive Alone	4:00	72	72	145	128	128	256	200	200	401
NHO	Drive Alone	4:30	230	230	460	175	175	349	302	302	605
NHO	Drive Alone	5:00	722	722	1443	128	128	256	849	849	1699
NHO	Drive Alone	5:30	616	616	1232	960	960	1920	1338	1338	2675
NHO	Drive Alone	6:00	1419	1419	2839	796	796	1592	1797	1797	3594
NHO	Drive Alone	6:30	2731	2731	5462	2142	2142	4283	3732	3732	7464
NHO	Drive Alone	7:00	2639	2639	5279	2207	2207	4415	4230	4230	8460
NHO	Drive Alone	7:30	6101	6101	12202	3896	3896	7792	8123	8123	16247
NHO	Drive Alone	8:00	8968	8968	17936	7775	7775	15550	13195	13195	26390
NHO	Drive Alone	8:30	13631	13631	27263	11619	11619	23239	19052	19052	38103
NHO	Drive Alone	9:00	18031	18031	36063	16246	16246	32491	25464	25464	50927
NHO	Drive Alone	9:30	23420	23420	46840	20209	20209	40417	32638	32638	65276
NHO	Drive Alone	10:00	28826	28826	57652	27049	27049	54098	41255	41255	82511
NHO	Drive Alone	10:30	34245	34245	68489	31471	31471	62942	48451	48451	96901
NHO	Drive Alone	11:00	37773	37773	75546	36804	36804	73609	54753	54753	109506
NHO	Drive Alone	11:30	38850	38850	77701	38339	38339	76679	56799	56799	113598
NHO	Drive Alone	12:00	41055	41055	82110	41506	41506	83012	59514	59514	119029
NHO	Drive Alone	12:30	36705	36705	73410	36229	36229	72458	54714	54714	109427
NHO	Drive Alone	13:00	36021	36021	72043	36972	36972	73945	54506	54506	109012
NHO	Drive Alone	13:30	37907	37907	75813	34183	34183	68366	55440	55440	110880
NHO	Drive Alone	14:00	33286	33286	66572	36241	36241	72481	54543	54543	109086
NHO	Drive Alone	14:30	30992	30992	61984	32922	32922	65843	49294	49294	98589
NHO	Drive Alone	15:00	32226	32226	64452	31009	31009	62017	48599	48599	97197
NHO	Drive Alone	15:30	25345	25345	50691	26785	26785	53571	42935	42935	85871
NHO	Drive Alone	16:00	22783	22783	45565	24696	24696	49391	38933	38933	77866
NHO	Drive Alone	16:30	21883	21883	43765	20028	20028	40057	36120	36120	72240
NHO	Drive Alone	17:00	21185	21185	42370	23770	23770	47540	37277	37277	74554
NHO	Drive Alone	17:30	17188	17188	34375	19492	19492	38985	30694	30694	61389
NHO	Drive Alone	18:00	15763	15763	31526	18048	18048	36096	26965	26965	53931
NHO	Drive Alone	18:30	16992	16992	33984	16678	16678	33355	25909	25909	51818
NHO	Drive Alone	19:00	14810	14810	29620	17142	17142	34284	24041	24041	48083
NHO	Drive Alone	19:30	11087	11087	22173	12604	12604	25209	17986	17986	35972
NHO	Drive Alone	20:00	7177	7177	14354	8229	8229	16458	12558	12558	25116
NHO	Drive Alone	20:30	8596	8596	17192	8315	8315	16630	12926	12926	25851
NHO	Drive Alone	21:00	4809	4809	9619	7103	7103	14205	9420	9420	18840
NHO	Drive Alone	21:30	4075	4075	8150	4532	4532	9064	6392	6392	12785
NHO	Drive Alone	22:00	2200	2200	4399	2839	2839	5678	4060	4060	8120
NHO	Drive Alone	22:30	612	612	1224	1352	1352	2704	1833	1833	3666
NHO	Drive Alone	23:00	257	257	514	647	647	1294	738	738	1475
NHO	Drive Alone	23:30	237	237	474	183	183	365	237	237	474
NHO	Carpool	0:00	323	323	646	364	364	729	323	323	646
NHO	Carpool	0:30	275	275	550	611	611	1223	535	535	1070
NHO	Carpool	1:00	52	52	104	259	259	517	259	259	517
NHO	Carpool	1:30	208	208	417	0	0	0	208	208	417
NHO	Carpool	2:00	0	0	0	208	208	417	208	208	417
NHO	Carpool	2:30	0	0	0	0	0	0	0	0	0
NHO	Carpool	3:00	0	0	0	0	0	0	0	0	0
NHO	Carpool	3:30	0	0	0	0	0	0	0	0	0
NHO	Carpool	4:00	0	0	0	0	0	0	0	0	0
NHO	Carpool	4:30	116	116	231	0	0	0	116	116	231
NHO	Carpool	5:00	432	432	864	116	116	231	547	547	1095
NHO	Carpool	5:30	149	149	298	366	366	732	581	581	1161
NHO	Carpool	6:00	372	372	744	214	214	429	586	586	1172
NHO	Carpool	6:30	2395	2395	4789	980	980	1959	2767	2767	5533
NHO	Carpool	7:00	4650	4650	9300	2648	2648	5295	6437	6437	12874
NHO	Carpool	7:30	4831	4831	9663	5084	5084	10168	8621	8621	17242
NHO	Carpool	8:00	6737	6737	13474	5090	5090	10179	10274	10274	20548
NHO	Carpool	8:30	12407	12407	24814	8211	8211	16422	17592	17592	35183
NHO	Carpool	9:00	13241	13241	26482	14735	14735	29469	22621	22621	45242
NHO	Carpool	9:30	18970	18970	37941	15657	15657	31314	26857	26857	53714
NHO	Carpool	10:00	27021	27021	54041	25757	25757	51514	38220	38220	76441
NHO	Carpool	10:30	34856	34856	69712	28843	28843	57687	47319	47319	94639
NHO	Carpool	11:00	39554	39554	79108	39072	39072	78145	58030	58030	116060
NHO	Carpool	11:30	47823	47823	95645	42321	42321	84642	66781	66781	133561
NHO	Carpool	12:00	45371	45371	90742	46879	46879	93757	69830	69830	139661
NHO	Carpool	12:30	39725	39725	79450	46458	46458	92916	62677	62677	125354
NHO	Carpool	13:00	34760	34760	69520	30474	30474	60948	50978	50978	101957
NHO	Carpool	13:30	29263	29263	58527	33137	33137	66274	49768	49768	99536
NHO	Carpool	14:00	30271	30271	60543	28727	28727	57454	46903	46903	93805
NHO	Carpool	14:30	36617	36617	73234	35510	35510	71020	54792	54792	109585
NHO	Carpool	15:00	46239	46239	92478	41918	41918	83836	65521	65521	131043
NHO	Carpool	15:30	37518	37518	75036	41734	41734	83468	61121	61121	122243
NHO	Carpool	16:00	37942	37942	75884	39085	39085	78170	57329	57329	114659
NHO	Carpool	16:30	33451	33451	66903	32432	32432	64864	51696	51696	103391
NHO	Carpool	17:00	32550	32550	65101	27810	27810	55619	51814	51814	103628
NHO	Carpool	17:30	36204	36204	72408	39780	39780	79561	60208	60208	120417

# Appendix B Weighted time of day summaries by purpose, mode, and direction

Purpose	Mode	Period	TripsBeg H>NH	TripsBeg NH>H	TripsBeg Total	TripsEnd H>NH	TripsEnd NH>H	TripsEnd Total	inMotion H>NH	inMotion NH>H	inMotion Total
NHO	Carpool	18:00	32318	32318	64635	36195	36195	72391	52745	52745	105491
NHO	Carpool	18:30	29277	29277	58555	29677	29677	59353	45828	45828	91655
NHO	Carpool	19:00	26753	26753	53506	32151	32151	64302	42904	42904	85807
NHO	Carpool	19:30	27084	27084	54168	24564	24564	49127	37836	37836	75673
NHO	Carpool	20:00	16932	16932	33864	22835	22835	45671	30205	30205	60410
NHO	Carpool	20:30	12177	12177	24354	13594	13594	27188	19547	19547	39094
NHO	Carpool	21:00	5824	5824	11648	7641	7641	15282	11777	11777	23554
NHO	Carpool	21:30	5272	5272	10543	5902	5902	11804	9408	9408	18815
NHO	Carpool	22:00	4849	4849	9698	4815	4815	9631	8259	8259	16518
NHO	Carpool	22:30	526	526	1052	2851	2851	5702	3970	3970	7939
NHO	Carpool	23:00	1119	1119	2238	1496	1496	2992	2238	2238	4475
NHO	Carpool	23:30	542	542	1084	795	795	1589	1193	1193	2387
NHO	All Persons	0:00	442	442	884	774	774	1548	442	442	884
NHO	All Persons	0:30	566	566	1132	716	716	1433	826	826	1653
NHO	All Persons	1:00	784	784	1568	1144	1144	2289	1282	1282	2563
NHO	All Persons	1:30	272	272	544	137	137	275	409	409	819
NHO	All Persons	2:00	543	543	1086	687	687	1374	815	815	1630
NHO	All Persons	2:30	414	414	828	542	542	1084	542	542	1084
NHO	All Persons	3:00	0	0	0	0	0	0	0	0	0
NHO	All Persons	3:30	256	256	512	128	128	256	256	256	512
NHO	All Persons	4:00	72	72	145	128	128	256	200	200	401
NHO	All Persons	4:30	499	499	998	175	175	349	572	572	1143
NHO	All Persons	5:00	1189	1189	2379	280	280	559	1586	1586	3173
NHO	All Persons	5:30	830	830	1659	1391	1391	2782	2136	2136	4273
NHO	All Persons	6:00	1947	1947	3894	1062	1062	2124	2693	2693	5385
NHO	All Persons	6:30	6081	6081	12162	3287	3287	6575	7711	7711	15423
NHO	All Persons	7:00	9981	9981	19962	6164	6164	12329	14405	14405	28810
NHO	All Persons	7:30	14318	14318	28637	11450	11450	22899	22559	22559	45118
NHO	All Persons	8:00	20548	20548	41095	16930	16930	33860	31657	31657	63314
NHO	All Persons	8:30	31115	31115	62230	25022	25022	50044	45842	45842	91684
NHO	All Persons	9:00	37248	37248	74496	37568	37568	75136	58068	58068	116135
NHO	All Persons	9:30	49720	49720	99441	40562	40562	81124	70220	70220	140441
NHO	All Persons	10:00	61542	61542	123085	61827	61827	123655	91201	91201	182402
NHO	All Persons	10:30	76214	76214	152429	66494	66494	132987	105588	105588	211175
NHO	All Persons	11:00	86233	86233	172466	83281	83281	166562	125327	125327	250654
NHO	All Persons	11:30	97725	97725	195451	91897	91897	183794	139772	139772	279543
NHO	All Persons	12:00	95181	95181	190362	98451	98451	196901	143056	143056	286111
NHO	All Persons	12:30	90699	90699	181397	95388	95388	190776	135304	135304	270607
NHO	All Persons	13:00	81313	81313	162625	77353	77353	154706	121228	121228	242457
NHO	All Persons	13:30	78297	78297	156595	79735	79735	159469	122173	122173	244345
NHO	All Persons	14:00	77316	77316	154632	77695	77695	155390	119754	119754	239508
NHO	All Persons	14:30	82290	82290	164580	80729	80729	161457	124349	124349	248698
NHO	All Persons	15:00	91837	91837	183674	86241	86241	172481	135457	135457	270915
NHO	All Persons	15:30	74386	74386	148772	79955	79955	159909	123603	123603	247206
NHO	All Persons	16:00	70255	70255	140509	77115	77115	154230	113903	113903	227806
NHO	All Persons	16:30	65271	65271	130543	59818	59818	119635	102059	102059	204118
NHO	All Persons	17:00	59489	59489	118977	57880	57880	115760	101730	101730	203460
NHO	All Persons	17:30	59714	59714	119428	65343	65343	130686	103564	103564	207129
NHO	All Persons	18:00	54677	54677	109355	63443	63443	126886	92899	92899	185798
NHO	All Persons	18:30	49838	49838	99677	52143	52143	104287	79294	79294	158588
NHO	All Persons	19:00	48684	48684	97368	55006	55006	110011	75835	75835	151669
NHO	All Persons	19:30	44476	44476	88952	45325	45325	90650	65305	65305	130610
NHO	All Persons	20:00	27011	27011	54022	33487	33487	66975	46991	46991	93982
NHO	All Persons	20:30	24234	24234	48468	25801	25801	51602	37737	37737	75475
NHO	All Persons	21:00	12057	12057	24114	16610	16610	33220	23993	23993	47987
NHO	All Persons	21:30	10266	10266	20532	11311	11311	22622	17650	17650	35299
NHO	All Persons	22:00	8264	8264	16528	9225	9225	18450	14508	14508	29015
NHO	All Persons	22:30	1647	1647	3294	5030	5030	10060	6929	6929	13859
NHO	All Persons	23:00	1973	1973	3946	2778	2778	5557	3872	3872	7745
NHO	All Persons	23:30	1305	1305	2610	1514	1514	3028	2171	2171	4342

Appendix C Trips in Motion by Time of Day, Purpose

Appendix C Trips in Motion by Time of Day, Purpose

Mode: Transit
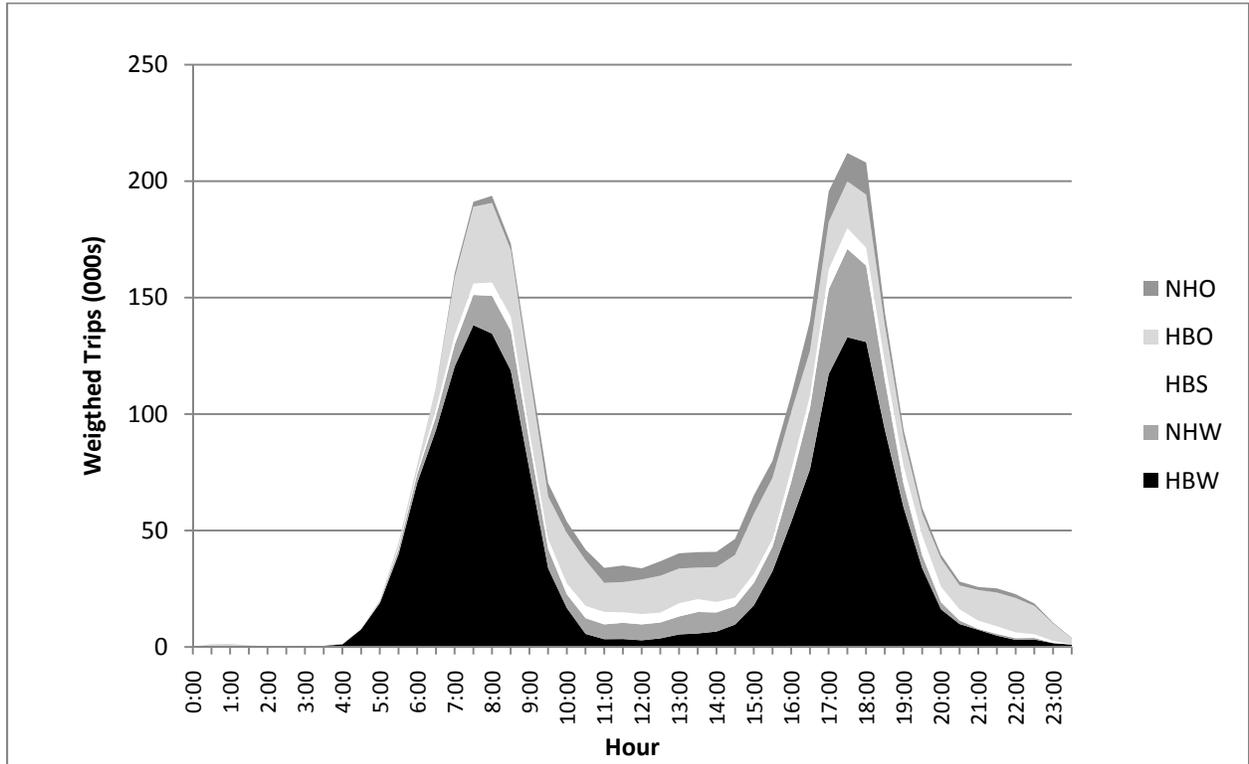
Mode: Auto Driver
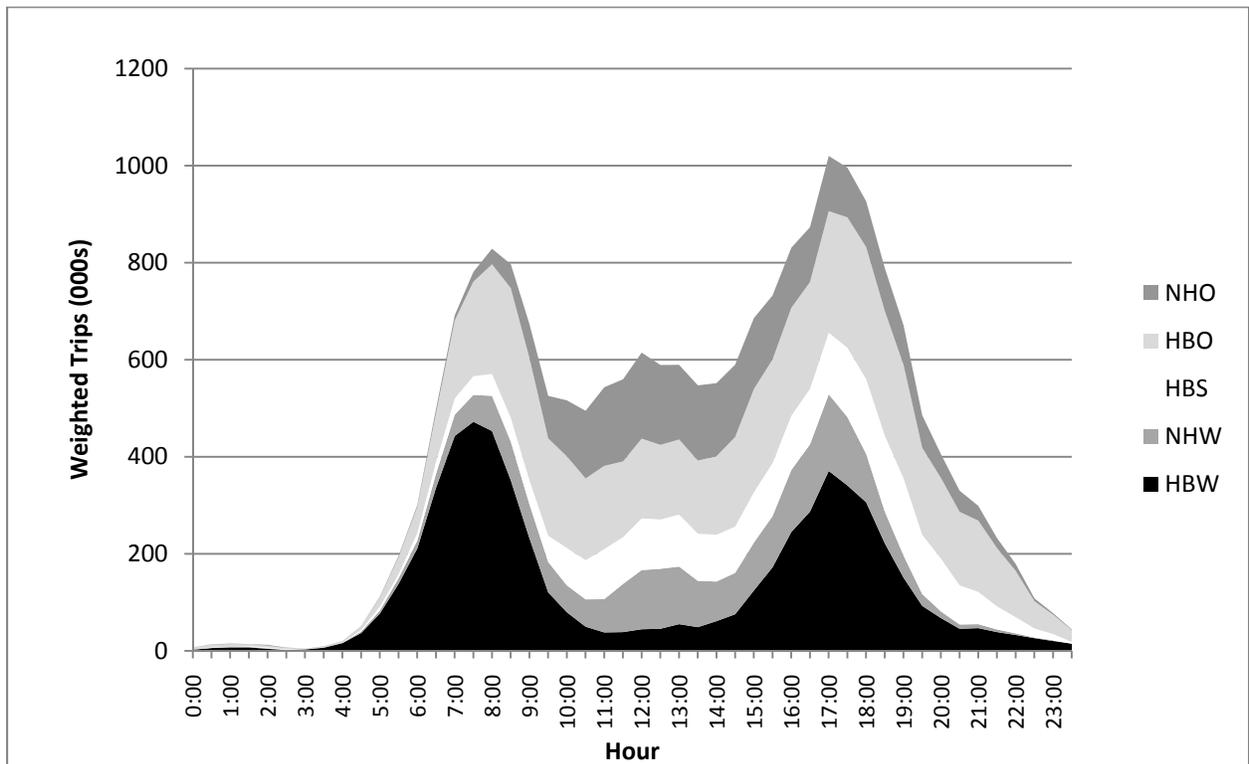
Appendix C Trips in Motion by Time of Day, Purpose

Mode: Auto Passenger
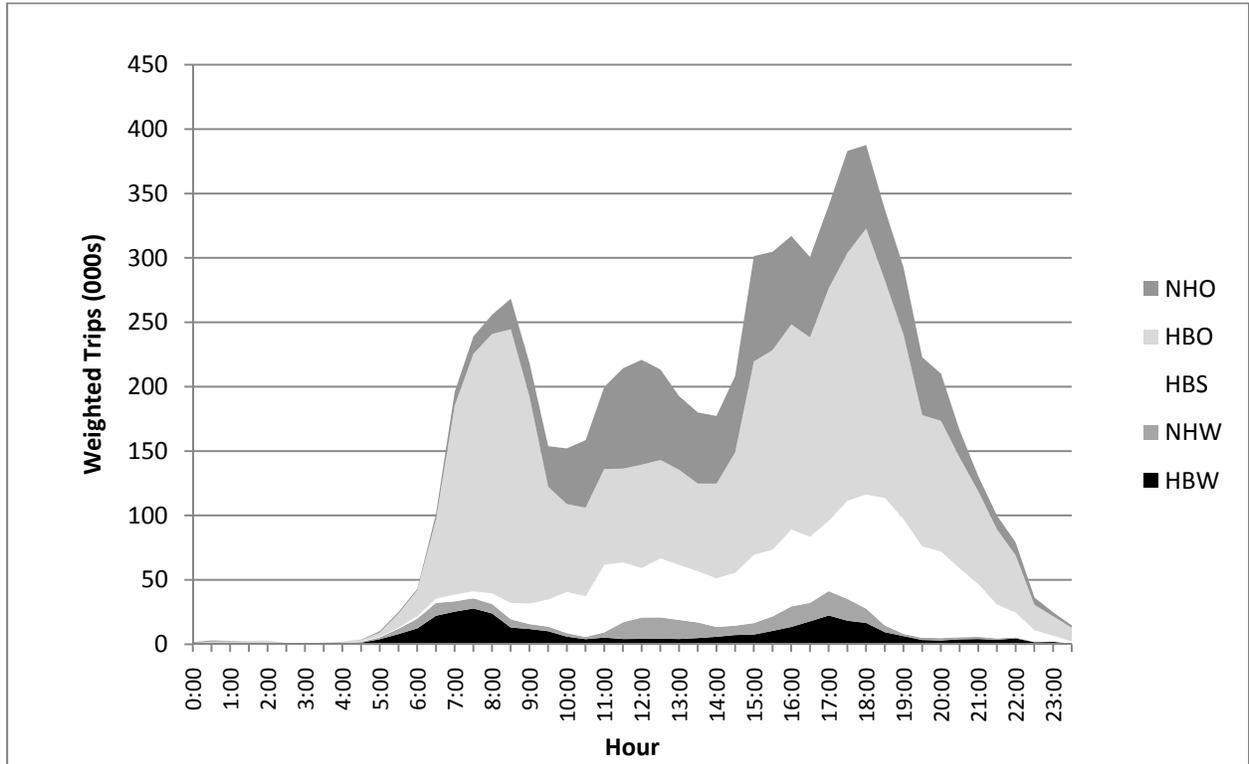
Mode: Auto Person
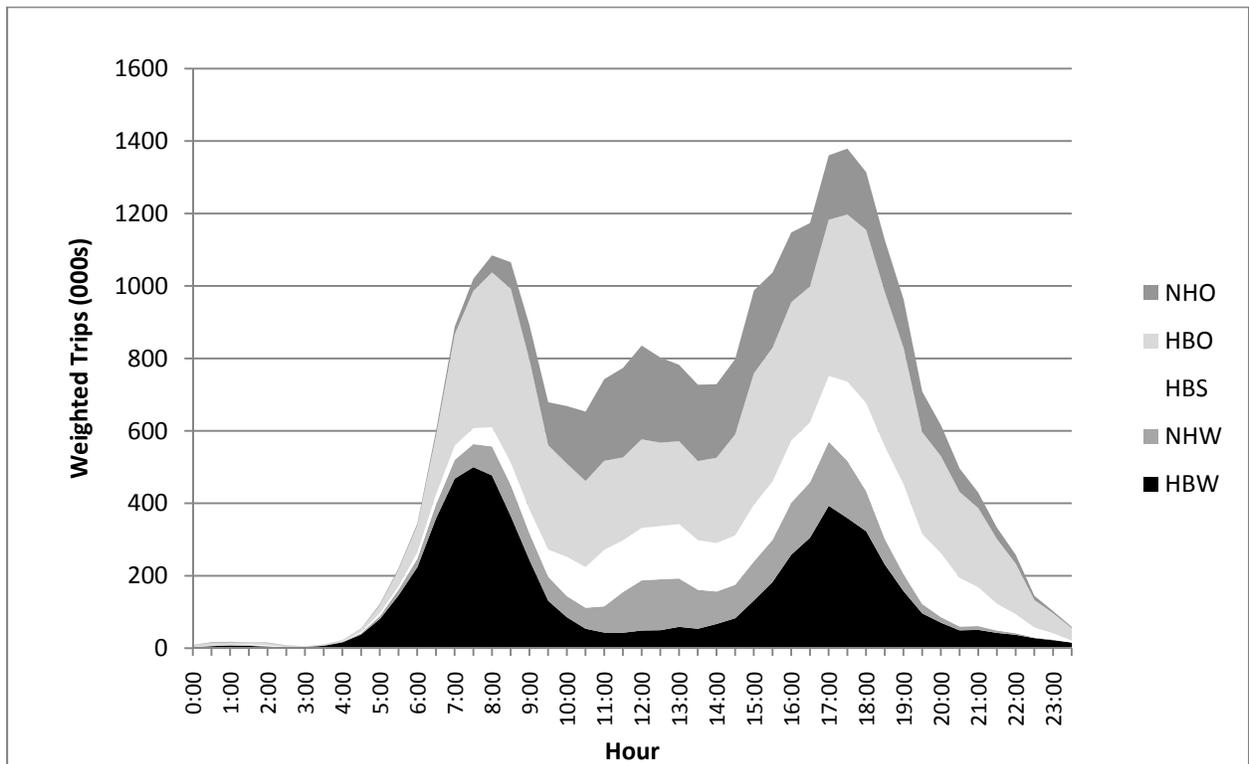
Appendix C Trips in Motion by Time of Day, Purpose

Mode: Drive Alone
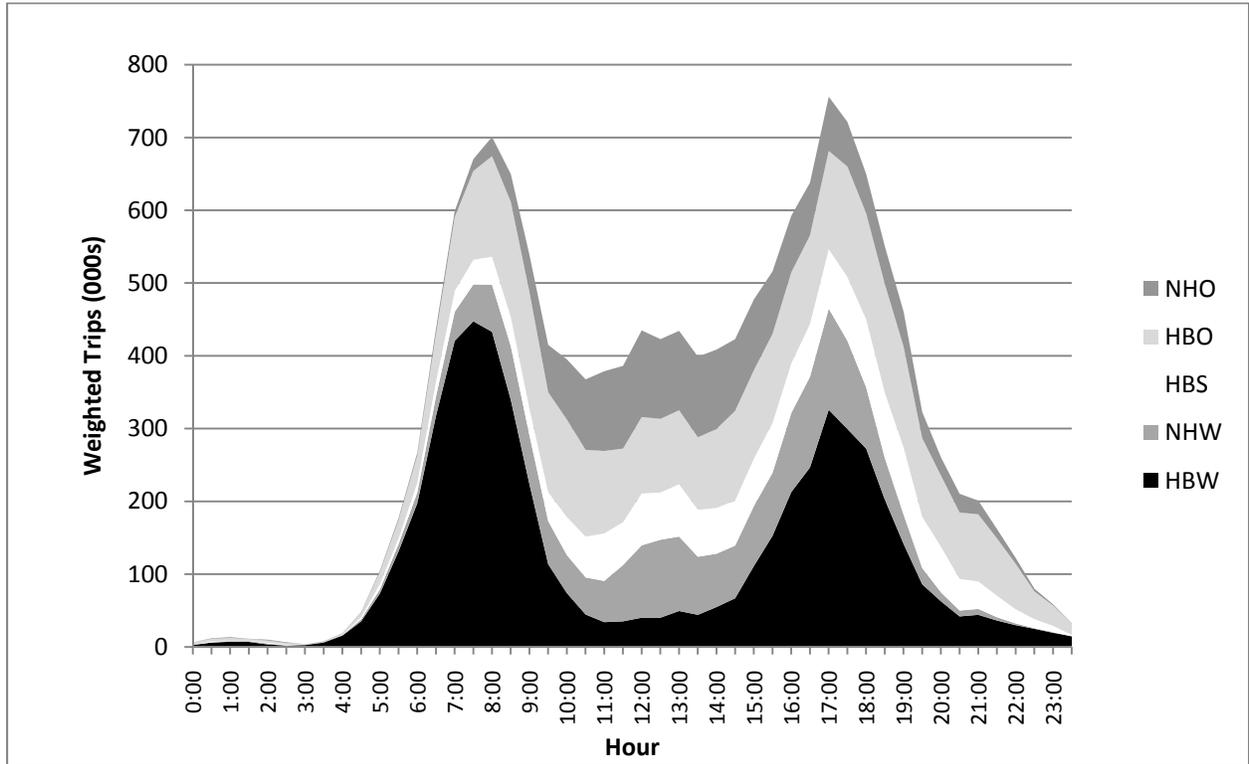
Mode: Carpool
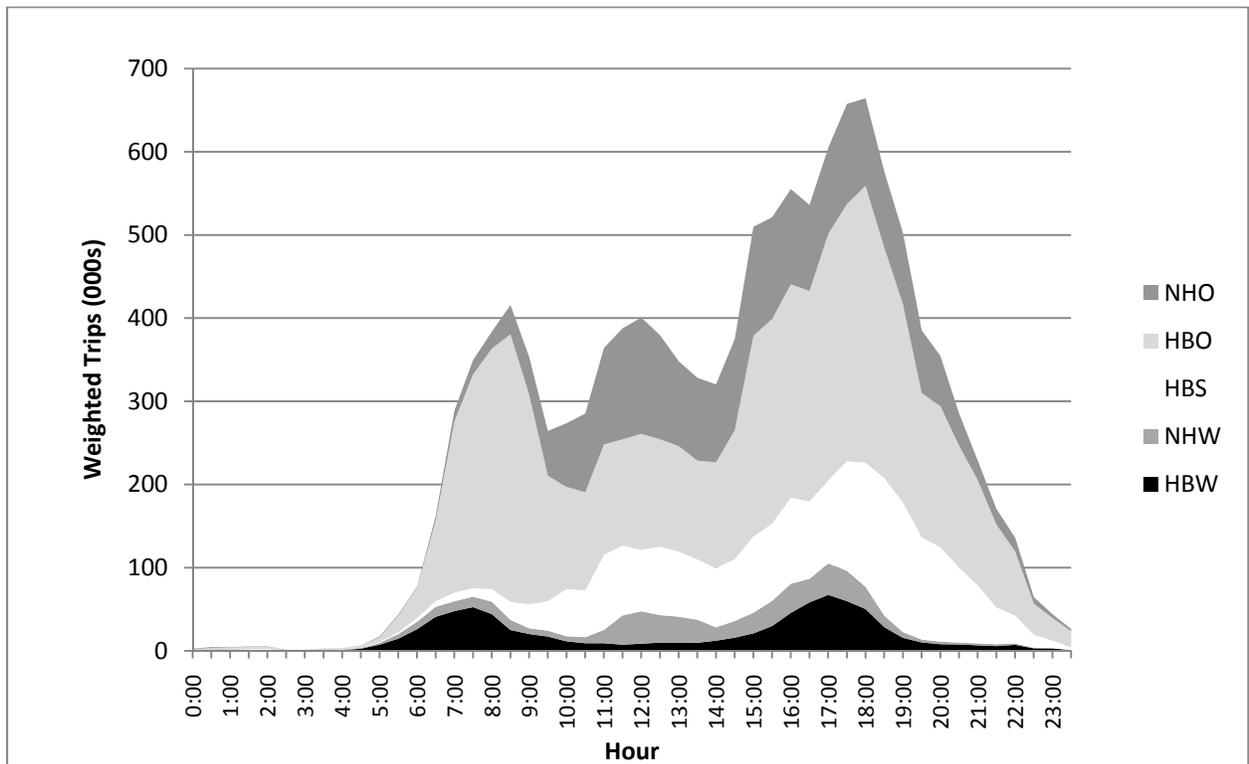
Appendix C Trips in Motion by Time of Day, Purpose

Mode: All Persons
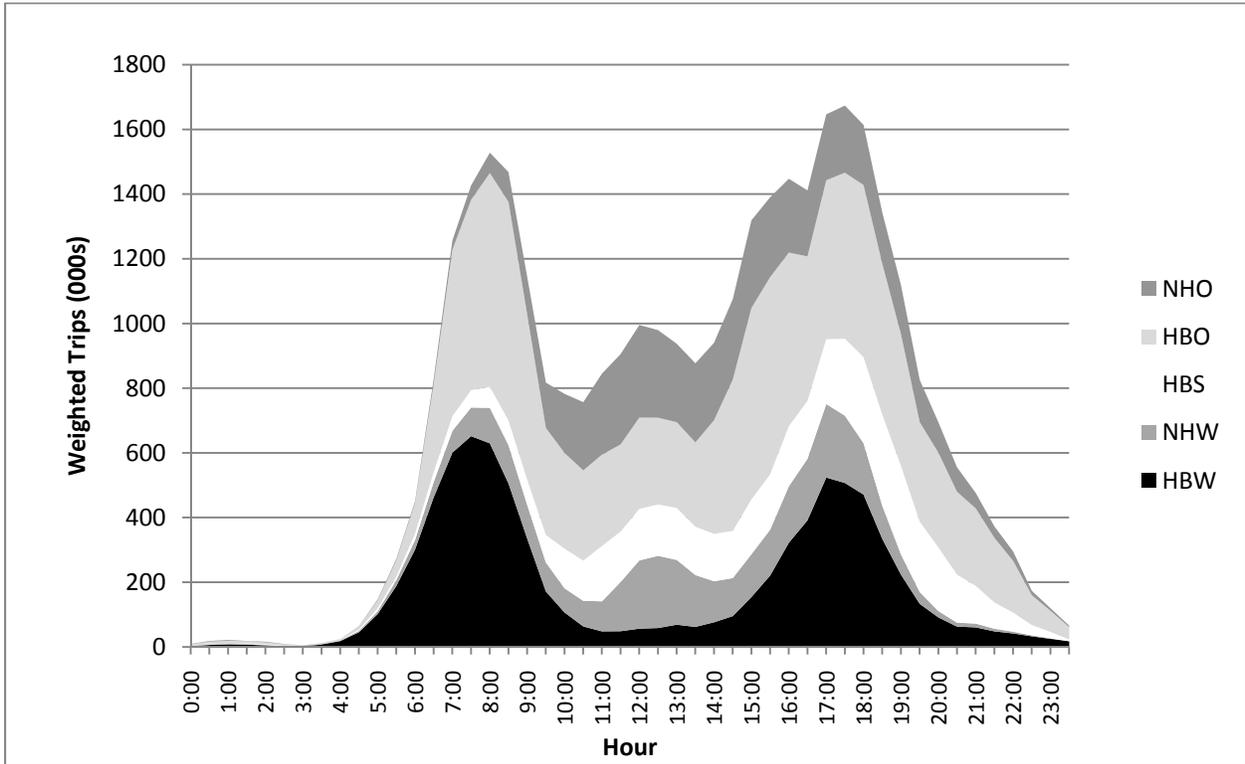
Appendix D Trips in Motion Distribution (%) by Purpose and Period

Appendix D Trips in Motion Distribution (%) by Purpose and Period

Mode: Transit

| | Trip Purpose | | | | | |
	HBW	HBS	HBO	NHW	NHO	Total
AM Peak (5:00-10:00)	49.2%	20.3%	28.4%	23.5%	11.3%	38.0%
Midday (10:00-15:00)	3.7%	27.5%	25.5%	19.4%	34.4%	13.2%
PM Peak (15:00-20:00)	43.7%	38.5%	31.6%	55.2%	48.8%	42.6%
All other hours	3.4%	13.8%	14.4%	1.9%	5.5%	6.2%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2007/08 HTS

Mode: Auto Driver

| | Trip Purpose | | | | | |
	HBW	HBS	HBO	NHW	NHO	Total
AM Peak (5:00-10:00)	46.7%	11.0%	23.8%	18.6%	9.4%	25.9%
Midday (10:00-15:00)	8.9%	32.4%	26.1%	37.6%	50.2%	26.8%
PM Peak (15:00-20:00)	38.1%	43.8%	36.8%	41.7%	34.7%	38.4%
All other hours	6.4%	12.9%	13.2%	2.1%	5.7%	8.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2007/08 HTS

Mode: Auto Passenger

| | Trip Purpose | | | | | |
	HBW	HBS	HBO	NHW	NHO	Total
AM Peak (5:00-10:00)	44.0%	5.4%	28.1%	22.1%	8.6%	20.4%
Midday (10:00-15:00)	13.9%	29.1%	19.4%	35.4%	41.1%	25.9%
PM Peak (15:00-20:00)	34.8%	49.5%	41.7%	39.0%	43.5%	43.1%
All other hours	7.3%	16.0%	10.9%	3.5%	6.9%	10.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2007/08 HTS

Appendix D Trips in Motion Distribution (%) by Purpose and Period

Mode: Auto Person

| | Trip Purpose | | | | | |
	HBW	HBS	HBO	NHW	NHO	Total
AM Peak (5:00-10:00)	46.5%	9.2%	25.5%	18.9%	9.1%	24.5%
Midday (10:00-15:00)	9.2%	31.3%	23.6%	37.4%	47.2%	26.6%
PM Peak (15:00-20:00)	37.9%	45.6%	38.6%	41.4%	37.6%	39.6%
All other hours	6.4%	13.9%	12.3%	2.3%	6.1%	9.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2007/08 HTS

Mode: Drive Alone

| | Trip Purpose | | | | | |
	HBW	HBS	HBO	NHW	NHO	Total
AM Peak (5:00-10:00)	48.2%	13.9%	24.6%	19.7%	10.8%	29.3%
Midday (10:00-15:00)	8.7%	33.0%	28.2%	36.8%	51.9%	26.0%
PM Peak (15:00-20:00)	36.7%	41.3%	33.6%	41.3%	32.3%	36.5%
All other hours	6.5%	11.8%	13.6%	2.2%	5.0%	8.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2007/08 HTS

Mode: Carpool

| | Trip Purpose | | | | | |
	HBW	HBS	HBO	NHW	NHO	Total
AM Peak (5:00-10:00)	35.4%	5.5%	26.0%	16.2%	7.7%	18.6%
Midday (10:00-15:00)	12.5%	30.0%	20.7%	39.6%	43.4%	27.3%
PM Peak (15:00-20:00)	46.1%	48.9%	41.8%	41.7%	41.9%	43.5%
All other hours	6.0%	15.5%	11.6%	2.6%	7.0%	10.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2007/08 HTS

Appendix D Trips in Motion Distribution (%) by Purpose and Period

Mode: All Persons

| | Trip Purpose | | | | | |
	HBW	HBS	HBO	NHW	NHO	Total
AM Peak (5:00-10:00)	47.0%	9.8%	28.5%	18.8%	9.7%	26.5%
Midday (10:00-15:00)	8.2%	31.0%	23.2%	39.6%	46.6%	25.9%
PM Peak (15:00-20:00)	39.0%	45.3%	37.6%	39.6%	37.7%	39.2%
All other hours	5.8%	13.9%	10.7%	2.0%	6.0%	8.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2007/08 HTS

Appendix E Trip Record Frequency by Reported Time

Appendix E Trip Record Frequency by Reported Time
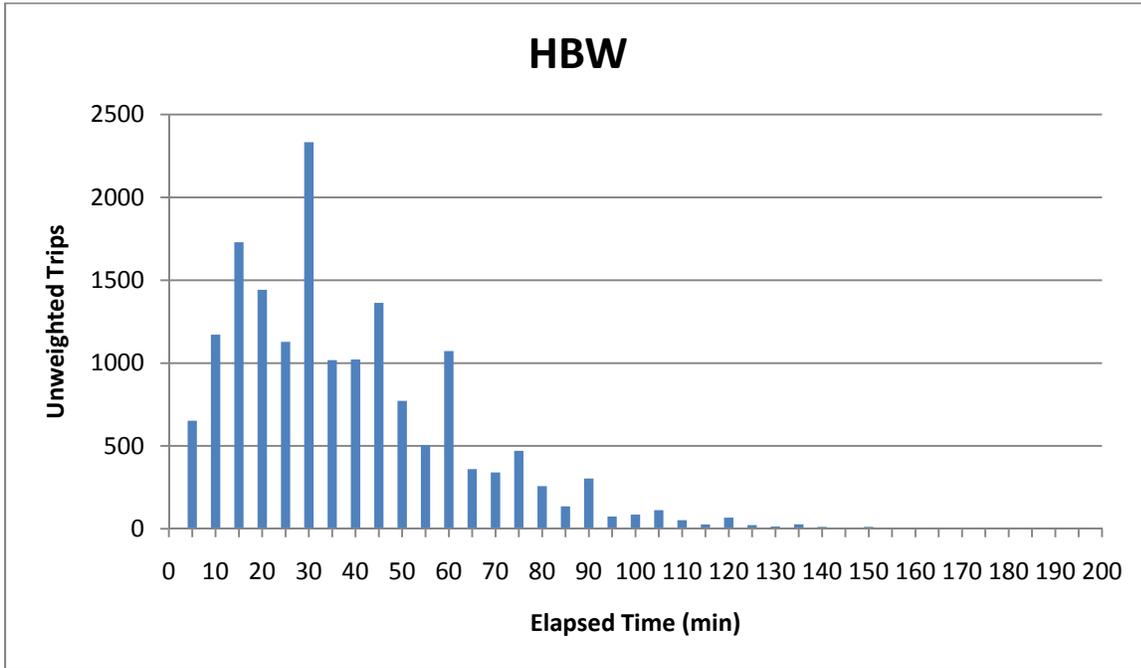
Purpose: HBW

Source: 2007/08 HTS

Purpose: HBS
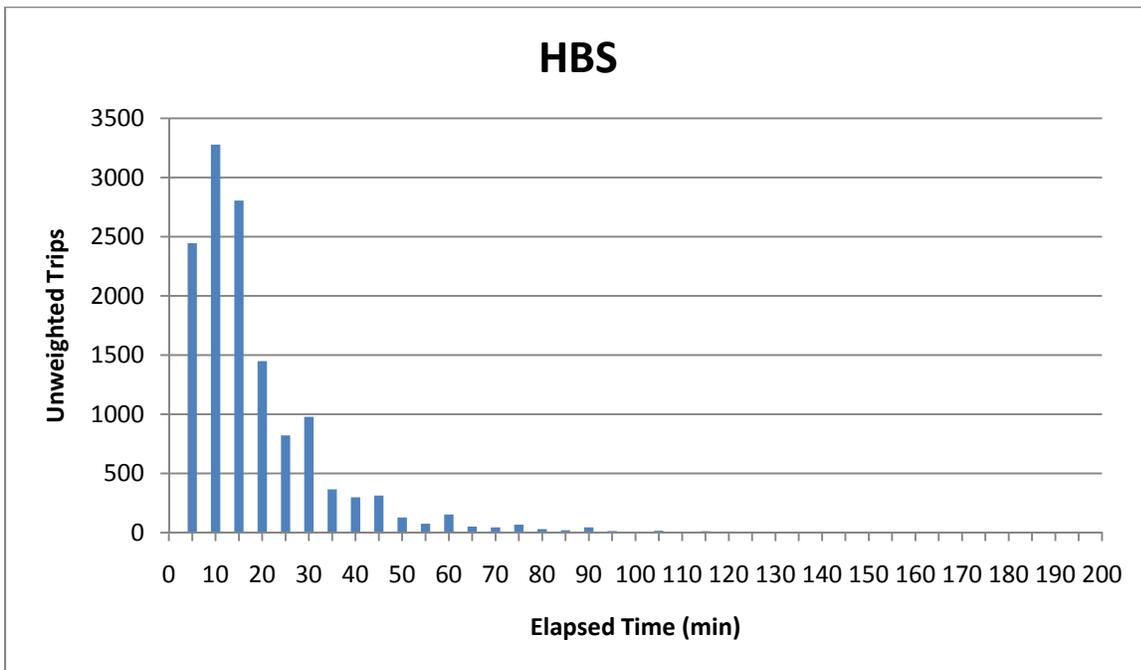
Source: 2007/08 HTS

Appendix E Trip Record Frequency by Reported Time

Purpose: HBO
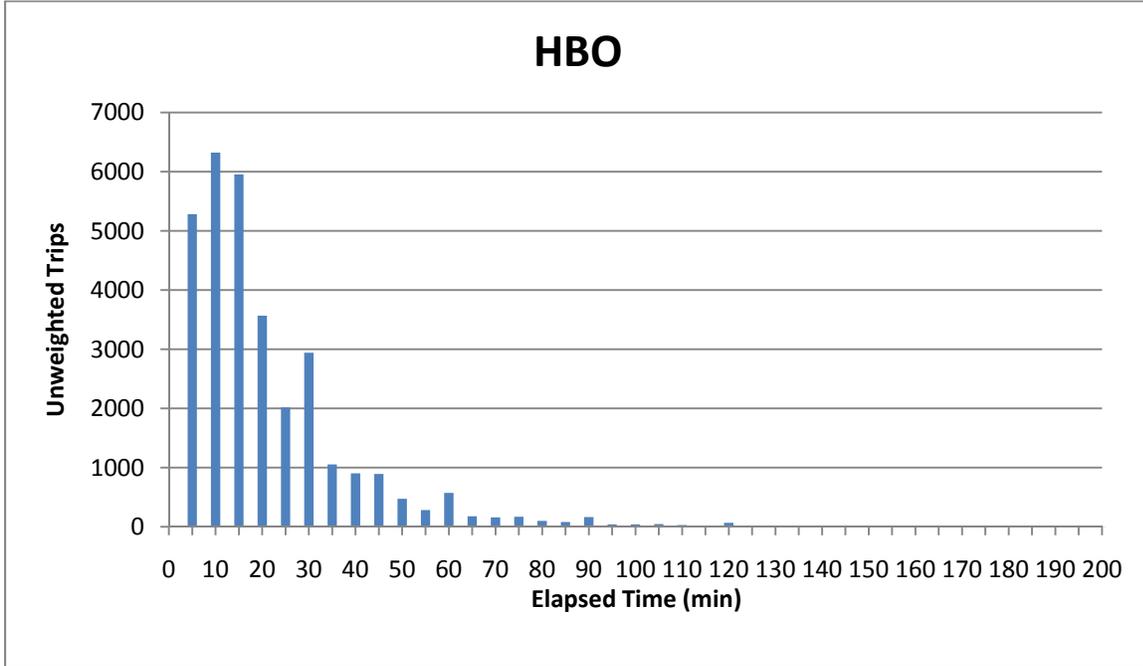
Source: 2007/08 HTS

Purpose: NHW
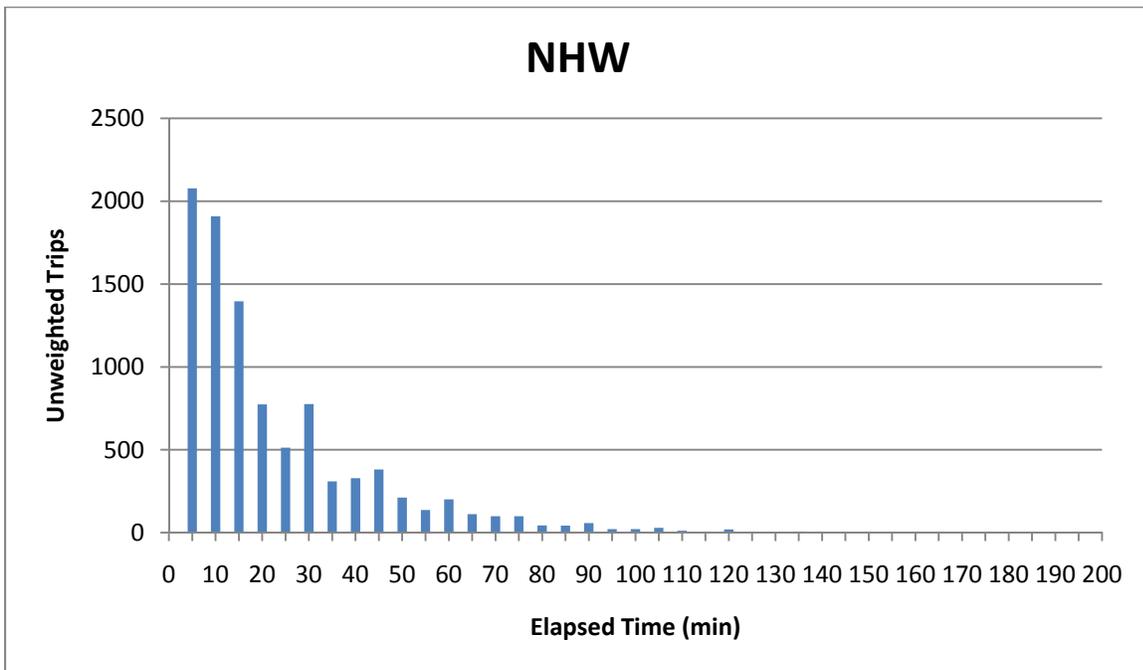
Source: 2007/08 HTS

Appendix E Trip Record Frequency by Reported Time

Purpose: NHO
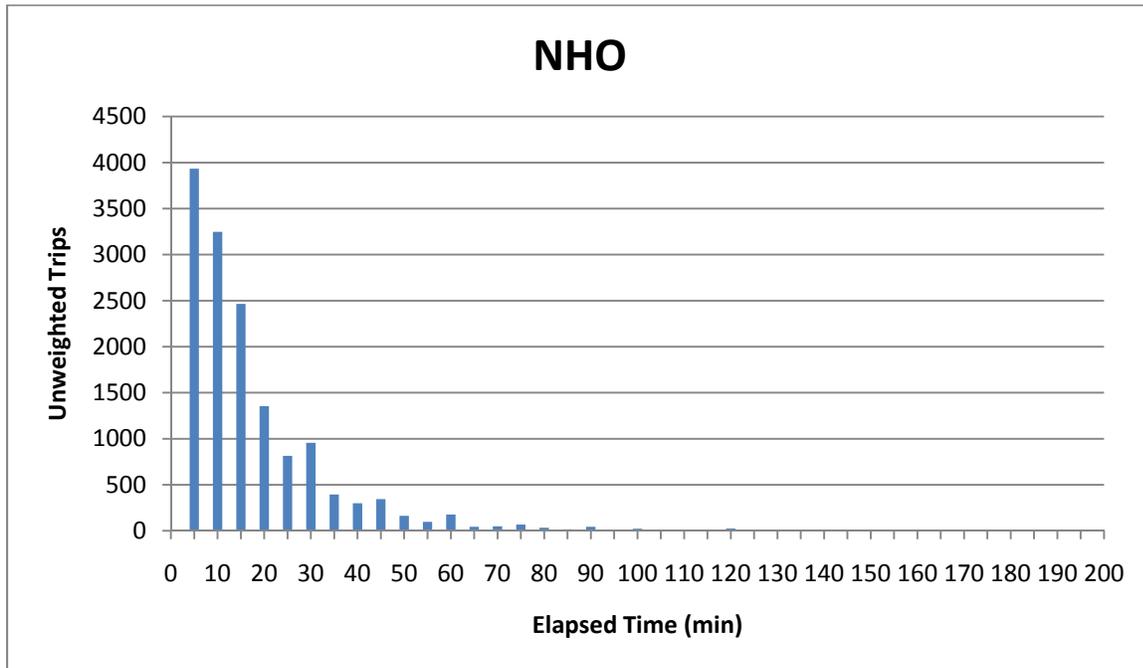
Source: 2007/08 HTS

Appendix F 2007/2008 Household Travel Survey- Trip File Processing

Appendix F 2007/2008 Household Travel Survey- Trip File Processing

TITLE:	2007/08 Household Travel Survey- Trip File Processing
COMPANY: MWCOG	CREATOR: RJM/MS
DATE: 07/08/2010	PG: 1 OF 6 PGS
FILENAME: 2007_08_HTS_Trip_HH_File_Processing.vsd	

2007/08 Household Travel Survey - Household File Processing

Subdirectory:I:\ateam\survey\hts2007\data\2010_03_26\HH_File_Processing

HH Level Survey File:
I:\ateam\survey\hts2007\data\2010_03_26\tpb_hts07_hf.csv

HH_ID - 3,722 TAZ equivalence file (to be joined to HH File)
I:\ateam\survey\hts2007\data\2010_03_26\home_newtaz.csv

Remove_holidays.s

Initial HH Survey File in DBF format
HTS200708_HH.dbf

Initial HH household summary by stratum
HHSTRATUM_Ini.dbf

Adjusted weighting factors by stratum
Update_factors.dbf

Final HH summary by stratum, reflecting adjusted weighting
HHSTRATUM_Fin.dbf

Final -Reweighted HH Survey File in DBF format
('ffactor' is adjusted)
HTS0708_HH_NoHol.dbf → A To below

From above A → **HH_File_Summaries.s**

Basic Income, Size, Vehicle summaries
→ **HH_File_Summaries.txt**

From above A → **Join_Trips_HHs.s**

Join_Trips_HHs.txt
Join_Trips_HHs.xls

From Page 3 H → **(HH_Level_TripsbyPurp.dbf)** →

Household level file
containing HH ID,
Size, Income, Veh Av. Levels

Trip_Production_Calib.dbf → B To Page 4

F-1

Appendix F 2007/2008 Household Travel Survey- Trip File Processing

TITLE:	2007/08 Household Travel Survey- Trip File Processing		
COMPANY: MWCOG		CREATOR: RJM/MS	
DATE: 07/08/2010	PG: 2	OF 6	PGS
FILENAME: 2007_08_HTS_Trip_HH_File_Processing.vsd			

2007/08 Household Travel Survey - Trip File Processing

Subdirectory:I:\ateam\survey\hts2007\data\2010_03_26\Trip_File_Processing

Trip Level Survey File:
I:\ateam\survey\hts2007\data\2010_03_26*tpb_hts07_tf.csv*

Trip_ID – 3,722 TAZ equivalence file (to be joined to Trip File:
I:\ateam\survey\hts2007\data\2010_03_26*trip_od_newtaz.csv*

Adjusted HH weighting factors by stratum to be used for adjusting trip file:
I:\ateam\survey\hts2007\data\2010_03_26\HH_File_Processing*Update_factors.dbf*

tripSum_1a.s

DBF Version of HTS file with additional data fields:
(beghr, begmin, endhr, endmin, Hcnt, Pcnt, Tcnt, ONewTAZ, DNewTAZ)
Note: "ffactor' is adjusted to reflect adjusted weighting

HTS200708Trips.dbf → C To below and Page 5

From above C → **Set_Purposes_Modes_Types.s**

Set_Purposes_Modes.txt ————————Text file showing totals for checking

To Pages 4 & 5 D ◁— **HTS200708PATrips.dbf** ————————— Basic Trip File with model-specific purposes, modes
Variables included:
Fields = Ptaz2191, Ataz2191, Ptaz3722, Ataz3722, purpcode, modecode,Typecode, ffactor, sampn, Hcnt, Pcnt, Tcnt,rtripid(15.2),mode, P_accmode, A_egrmode,vehid,oocc,docc,tt

HTS0708PATrips2191_IntExt.txt ———————— Internal/External trip records – 2,191 TAZ based
Variables: Ptaz2191, ATAZ2191,purpcode, modecode, PM, FFactor, sampn

To Page3 E ◁— **HTS0708PATrips2191_Int.txt** ————————— same as above, but internal (I–I) records only

HTS0708PATrips3722_IntExt.txt ———————— Internal/External trip records – 3,722 TAZ based
Variables: Ptaz2191, ATAZ2191,purpcode, modecode, PM, FFactor, sampn

To Page 3 F ◁— **HTS0708PATrips3722_Int.txt** ————————— same as above, but internal (I–I) records only

To below G ◁— **HH_TripPurp_Recs.dbf** ————————— dbf file to be summarized at HH level (later)
sampn, Hcnt, Pcnt,Tcnt, purpcode, modecode, typecode, ffactor

Appendix F 2007/2008 Household Travel Survey- Trip File Processing

TITLE: 2007/08 Household Travel Survey- Trip File Processing	
COMPANY: MWCOG	CREATOR: RJM/MS
DATE: 07/08/2010	PG: 3 OF 6 PGS
FILENAME: 2007_08_HTS_Trip_HH_File_Processing.vsd	

2007/08 Household Travel Survey – Trip File Processing (Continued)

Subdirectory: I:\ateam\survey\hts2007\data\2010_03_26\Trip_File_Processing

From Page 2 [G] → (HH_TripPurp_Recs.dbf) → `Prep_HH_Trip_File.s` → HH_Level_TripsbyPurp.dbf
Weighted/unweighted trips(II,IX only) by purpose aggregated to HH Level
→ [H] → **To Page 1**

Binary HTS Trip tables (I-I) 3,722 x 3,722 by purpose- 9 Tables in each file
1/Trn, 2/Adr, 3/Apx, 4/Walk, 5/Bike, 6/Other, 7/Motorized psn, 8/Walk&Bike, 9/Person (T7+T8)

From Page 2 [F] → (HTS0708PATrips3722_Int.txt) → `Trip_BuildHTS_3722.s` →

```
HTS07HBWtrips.psn
HTS07HBStrips.psn
HTS07HBOtrips.psn
HTS07NHWtrips.psn
HTS07NHNtrips.psn
```

(Extratab.exe)
→ `HTS_Juris_Summary.s` → HTS_Juris_Summary.tab

I-I zonal non-motorized & person trip productions by purpose
`HTS_PsnNmtr_Ps3722.dbf` → [I] **To below**
I-I zonal non-motorized & person trip attractions by purpose
`HTS_PsnNmtr_As3722.dbf` → [J] **To below**

Binary HTS Trip tables (I-I) 3,722 x 3,722 by purpose- 9 Tables in each file – Trips are unweighted
1/Trn, 2/Adr, 3/Apx, 4/Walk, 5/Bike, 6/Other, 7/Motorized psn
8/Walk&Bike, 9/Person (T7+T8)

From Page 2 [F] → (HTS0708PATrips3722_Int.txt) → `UW_Trip_Build HTS_3722.s` →

```
HTS07HBWCount.psn
HTS07HBSCount.psn
HTS07HBOCount.psn
HTS07NHWCount.psn
HTS07NHNCount.psn
```
I-I zonal non-motorized & person unweighted trip productions by purpose
`UW_HTS_PsnNmtr_Ps3722.dbf`

Binary HTS Trip tables (I-I) 2,191 x 2,191 by purpose- 9 Tables in each file – Trips are weighted
1/Trn, 2/Adr, 3/Apx, 4/Walk, 5/Bike, 6/Other, 7/Motorized psn
8/Walk&Bike, 9/Person (T7+T8)

From Page 2 [E] → (HTS0708PATrips2191_Int.txt) → `Trip_BuildHTS_2191.s` →

```
HTS07HBWtrips2191.psn
HTS07HBStrips2191.psn
HTS07HBOtrips2191.psn
HTS07NHWtrips2191.psn
HTS07NHNtrips2191.psn
```
I-I zonal non-motorized & person trip productions by purpose
`HTS_PsnNmtr_Ps2191.dbf`

'Floating' nonmotorized/person trips w/in 0.0, 0.5, 1.0, and 1.5 miles, by purpose

From above [I]
I:\ateam\mod_inputs\lu\V2.3_LandUse_taz3722*zone.dbf*
2007_node.dbf
TPB3722Area_sqmi.dbf
→ `Accum_WalkBikeProductions.s` →
```
HTS_PsnNmtr_Ps_00mi.dbf
HTS_PsnNmtr_Ps_05mi.dbf
HTS_PsnNmtr_Ps_10mi.dbf
HTS_PsnNmtr_Ps_15mi.dbf
```

From above [J]
I:\ateam\mod_inputs\lu\V2.3_LandUse_taz3722*zone.dbf*
2007_node.dbf
TPB3722Area_sqmi.dbf
→ `Accum_WalkBikeAttractions.s` →
```
HTS_PsnNmtr_As_00mi.dbf
HTS_PsnNmtr_As_05mi.dbf
HTS_PsnNmtr_As_10mi.dbf
HTS_PsnNmtr_As_15mi.dbf
```

Appendix F 2007/2008 Household Travel Survey- Trip File Processing

TITLE:	2007/08 Household Travel Survey- Trip File Processing
COMPANY: MWCOG	CREATOR: RJM/MS
DATE: 07/08/2010	PG: 4 OF 6 PGS
FILENAME: 2007_08_HTS_Trip_HH_File_Processing.vsd	

2007/08 Household Travel Survey - Trip File Processing (Continued)
Subdirectory:I:\ateam\survey\hts2007\data\2010_03_26\Trip_File_Processing

From Page 1 B ▸(Trip_Production_Calib.dbf)→

From Page 2 D ▸(HTS200708PATrips.dbf)→

`Join_HH_Inc_to_Trips.s`

`Join_HH_Inc_to_Trips.txt` ---- (text file with basic totals)

`HTS200708PAHBWTrips_with_HHInc.txt`
`HTS200708PAHBSTrips_with_HHInc.txt`
`HTS200708PAHBOTrips_with_HHInc.txt`
`HTS200708PANHWTrips_with_HHInc.txt`
`HTS200708PANHOTrips_with_HHInc.txt`

Income stratified trips by mode - separate file for each purpose

`Trip_BuildHTS_HHIncome3722.s`

3722x3722 (I-I) Person trips by purpose, income and mode
each file has 6 modal tables: Trn, Adr, Apx, Walk, Bike, total

`HTS07HBW_Income1byMode.PTT`
`HTS07HBW_Income2byMode.PTT`
`HTS07HBW_Income3byMode.PTT`
`HTS07HBW_Income4byMode.PTT`

`HTS07HBS_Income1byMode.PTT`
`HTS07HBS_Income2byMode.PTT`
`HTS07HBS_Income3byMode.PTT`
`HTS07HBS_Income4byMode.PTT`

`HTS07HBO_Income1byMode.PTT`
`HTS07HBO_Income2byMode.PTT`
`HTS07HBO_Income3byMode.PTT`
`HTS07HBO_Income4byMode.PTT`

`HTS07NHW_Income1byMode.PTT`
`HTS07NHW_Income2byMode.PTT`
`HTS07NHW_Income3byMode.PTT`
`HTS07NHW_Income4byMode.PTT`

`HTS07NHO_Income1byMode.PTT`
`HTS07NHO_Income2byMode.PTT`
`HTS07NHO_Income3byMode.PTT`
`HTS07NHO_Income4byMode.PTT`

Trip Production Files

`HTS_HBW_II_PsByIncMode3722.dbf`
`HTS_HBS_II_PsByIncMode3722.dbf`
`HTS_HBO_II_PsByIncMode3722.dbf`
`HTS_NHW_II_PsByIncMode3722.dbf`
`HTS_NHO_II_PsByIncMode3722.dbf`

Trip Attraction Files

`HTS_HBW_II_AsByIncMode3722.dbf`
`HTS_HBS_II_AsByIncMode3722.dbf`
`HTS_HBO_II_AsByIncMode3722.dbf`
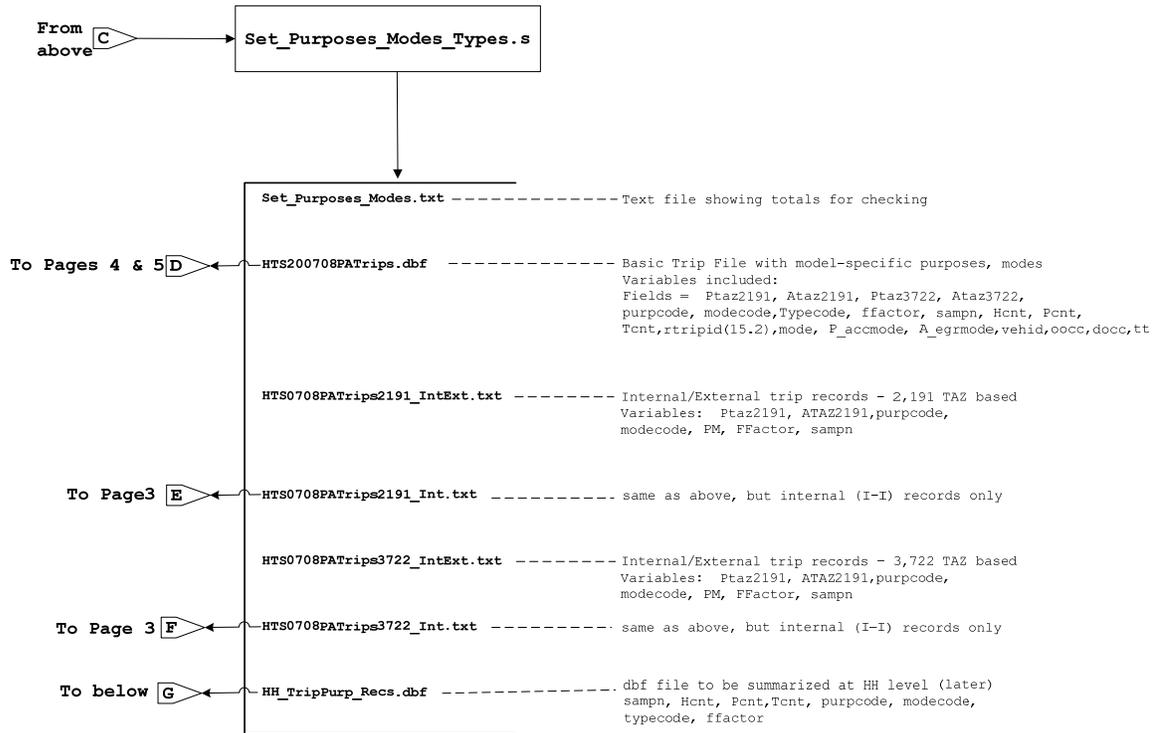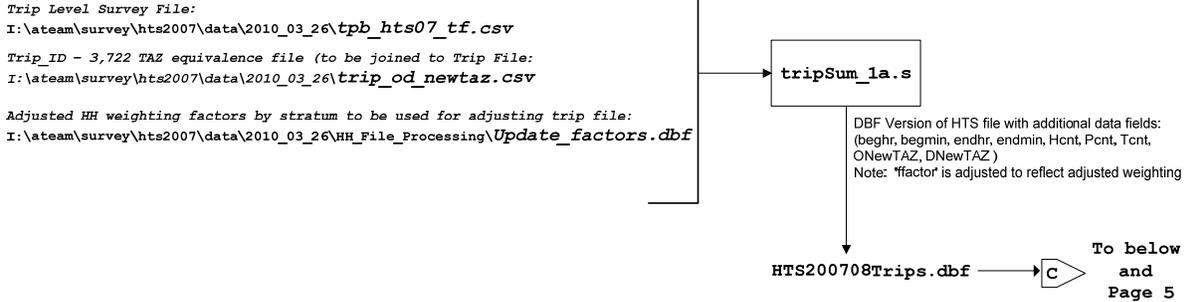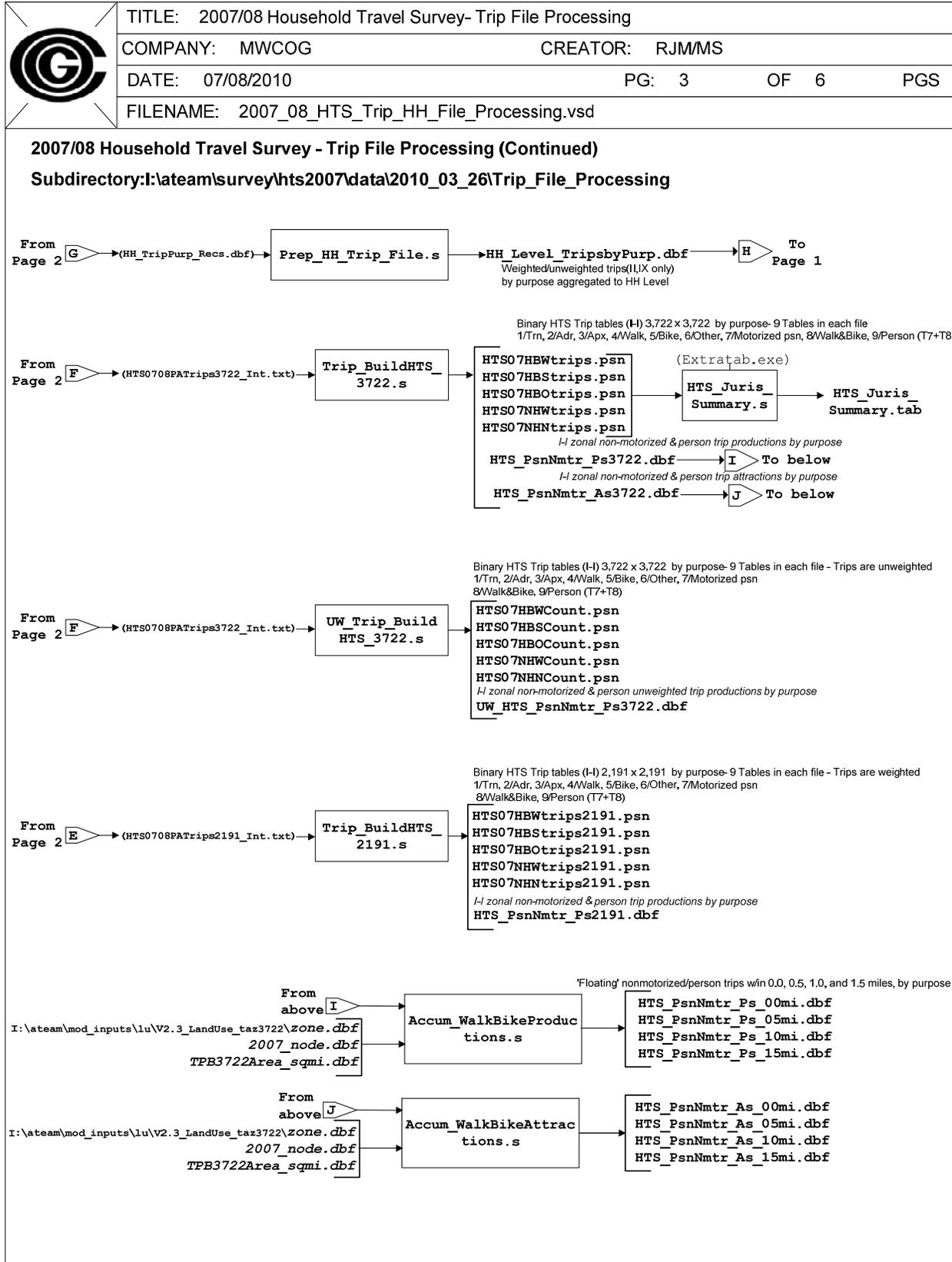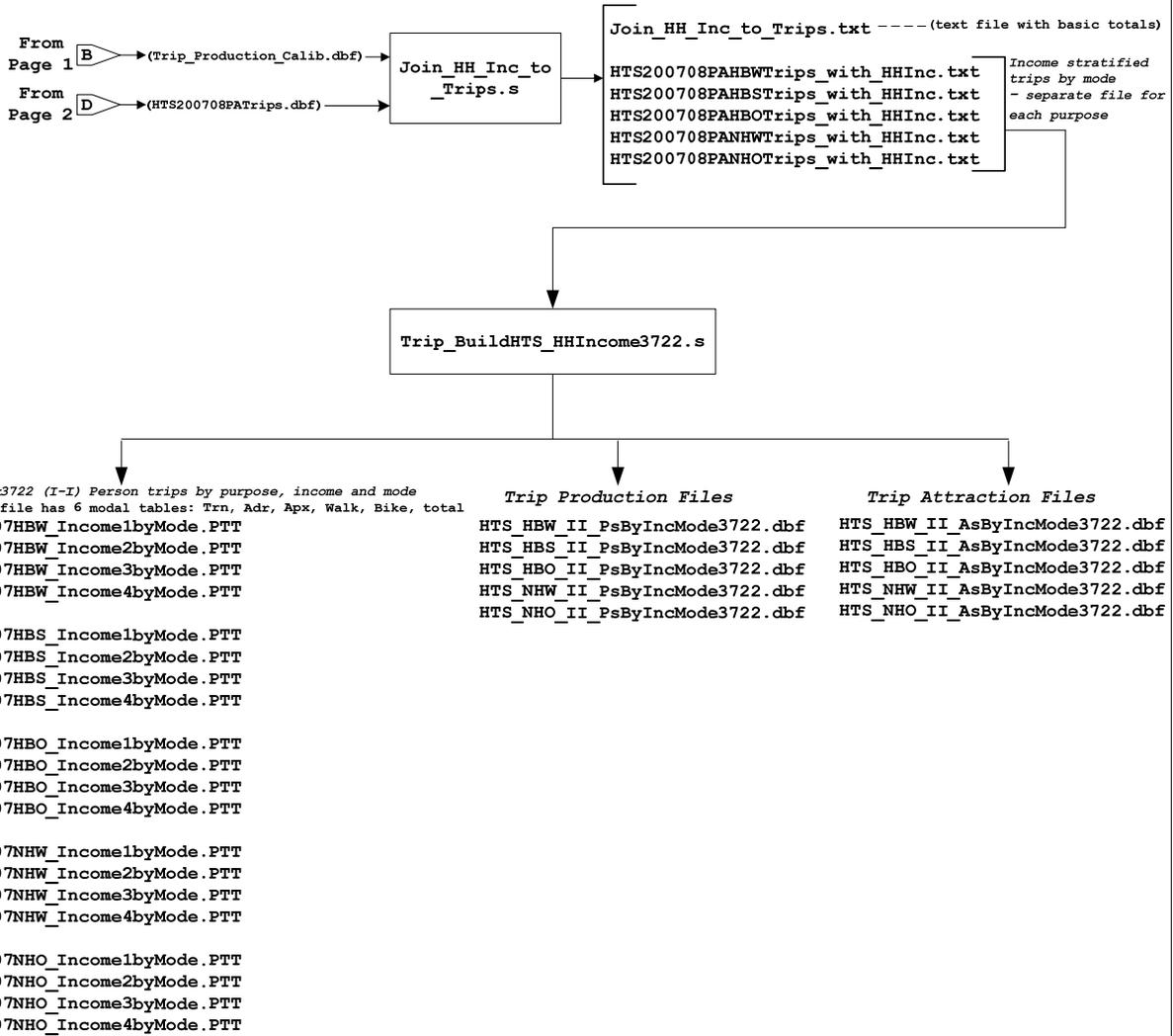`HTS_NHW_II_AsByIncMode3722.dbf`
`HTS_NHO_II_AsByIncMode3722.dbf`

Appendix F 2007/2008 Household Travel Survey- Trip File Processing

TITLE:	2007/08 Household Travel Survey- Trip File Processing				
COMPANY: MWCOG		CREATOR: RJM/MS			
DATE: 07/08/2010			PG: 5	OF 6	PGS
FILENAME: 2007_08_HTS_Trip_HH_File_Processing.vsd					

2007/08 Household Travel Survey - Trip File Processing (Continued)

**Subdirectory:I:\ateam\survey\hts2007\data\2010_03_26\Trip_File_Processing**

Weighted mode, cross mode X-tabs

From Page 2 C → (HTS200708Trips.dbf) → `Submode_Summaries.s` → `Submode_Summaries.txt` `Submode_Summaries.xls`

`I:\ateam\mod_inputs\lu\V2.3_LandUse_taz3722\` `TAZ_AirDist_Externals.dbf`

From Page 2 D → (HTS200708PATrips.dbf) → `Make_II_IX_Productions_File.s` → `Make_II_IX_Productions_File.txt` `II_IX_Productions_File.dbf`

Frequency of elapsed time by purpose

From Page 2 D → (HTS200708PATrips.dbf) → `Elapsed_Time_Check.s` → `Elapsed_Time_Check.txt`

30 min. trips-in-motion summaries by purp./mode

From Page 2 D → (HTS200708PATrips.dbf) → `TOD_V51.s` → `TOD_V51.txt`

Appendix F 2007/2008 Household Travel Survey- Trip File Processing

	TITLE: 2007/08 Household Travel Survey- Trip File Processing				
	COMPANY: MWCOG		CREATOR: RJM/MS		
	DATE: 07/08/2010		PG: 6	OF 6	PGS
	FILENAME: 2007_08_HTS_Trip_HH_File_Processing.vsd				

Development of 'Floating' GIS Variables
Subdirectory:I:\ateam\survey\hts2007\data\2010_03_26\GIS_Processing

`I:\ateam\mod_inputs\lu\V2.3_LandUse_taz3722\Zone.dbf`
`GIS_variables.DBF` → `Accum_GIS_Variables.s`
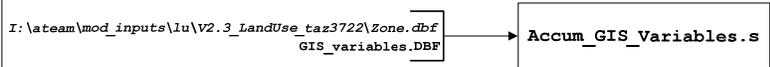
```
GIS_Float_00mi.dbf (variables within 0.0 floating miles)
GIS_Float_05mi.dbf (variables within 0.5 floating miles)
GIS_Float_10mi.dbf (variables within 1.0 floating miles)
GIS_Float_15mi.dbf (variables within 1.5 floating miles)
```

Model	Control totals File Name(s)			
Variables Name	GIS_Float_00mi.dbf	GIS_Float_05mi.dbf	GIS_Float_10mi.dbf	GIS_Float_15mi.dbf
TAZ	---	---	---	---
THREEWAYS??	110073.00	162381.00	509574.50	1101769.50
FOUR_WAYS??	25328.75	54861.50	191078.75	406188.25
CULDESAC??	65838.00	81751.00	226857.00	493780.00
BLOCKS??	39154.00	79834.00	278784.00	595097.00
BLOCKPERI??	160734541.89	250544149.66	762782592.16	1620394513.87
BLOCKAREA??	84661132060.74	96804428797.79	182612483238.49	347120408633.42
MAJORMILE??	7265.92	10798.12	29584.85	61600.87
MINORMILE??	25470.80	34585.22	96229.67	204402.30
CENSUS_BL??	62918.00	115441.00	377699.00	803452.00
CBLOCKSPE??	357767490.54	482828068.25	1254096005.96	2614335614.30
CBLOCKSAR??	184668045343.71	202934189825.69	352069889888.92	663476803216.63
(??= '00', '05', '10', or '15')				