Metropolitan Washington Council of Governments

COG/TPB Travel Forecasting Model

Version 2.1/TP+, Release C

Calibration Report

December 23, 2002

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The Metropolitan Washington Council of Governments (COG) and the National Capital Region Transportation Planning Board (TPB).

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Credits

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Abstract: This report describes the model calibration results of an advanced travel forecasting process for the Washington, D.C. region known as the Version 2.1/TP+ model. This work represents a continuation of a multi-year models development plan that was formulated in FY-93 by the Travel Forecasting Subcommittee (TFS), a subcommittee of the TPB's Technical Committee. COG staff has been developing the Version 2.1/TP+ model during the past eighteen months under the review of the TFS. The model contains features that have not been considered in previous travel models used at MWCOG such as time-period specific traffic assignments, non-work mode choice models, and zone level modeling procedures for the entire four-step process.

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Chapter 1. Introduction

This report documents MWCOG's model calibration work relating to a new travel forecasting process for the Washington, D.C. Region. This work represents a continuation of a multi-year models development plan that was formulated in FY-93 in response to the Federal Clean Air Act Amendments (CAAA) of 1990 and the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The models development program at MWCOG is monitored by the Travel Forecasting Subcommittee (TFS) - a subcommittee of the Transportation Planning Board's Technical Committee. The TFS is comprised of representatives from state and local transportation agencies, as well as local transportation consultants. It operates by consensus in providing review and guidance to MWCOG's models development work program.

This report documents the calibration and validation of the COG/TPB Travel Forecasting Model, Version 2.1/TP+, Release C, to be henceforth referred to in this report as the Version 2.1/TP+ model. The model is a descendent of prior TP+ based model versions that have been progressively refined in recent months.

The Version 2.1/TP+ model is a translation of the MINUTP-based Version 2 model developed by MWCOG in January 2000. The Travel Forecasting Subcommittee concurred with a staff recommendation at that time to migrate the model to an upgraded software package. Staff felt that the migration was necessary as the size and complexity of the Version 2 process was testing the limits of MINUTP. After a deliberative evaluation of available software packages on the market, TP+ was selected as the upgraded package. The migration involved the development of TP+ program scripts that resembled pre-existing MINUTP procedures, as well as a re-estimation of trip distribution and mode choice model parameters. Experience has shown such a re-estimation is necessary to address pathbuilding differences which inevitably exist between software packages. The basic structure of the MINUTP Version 2 model was unaltered in the migration from MINUTP to TP+, with one exception; the recycling of restrained highway speeds back into trip distribution was undertaken for both work *and non-work* purposes. The speed feedback linkage in the earlier MINUTP application was applied for the work purpose only.

The first Version 2/TP+ model release was issued by COG in March 2002. Subsequent checks of network-related inputs and outputs revealed a few problems. A review of highway and transit accessibility changes over time indicated the presence of isolated network coding errors as well as inconsistencies in transit access coding. These findings prompted staff to correct highway and transit network coding errors and to revisit the automated transit access development process (both walk and drive links) to strive for increased consistency over time. Another subsequent check of restrained highway speeds summarized by jurisdiction indicated that highway speeds of some jurisdictions were *increasing* over time. This counter-intuitive result was ultimately attributed to trip generation adjustments made earlier in an effort to achieve improved estimated and observed VMT matches out of the highway assignment process. Such adjustments were eliminated in later releases.

The next model release, Version 2.1/TP+, Release A issued in October of 2002, addressed the above cited problems. The model also reflected a re-estimation of trip distribution and mode

choice model parameters. The release was also structurally refined from the prior TP+ versions in that it included added steps to ensure that restrained highway speeds on drive access transit connections were updated with restrained highway speeds. The latest model version (Version 2.1/TP+, Release C) includes minor corrections and refinements made to TP+ scripts, the correction of a file handling error in the model application process (relating to fare development), and a re-estimated mode choice model.

The Version 2.1/TP+ model incorporates several advanced features compared to MWCOG's existing (Version 1) transportation forecasting process. It is important to recognize that these newly added modeling features have resulted directly from mandates in the CAAA and the ISTEA. The mandates have dominated the direction and specificity of transportation modeling improvements in the Washington, D.C. area as well as in other non-attainment areas across the United States.

The CAAA and the ISTEA essentially promote the integration of transportation and air quality planning. The CAAA established the creation of ongoing air quality planning procedures known as State Implementation Plans (SIPs). SIP procedures require mobile emissions and VMT estimates for current and future years using transportation network models, a demonstration of attaining air quality standards, and, for instances where milestone goals are not met, the implementation of Transportation Control Measures (TCMs). The ISTEA was promulgated soon after the CAAA to establish specific mandates deemed necessary to achieve air quality planning objectives. ISTEA has established 15 factors that must be addressed in the metropolitan planning process. The ISTEA not only enforces cooperation and coordination between regional and state planning agencies, but also enforces coordination between the planning agencies and various public interest groups, particularly groups associated with environmental interests. Therefore, the 15 factors address the relationship between the highway system and environmental concerns, emphasizing a shift away from highway construction towards growth management and improving the efficiency of the existing highway system. The ISTEA has compelled planners to focus on non-traditional strategies including intermodalism, congestion management, the interaction of land use and transportation, congestion pricing, and the encouragement of mass transit and non-motorized modes.

The conventional four-step transportation planning process was originally developed to evaluate the construction of new transportation facilities. Despite several decades of development, the process has been limited in the ability to study policies aimed at increasing the transportation system's efficiency. In response, the Department of Transportation, the Department of Energy, and the Environmental Protection Agency jointly sponsored a program known as the Travel Model Improvement Program (TMIP). TMIP was created to provide guidance on increasing the abilities of existing planning tools to respond to emerging issues of the new legislation. The recommendations advanced by the TMIP program were incorporated into the design of the Version 2.1/TP+ model to the fullest extent possible. The added features in the Version 2.1/TP+ model include time of day modeling, the inclusion of non-motorized (bicycle and pedestrian) travel, the use of accessibility variables in trip generation, greater sensitivity to land development considerations, and the enhanced use of demographic variables in the model chain.

Some recommendations advanced by the TMIP program have not been included in the Version 2.1/TP+ model, such as the representation of trip chaining behavior in travel models. This feature is presently viewed as too far ahead of the state-of-the-practice, in COG's estimation. However, MWCOG's model development staff continues to keep abreast of emerging forecasting methods. The incorporation of such methods into 'production' models will be determined by: 1) their acceptance by the profession, 2) the availability of observed data to calibrate to support the methods, and 3) the availability of application tools supporting the methods.

An overview of the Version 2.1/TP+ model features and application is provided in sections 1.1 and 1.2 of this chapter. A summary of the travel survey data used in the calibration work is discussed next, in Chapter 2. The detailed calibration work associated with individual model steps is presented in Chapters 3 through 8. Chapter 9 describes the results of validation checks of the model. An appendix section appears at the end of this report containing detailed summaries.

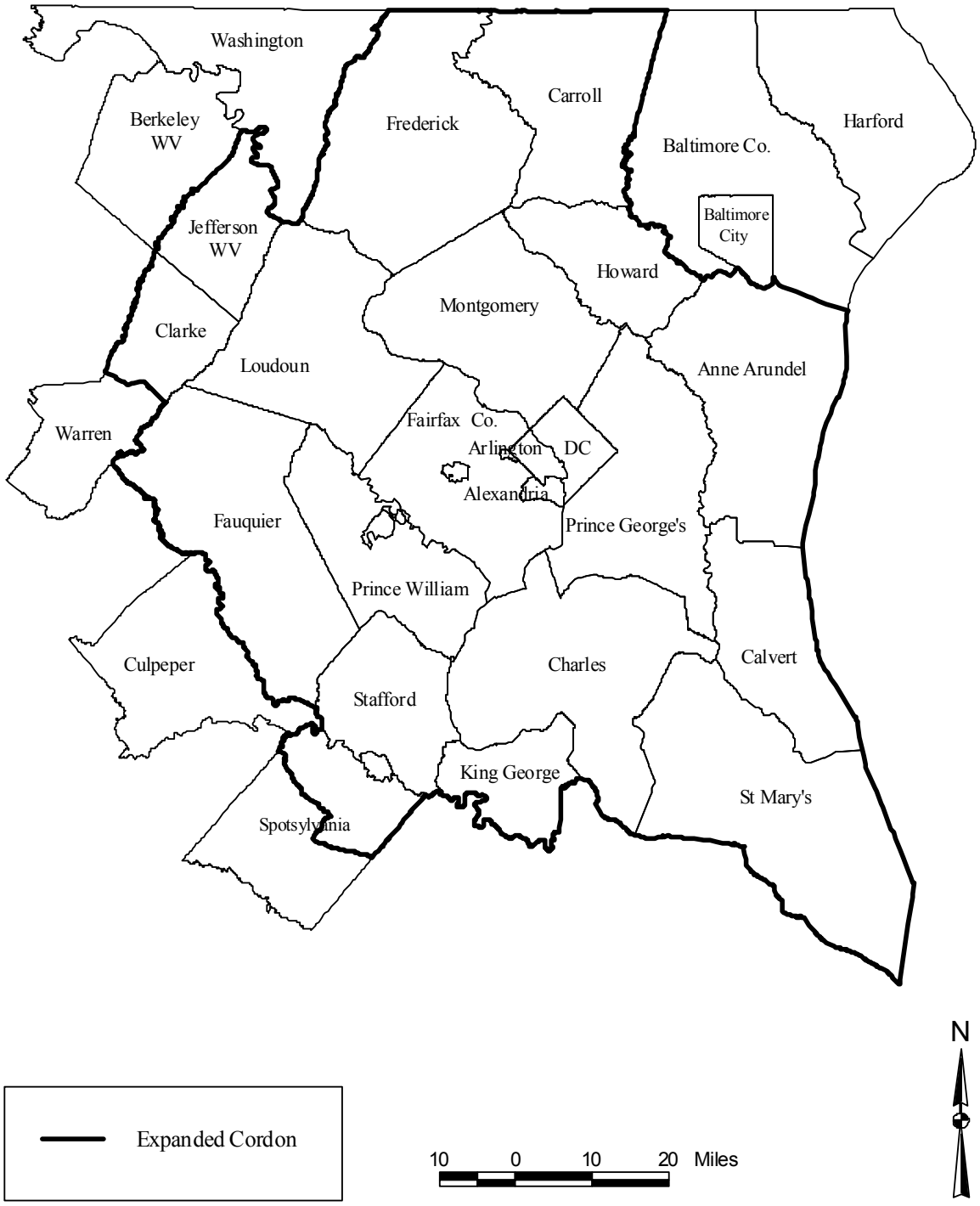
1.1 Overview of Version 2.1/TP+ Model

The Version 2.1/TP+ model is similar to the current (Version 1) travel model in several respects. Like the Version 1 model, Version 2.1/TP+ adheres to the standard four-step urban transportation planning process involving trip generation, trip distribution, mode choice, and trip assignment. Both models operate on a study area known as the expanded cordon (see Exhibit 1-1). Furthermore, the basic trip purpose definitions are consistent between the Version 1 and Version 2.1/TP+ Models. The trip purposes are HBW, HBS, HBO, NHB, and two truck types: medium and heavy. Medium trucks are defined as single unit trucks with six or more axles. Heavy trucks represent all combination-type trucks. Light trucks and pick-ups are subsumed within the NHB purpose. Finally, the Version 2.1/TP+ model is also similar to Version 1 in that it employs an iterative feedback linkage, which returns traffic assignment-based travel times back into the HBW trip distribution process.

The Version 2.1/TP+ model is, however, different from the current model version in a number of ways. First, the Version 2.1/TP+ model incorporates travel markets that have not been previously modeled. Whereas the Version 1 model addresses only work-person travel and non-work auto driver travel, the Version 2.1/TP+ model now explicitly addresses motorized person travel for both work and non-work purposes. The Version 2.1/TP+ model, therefore, provides for the estimation of non-work transit, as well as work-related transit. Moreover, non-motorized (i.e., walking and bicycling) work travel is also explicitly computed in the Version 2.1/TP+ process, but within the trip generation step only.

The Version 2.1/TP+ model is also different in that highway and transit travel is explicitly modeled by time period. Whereas the Version 1 model is applied to arrive at daily traffic volumes, the Version 2.1/TP+ model is designed to produce traffic volume and speed estimates corresponding to three periods: AM peak period, PM peak period, and off-peak time period. The model also utilizes both AM peak and off-peak transit service levels in trip distribution and mode choice model procedures. The AM peak service levels are used to support HBW distribution and mode choice procedures, while off-peak service levels support distribution and mode choice for the remaining (HBS, HBO, and NHB) purposes. The Version 2.1/TP+ time-of-

Exhibit 1-1 Expanded Cordon Region



day modeling is based on a post-mode choice approach. The trip generation, distribution, and mode choice models produce daily trip tables that are subsequently apportioned among time periods prior to the traffic assignment step.

There are also differences between the way that the Version 1 and Version 2.1/TP+ model sets are applied. Whereas the Version 1 model makes use of a district-level area system for trip generation and trip distribution and zone-level area system for mode choice and traffic assignment steps, the Version 2.1/TP+ model makes use of a single zone-level application which remains consistent for the entire four-step process.

Finally, the Version 1 model considers only one demographic (household) variable, vehicles available. The estimation of this variable is developed in an off-line 'pre-processing' step prior to the travel model execution. The Version 2.1/TP+ model also considers vehicle availability levels, but additionally, considers household size and income level. Furthermore, demographic models used to estimate households by size, income level, and vehicles available are now an integrated component of the modeling process.

1.2 General Application of the Version 2.1/TP+ Model

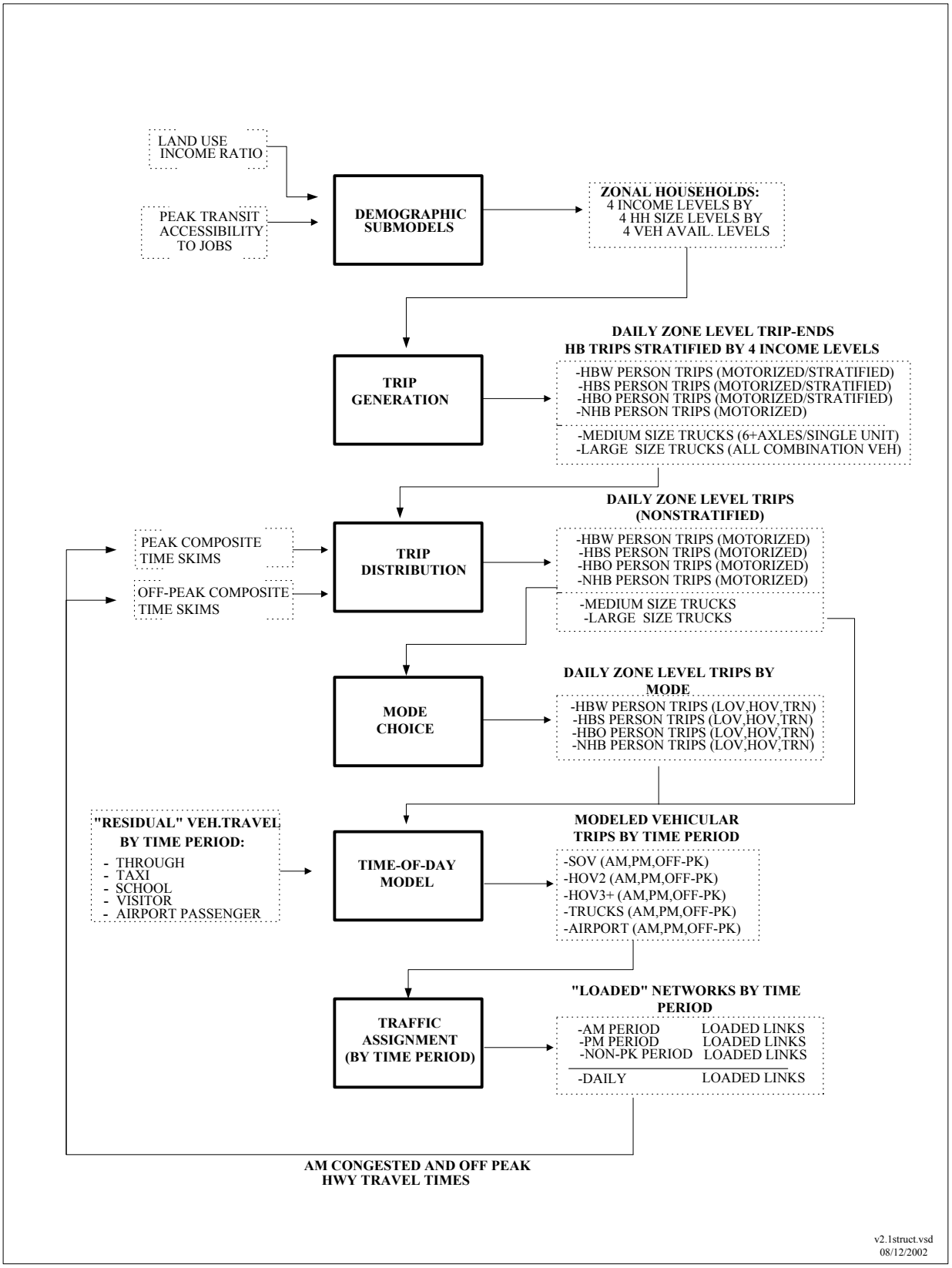
The conceptual operation of the Version 2.1/TP+ modeling process is shown graphically as Exhibit 1-2. The exhibit indicates the general sequence of steps that are undertaken in a given model application, as well as, the information that is utilized and generated from each successive operation.

The demographic models are first applied for the purpose of disaggregating the total number of households among 64 cross-classes: 4 household income groups[1] by 4 household size groups (1, 2, 3, 4+) by 4 vehicle availability groups (0, 1, 2, and 3+ vehicles available). The allocation of households to each cross-class is made at traffic analysis zone (TAZ) level. The exhibit indicates that peak-hour transit accessibility measures are used as part of the demographic (vehicle availability) submodel step.

The trip generation process involves the application of daily trip rates to the number of households in each of the 64 classes. The HBW trip rates reflect both motorized and non-motorized (transit, automobile, bicycle, and walk) person travel. Trip rates associated with the remaining modeled purposes represent motorized (transit and automobile) person travel only. The non-motorized component of HBW trip-ends generated is subsequently extracted from the total trip-ends prior to trip distribution. Trip attractions are computed by purpose as a function of gross land use categories. External (E/I and I/E) productions and attractions are entered as an exogenous input, by purpose, into the trip generation process and are unaltered. External Home-Based and NHB travel relates to auto person travel only, i.e. transit travel is not represented in MWCOG's external trip tables. The trip generation process yields productions and attractions, which are stratified by the 4 income levels for the home-based purposes, and non-stratified for the NHB and truck-related purposes.

[1] The income levels used approximate household income quartiles.

Exhibit 1-2 Version 2.1/TP+ Travel Model Structure



The trip distribution model utilizes the standard gravity model formulation and is applied at zone level. The model makes use of a composite time function that represents a blending of transit and highway travel times. The distribution step involves separate gravity model runs for 25 travel markets, given that home-based purposes are income stratified, and external travel is modeled separately by purpose and facility type (interstate travel vs. non-interstate). However, the trip distribution process ultimately results in six daily trip tables corresponding to the basic motorized person and truck purposes.

The mode choice process consists of four models corresponding to the HBW, HBS, HBO and NHB purposes. The models are used to apportion total motorized person trips among auto driver, auto passenger, and transit modes. The HBW model also distinguishes auto trips that utilize special preferential HOV facilities that have been coded into the highway network. Prior to the mode choice step, peak and off-peak highway skims are generated from initial (or 'pump-prime') peak and off-peak traffic assignments. The initial assignments are performed by first applying pre-existing auto driver percentage matrices to the person trips resulting from trip distribution, which results in daily vehicle trip tables. Next, the time-of-day model (described more below) is used to convert the daily vehicle trips to peak and off-peak trips. Finally, these trips are assigned to peak and off-peak highway networks. The resulting peak and off-peak restrained highway times are, then, skimmed for use in the mode choice model.

It is important to point out that the Version 2.1/TP+ mode choice process is executed once using 'pump-prime' highway assignment-based speeds. The mode choice process is <u>not</u> rerun as part of subsequent feedback linkages connecting peak traffic assignment skims back to the HBW trip distribution process. Although the work trip distribution is rerun using updated highway travel time skims, the transit and HOV trips produced from the initial mode choice model run are simply preserved, i.e. the pre-existing transit and HOV trips are subtracted from total person trips. Revised LOV trips are computed by applying LOV auto driver percents, again, from the initial mode choice model run, to the remaining balance of person trips.

The time-of-day model functions to convert daily residential travel among three time periods: AM peak period (6AM-9AM), PM peak period (4PM-7PM) and off-peak period (all remaining hours). The model consists of survey-based factors that are applied on the basis of purpose, mode, and trip orientation, i.e. home-to-non-home or non-home-to-home. This step also includes provisions for apportioning daily residual travel[2] and truck travel among the three time periods. The time-of-day process ultimately produces three 'total vehicle' trip tables, one for each of the three time periods.

The Version 2.1/TP+ traffic assignment process is executed four times within a given model run. Each traffic assignment procedure consists of three separate assignment executions, which correspond to the three discrete time periods. Further, each assignment utilizes a multiple iteration equilibrium algorithm. The first (or 'pump prime') traffic assignment process uses vehicle trip tables which are based on approximate auto driver percentages that are applied, by

[2] Residual travel is also referred to as 'miscellaneous' travel which represents special travel markets that are typically not (or not well) represented in home-interview surveys; it is comprised of taxi, school, visitor/tourist, and air passenger auto driver travel.

purpose, to the modeled person trips. The highway time skims resulting from the pump prime assignment are, then, used in the mode choice model step. The second (or 'base' iteration) traffic assignment utilizes vehicle trips resulting directly from the mode choice model output. There are two additional model cycles beyond the base iteration in which peak and off-peak highway speeds are fed back into trip distribution. The cycles are known as the "first" and "second" iterations.

A link level volume averaging process is applied after the first and second iteration traffic assignments to encourage a convergence of highway volumes and speeds. After the first iteration assignment, 'final' link volumes are computed as:

1/ 2 base iteration link volume + 1/2 the first iteration link volume

After the second iteration assignment, 'final' link volumes are computed as:

2 / 3 first iteration link volume (averaged) + 1/ 3 the second iteration link volume

Chapter 2. Observed Data

The study area, known as the "expanded cordon" study area, covers almost 7,000 square miles. It is comprised of both MWCOG member governments as well as counties belonging to neighboring MPOs. The most prominent of the nearby MPOs is the Baltimore Regional Transportation Board (BRTB), housed at the Baltimore Metropolitan Council (BMC). The expanded cordon was originally established to include not only Washington's non-attainment area, but also an additional buffer area extending approximately one county beyond the non-attainment area. Assembling observed data supporting this sizeable area was and continues to be a challenge. This chapter provides an overview of the observed data and base-year land use files that were used in the development of the Version 2.1/TP+ models.

The observed information used in the development of Version 2.1/TP+ models are listed below:

- 1990 Census Transportation Planning Package (CTPP);
- 1993 Baltimore Regional Household Travel Survey (BTS);
- 1994 COG/TPB Household Travel Survey (HTS);
- 1994 COG/TPB Auto External Survey (AES);
- 1994 WMATA Metrorail Survey (WMS);
- 1996 COG/TPB Truck Internal Survey; and
- 1996 COG/TPB Truck External Survey (TES).

Exhibit 2-1 shows the relationship of the HTS and BTS survey areas to the modeled area. The exhibit indicates that the HTS, the primary survey used in model estimation work, targeted the residents of 13 of the 22 jurisdictions comprising the modeled area. The BTS was used to obtain information for the three Baltimore-area counties within the modeled area, which are beyond the scope of the HTS. The exhibit further indicates that household travel information was unavailable for six exurban jurisdictions of the modeled area (the City of Fredericksburg, and, St. Mary's, King George, Spotsylvania[1], Clarke, and Jefferson Counties).

A general description of the information obtained from the above surveys for the Version 2.1/TP+ model work follows. A description of the land use forecast data, known as Cooperative Forecast data, used for model application work is also provided.

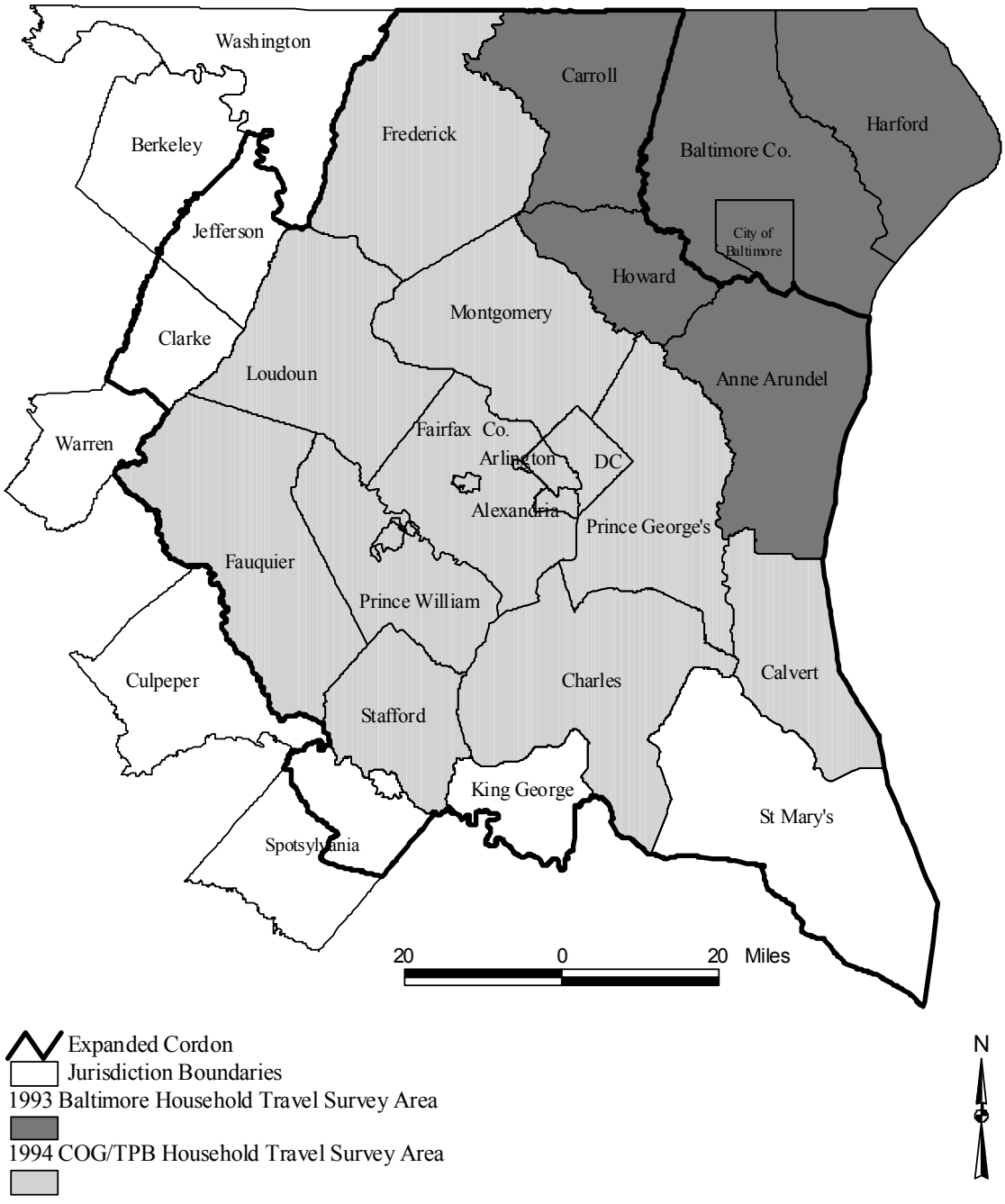
2.1 1993 Baltimore Household Travel Survey

The BTS was used to obtain travel information for the three Baltimore area counties within the modeled region, Carroll, Anne Arundel, and Howard Counties. The distribution of travel generated was of key interest since substantial travel interaction between the three counties and the Baltimore region is recognized. The travel summaries were subject to two constraints: 1) since BTS file was not geocoded to the modeled (2,191) TAZ system, summaries where made at

[1] Spotsylvania County is only partially included in the modeled area, approximately the portion north of VA Rt. 606. All other jurisdictions are within the modeled cordon, in their entirety.

the county level or higher, and 2) the travel summaries were limited to motorized person travel for home-based purposes only.

Exhibit 2-1 Areas Associated with the 1993 Baltimore Travel Survey & 1994 COG/TPB Household Travel Survey



Ref: 1994hts.wmf

A previous review of the BTS data[2] has established reasonable comparability with the HTS, in terms of the overall sampling rate, person trip rates, and travel distributions by purpose between the BTS and the HTS. The BTS survey file consists of 21,000 linked trip records associated with 2,700 households in the greater Baltimore region (approximately a 1-in-300 sample). The steps taken for assembling travel data from the BTS were as follows:

1) Motorized person trips from the BTS, corresponding to HBW, HBS and HBO purposes, were summarized at county level. Trips from counties located beyond the expanded cordon were grouped into a single 'external' category.

2) Average annual growth factors were applied, by county, to adjust the travel summaries from 1993 to 1994. The growth factors were based on the average land use change between 1990 and 1995 and ranged from 1.4% to 3.0%.

3) The BTS summaries did not indicate travel destined to DC, which was troubling given that the Baltimore/Washington corridor is well served by transit. Travel figures based on the 1990 CTPP (adjusted to 1994) were ultimately inserted into the summaries.

4) External travel (I-X) from the BTS was compared to that from the COG's Auto External Survey (AES), and some differences were noted. Since the AES was deemed to be the stronger of the two surveys, external travel figures from the AES were used in place of those from the BTS. However, the use of AES trips resulted in a slight change to the original trip control totals. Given this situation, two adjustments were made to the travel summaries: 1) the trip summaries were uniformly adjusted so that the original BTS control totals were preserved, and 2) after the uniform adjustment, care was taken to preserve the relative internal distribution of county-level travel as established by the BTS.

Internal travel estimates, by mode and purpose, were also desired to support the Version 2.1/TP+ mode choice work. County-level transit and car-occupancy information was summarized from the survey. The global results are shown in the table below.

Anne Arundel, Howard, and Carroll Counties
Internal Travel Summary by Mode
(1994 Trips)

Purpose	Transit	Auto Person	Auto Driver	Total Person
HBW	13,600	385,900	354,200	399,500
HBS	700	202,000	165,800	202,700
HBO	1,800	693,100	468,900	694,900

[2] See, FY-98 Models Development Program for COG/TPB Models, MWCOG, 6/98, Section 3.1.3.

2.2 1994 COG/TPB Household Travel Survey

The 1994 HTS served as the primary data source for estimating the initial Version 2.1/TP+ model parameters. The survey file contains travel information associated with 4,863 households residing in 13 jurisdictions which comprise the greater Washington, D.C. region (approximately a 1-in-300 sample). The survey was conducted in two waves during the fall and the spring. The survey file contains 39,800 internal trip records with respect to the expanded cordon. A more detailed description of the file development can be found in previously published documents.[3]

A summary of the weighted HTS trips by purpose and mode is displayed as Exhibit 2-2. The trip summary reflects travel made by residents of the HTS area to any location within the expanded cordon (i.e. travel made to areas beyond the expanded cordon is not included). The summary also includes trips associated with modes such as taxi and school bus, which are included in traffic assignment, but are not explicitly modeled in trip generation, distribution, and mode choice.

Exhibit 2-2 indicates approximately 13,774,800 daily trips (weighted) are made within the surveyed area, approximately 87% of which are related to automobile and transit modes. Given that 1,562,000 households resided in the surveyed area during 1994, the survey yields an average household trip rate of 8.82 person trips per household, as per all modes of travel.

[3] 1994 COG/TPB Household Travel Survey for the Metropolitan Washington Region/Technical Report and Documentation, MWCOG, June 1997.

Exhibit 2-2 1994 HTS Summary of Trips by Purpose and Mode

(Current Model Purpose Definitions)
Source: 1994 COG/TPB Household Travel Survey

Mode of Travel	Purpose				TOTAL	*Row Percent*
	HB Work	**HB Shop**	**HB Other**	**NHB**		
Auto Driver	2,070,084	1,158,878	2,967,634	2,544,072	8,740,668	***63.45%***
Auto Passenger	239,038	269,340	1,313,190	638,297	2,459,865	***17.86%***
Auto Person Subtotal:	2,309,122	1,428,218	4,280,824	3,182,369	11,200,533	***81.31%***
Average Auto Occupancy	***1.12***	***1.23***	***1.44***	***1.25***	***1.28***	
Transit	434,121	26,649	133,921	161,401	756,092	***5.49%***
Auto Person and Transit Subtotal:	2,743,243	1,454,867	4,414,745	3,343,770	11,956,625	***86.80%***
Transit Percentage	***15.83%***	***1.83%***	***3.03%***	***4.83%***	***6.32%***	
Taxi	11,600	1,134	23,313	24,240	60,287	***0.44%***
Walk	87,635	117,587	380,673	486,760	1,072,655	***7.79%***
Bicycle	19,855	6,089	39,111	7,017	72,072	***0.52%***
Nonmotorized Subtotal:	107,490	123,676	419,784	493,777	1,144,727	***8.31%***
School Bus	1,274	0	482,776	69,624	553,674	***4.02%***
Heavy Truck	1,903	450	2,438	22,512	27,303	***0.20%***
Other Modes	5,237	1,461	9,607	15,829	32,134	***0.23%***
Total Person Travel	2,870,747	1,581,588	5,352,663	3,969,752	13,774,750	***100.00%***
Column Percent	***20.84%***	***11.48%***	***38.86%***	***28.82%***	***100.00%***	

- Motorcycles have been combined into the auto driver mode.
- Trips shown are made by HHs in the jurisdictions of DC, Alexandria, Calvert, Charles, Frederick, Montgomery, Prince George's, Arlington, Fairfax, Fauquier, Loudoun, Prince William, and Stafford Counties.
- The surveyed trips shown are those geocoded within the expanded cordon area only.

Ref: modpur.xls

2.3 1994 COG/TPB Auto External Survey

The AES was conducted during the Fall of 1994. The survey effort entailed two phases. First, license plate numbers of automobiles crossing the expanded cordon in the inbound direction over an eight-hour period were recorded. Second, after obtaining addresses from several state motor vehicle departments, mail-out/mail-back postcards were distributed with a limited number of travel-related questions concerning the trip purpose, origin/destination location, and vehicle occupancy. 16,000 post cards were returned to MWCOG. The information obtained from the post cards provided the basis for the development of automobile external and through trip tables by purpose, mode (auto driver and auto passenger), and time-of-day. The processing of the survey and the development of trip tables can be obtained in prior documents.[4] The daily trips developed from the auto external survey are shown by purpose and mode in the table below.

Summary of 1994 External / Through Auto Trips
By Purpose and Mode

Purpose	Auto Drivers	Auto Persons
External HBW Trips	354,700	403,700
External HBS Trips	81,000	134,700
External HBO Trips	261,800	424,400
External NHB Trips	167,000	215,800
Through (X-X) Trips	31,800	54,600
Total External/Through Trips	896,300	1,233,200

A summary of auto travel at each external station is shown as Exhibit 2.3. Total auto driver travel shown (930,300) accounts for 82% of the total average annual weekday traffic (1,134,900) crossing the modeled cordon line.

[4] See, 1994 Auto External Survey for the Metropolitan Washington Region, MWCOG, 9/96 and FY-97 Models Development Program for COG/TPB Models, MWCOG, 6/30/97 (section 3.1.3).

Exhibit 2-3 Summary of 1994 Daily Auto External / Through Trip Totals by Station

Extl. Sta.	Facility Name	AADT	AAWDT	Truck %	Truck Count	I-I Auto %	**Control Total for External/Thru Auto Trips**	Total Ext'l Auto Prods	Total Ext'l Auto Attrs	Total Auto Thru Trip-Ends
2145	VA 3 (East)	5,600	6,160	13%	801	0%	**5,359**	2,733	2,145	563
2146	US 301 (South)	13,000	14,300	19%	2,717	6%	**10,888**	4,483	4,764	1,867
2147	US 17	2,200	2,420	5%	121	0%	**2,299**	1,370	929	14
2148	VA 2	5,500	6,050	5%	303	0%	**5,748**	3,421	2,344	0
2149	I-95 (South)	65,000	71,500	24%	17,160	0%	**54,340**	16,012	26,280	12,051
2150	US 1(South)	5,500	6,050	7%	424	2%	**5,514**	3,252	1,832	0
2151	VA 208/606	2,200	2,420	7%	169	2%	**2,206**	1,304	727	0
2152	VA 612	1,400	1,540	7%	108	2%	**1,404**	826	450	0
2153	VA 3(West)	12,000	13,200	7%	924	2%	**12,030**	7,142	3,979	572
2154	US 15/29 (South)	14,000	15,400	15%	2,310	0%	**13,090**	6,580	5,343	1,155
2155	US 211	13,000	14,300	3%	429	2%	**13,594**	8,848	4,607	257
2156	I-66	18,000	19,800	12%	2,376	0%	**17,424**	9,684	6,219	840
2157	VA 55	1,800	1,980	17%	337	1%	**1,627**	1,024	554	12
2158	US 340	6,400	7,040	17%	1,197	1%	**5,785**	3,442	2,133	216
2159	US 17/50	13,000	14,300	17%	2,431	1%	**11,750**	6,219	3,751	1,020
2160	VA 7	13,000	14,300	7%	1,001	0%	**13,299**	6,749	6,170	635
2161	WV 51	6,500	7,150	7%	501	0%	**6,650**	3,509	2,927	110
2162	WV 9	10,000	11,000	6%	660	1%	**10,237**	4,008	5,595	348
2163	WV 45	7,300	8,030	2%	161	1%	**7,791**	3,710	3,153	466
2164	MD 34/WVA 480	5,100	5,610	2%	112	1%	**5,443**	2,578	2,185	579
2165	Alt US 40	4,900	5,390	6%	323	8%	**4,661**	3,018	1,500	81
2166	I-70 (West)	41,100	45,210	17%	7,686	0%	**37,524**	19,703	12,923	5,335
2167	US 40	3,500	3,850	6%	231	8%	**3,329**	2,080	1,037	84
2168	MD 77	2,200	2,420	9%	218	0%	**2,202**	1,029	834	269
2169	MD 550	1,600	1,760	9%	158	0%	**1,602**	853	690	40
2170	MD 140/PA16	6,500	7,150	9%	644	0%	**6,507**	2,758	2,243	937
2171	US 15 (North)	10,600	11,660	18%	2,099	0%	**9,561**	4,019	3,690	1,193
2172	MD 194 /PA194	3,600	3,960	9%	356	0%	**3,604**	1,622	1,972	0
2173	MD 97/PA 97	5,100	5,610	9%	505	0%	**5,105**	2,275	2,794	20
2174	MD 30 (North)/ PA 94	12,500	13,750	9%	1,238	0%	**12,513**	4,719	5,779	1,972
2175	MD 86 / PA 516	2,800	3,080	9%	277	0%	**2,803**	1,267	1,549	0
2176	MD 88	5,500	6,050	9%	545	0%	**5,506**	2,489	3,045	0
2177	MD 30 (East)	12,500	13,750	9%	1,238	0%	**12,513**	4,410	5,428	1,948
2178	MD 140/91	31,400	34,540	4%	1,382	2%	**32,495**	11,542	20,523	439
2179	MD 26	26,500	29,150	4%	1,166	2%	**27,424**	9,865	17,533	170
2180	I-70 (East)	73,400	80,740	8%	6,459	9%	**67,596**	26,394	37,961	3,990
2181	US 40 (East) / MD 144	38,900	42,790	2%	856	7%	**38,999**	17,379	21,114	256
2182	I-95 (North)	130,400	143,440	13%	18,647	15%	**106,074**	50,165	49,297	8,684
2183	I-195 /US 1 (North)	47,100	51,810	5%	2,591	26%	**36,422**	20,605	15,379	284
2184	Md 295 / B/W Pkwy	64,200	70,620	3%	2,119	10%	**61,651**	39,836	19,829	963
2185	MD 170	12,700	13,970	2%	279	32%	**9,310**	4,382	4,952	0
2186	MD 648	26,000	28,600	2%	572	32%	**19,059**	8,946	10,117	0
2187	MD 3 / I-97	73,100	80,410	8%	6,433	14%	**63,620**	23,318	33,880	7,243
2188	MD 2	45,200	49,720	2%	994	22%	**38,006**	24,779	13,246	284
2189	MD 10	48,900	53,790	2%	1,076	22%	**41,117**	26,687	14,263	0
2190	MD 710	29,600	32,560	2%	651	22%	**24,889**	16,153	8,639	0
2191	US 50 (East) / 301	51,400	56,540	12%	6,785	0%	**49,755**	24,665	16,198	8,735
Total:		1,031,700	1,134,870	9%	99,766	10%	**930,322**	451,852	412,502	63,632

Ref: ext_ctl.xls

2.4 1996 Internal Truck Survey

The Internal Truck Survey was conducted in 1994 to obtain information on the travel patterns of local truck operators in the Washington region. A random sample was established from state vehicle registration data. A 'cluster' sample was established, based on the fleet size of the operator: less than 5 trucks, 5 to 49 trucks, and 50 or more trucks. The sample frame resulted in approximately 1,700 operators. 200 firms ultimately participated in the survey. Information collected included vehicle characteristics, cargo types, origin/destination locations, etc.[5]

The internal truck survey file contains 3,800 geocoded trip records. Although 6,600 trips were recorded in total, origin/destination locations were collected for only the first 9 truck stops. The distribution of the geocoded records by truck type is as follows:

Truck Type	Geocoded Trip Records	Percentage
Light Truck (single unit <6 tires)	1,461	38.2%
Medium Truck (single unit 6+ Tires	1,270	33.2%
Heavy Truck (all combination vehicles)	1,093	28.6%
Total	3,824	100.0%

A jurisdictional trip summary of the geocoded truck trips was prepared and compared to the existing modeled truck trips. The distribution summaries indicated that the majority of truck interchanges were within-jurisdiction movements, which was inconsistent with the existing modeled distributions, and was deemed unreasonable. Therefore, work on updating the regional truck trip generation, distribution models using the survey was discontinued.

It is the staff's recommendation to use the survey to provide temporal information on internal truck travel only. As an alternative to the development of a new truck model, the existing truck model used in Version 1 model work was adjusted based on available truck counts within the region.

2.5 1996 Truck External Survey

The External Truck Survey was conducted in the spring of 1996. Truck information was collected from 5,000 truck drivers at 12 sites that were 1) as nearby the modeled cordon, as possible, and 2) at locations that were suitable for safe data collection by human observers. The information was collected in the inbound direction, except for one site, the Bay Bridge, where an outbound intercept was more practical. Detailed information regarding the survey collection procedures is provided in a prior MWCOG publication.[6]

The External Truck Survey was used to produced external and through truck trips, by type and time-of-day.[7] The development of the trip tables resulted in the following 1994 trip totals.

[5] FY1996 Truck Surveys Technical Documentation, MWCOG, 6/96 for more detailed information.
[6] ibid.
[7] See 3/16/99 Memorandum from H. Humeida to Files on the subject: Development of 1994 External /Through Truck Trips based on 1996 External Truck Survey.

Truck Type	**Daily Trips, 1994**
External Medium Truck Trips	6,300
External Heavy Truck Trips	41,100
Through Truck Trips	26,200
Total External/Through Truck Trips	73,600

A summary of truck travel at each external station is shown as Exhibit 2-4. The exhibit indicates 1994 trucks crossing the expanded cordon amounts to about 99,800. Approximately 47,400 of these total truck trips are attributed to external travel (48%), while 52,400 trips are attributed to external trip-ends (52%). While I-95 (north/south) serves the largest market of through truck travel (32%), other substantial through truck interchanges include I-70 (east/west) and the Bay Bridge to I –97, US 301 (south), and I-95 (south).

Exhibit 2-4 Final 1994 Daily External / Through Truck Trips by Station

Based on the 1996 COG/TPB External Truck Survey

External Station TAZ	Facility	Control Total	Daily External Truck Trips			Daily X-X Truck Trip-Ends
			Medium	Heavy	Total	
2145	VA 3	800	40	262	302	498
2146	US 301	2,720	98	658	756	1,964
2147	US 17	120	6	36	42	78
2148	VA 2	300	14	92	106	194
2149	I-95	17,160	750	5084	5,834	11,326
2150	US 1	420	20	126	146	274
2151	VA 208/606	170	6	50	56	114
2152	VA 612	110	4	34	38	72
2153	VA 3	920	42	274	316	604
2154	US 15/29	2,310	152	1028	1,180	1,130
2155	US 211	430	28	192	220	210
2156	I-66	2,380	154	1058	1,212	1,168
2157	VA 55	340	22	152	174	166
2158	US 340	1,200	78	534	612	588
2159	US 17/50	2,430	160	1082	1,242	1,188
2160	VA 7	1,000	66	444	510	490
2161	WVA 51	500	32	222	254	246
2162	WVA 9	660	44	296	340	320
2163	WVA 45	160	8	72	80	80
2164	WVA 480 (MD 34)	110	6	52	58	52
2165	US 40 (Alt)	320	26	126	152	168
2166	I-70	7,690	616	2956	3,572	4,118
2167	US 40	230	18	88	106	124
2168	MD 77	215	16	100	116	99
2169	MD 550	160	12	74	86	74
2170	PA 16/MD 140	640	46	294	340	300
2171	US 15	2,100	146	958	1,104	996
2172	MD 194	360	26	162	188	172
2173	MD 97	500	34	230	264	236
2174	MD 30 (PA 94)	1,240	160	1078	1,238	2
2175	MD 86 (PA 516)	280	34	242	276	4
2176	MD 88/833	545	70	474	544	1
2177	MD 30	1,240	160	1078	1,238	2
2178	MD 140 and 91	1,380	178	1204	1,382	0
2179	MD 26	1,170	20	124	144	1,026
2180	I-70	6,460	98	666	764	5,696
2181	US 40 / MD 144	860	14	86	100	760
2182	I-95	18,650	948	6424	7,372	11,278
2183	US 1 / I-195	2,590	334	2258	2,592	0
2184	MD 295 B-W Pkwy	2,120	274	1846	2,120	0
2185	MD 170	280	16	96	112	168
2186	MD 648	570	74	498	572	0
2187	MD 3 / I-97	6,430	574	3964	4,538	1,892
2188	MD 2	990	98	670	768	222
2189	MD 10	1,080	54	372	426	654
2190	MD 710	650	84	568	652	0
2191	US 50/301	6,790	406	2756	3,162	3,628
Total:		**99,780**	**6,266**	**41,140**	**47,406**	**52,382**

tendtrk.xls

2.6 1994 Metrorail Survey

The 1994 Metrorail on-board survey was conducted by WMATA as part of an ongoing data collection activity to monitor the trends of passenger travel over time. This information was used to support the development of regional transit trips for the expanded cordon area. The file contains 56,000 records corresponding to 518,000 week-day trips (a sampling rate of nearly 11.0%). Metrorail-related trips account for about two thirds of total transit trips in the Washington region.

2.7 Round 6a Cooperative Land Use Forecasts

The Cooperative Forecast version used to derive 1994 land use for model application work was Round 6a which was released during the fall of 1998. The Cooperative Forecasting process provides land activity data at zone level in 5-year increments from 1990, 1995, …, 2025. The 1994 land use was interpolated by land use category using the following formula:

$$94LU = 90LU * (95LU / 90LU)^{0.8}$$

Where:
94LU = 1994 Land Use Category (Households, Population, Employment, etc.)
90LU = 1990 Land Use
95LU = 1995 Land Use

The above formula was applied at zone level for all land use categories, except for instances where the 1990 land activity figure was zero, where simple linear interpolation (80% of the 1995 figure) was used. The formula caused some occasional zone-level inconsistencies in that the nonlinear interpolation of individual employment categories did not always sum to the nonlinear interpolation of total employment. A zonal normalizing procedure was, therefore, established to preclude this potential problem. Regional land use totals for the 1990, 1994, and selected forecast years are shown in the table below.

Summary of Base-Year Land Use Forecasts

Source: Round 6A(Updated) Cooperative Forecasts

	Year		
Land Use Category	**1990**	**1994**	**1995**
Population	4,912,000	5,168,400	5,260,900
Households	1,805,000	1,912,800	1,948,600
Household Population	4,809,700	5,066,600	5,158,500
Grouped Quarter Population	102,200	101,800	102,400
Total Employment	2,986,100	3,049,600	3,099,100
Industrial Employment	410,000	426,400	436,700
Retail Employment	537,300	559,100	567,500
Office Employment	1,446,000	1,518,900	1,545,300
Other Employment	592,800	545,100	549,600

Chapter 3. Demographic models

This chapter describes the demographic modeling process used within the Version 2.1/TP+ model, which functions to allocate the total number of households among specific socioeconomic groups. With the migration to TP+, the vehicle availability model, developed previously in the MINUTP environment was re-estimated. The household size and income models are identical to those developed in the Version 2/MINUTP model. A review of previous calibration work leading to the household size and household income sub-models is provided below. The TP+ based vehicle availability model development and specification is also detailed.

3.1 Model structure

The demographic models are used to distribute the total number of households in a given zone among 64 classes. The classes are established by three dimensions:

- Household size (1, 2, 3, or 4+ persons per household);
- Household income (Income "quartile" 1, 2, 3, or 4); and
- Vehicle ownership/availability (0, 1, 2, or 3+ vehicles per household).

The income quartiles are defined as discrete ranges shown in the table below.

Quartile	Income range (1994 dollars)
First	Less than $30,000
Second	$30,000 to $49,999
Third	$50,000 to $74,999
Fourth	$75,000 or more

A socioeconomic sub-model was developed for each of the three dimensions. The household size sub-model uses Census-based relationships to estimate the percent of households in each integer class of household size, given the zone's average household size. The household income sub-model uses similar Census-based relationships to estimate the percent of households in each income class, given the zone's median household income. Lastly, the vehicle ownership model uses a disaggregate logit model to estimate the percentage of households in each of the four vehicle-availability classes. The logit model makes use of the household size and income information developed in prior steps.

The application of the sub-models is described in the last section of this chapter. The next three sections discuss the calibration of each sub-model.

3.2 Household size sub-model

The household size sub-model was developed as an "aggregate share" model. The model is essentially a family of four curves used to allocate the total number of households among integer size levels, based on the average household size of a given zone. Each curve uses the same independent variable:

Curve	Dependent variable	Independent variable
1	Percent of HHs with 1 person	Average zonal household size
2	Percent of HHs with 2 persons	Average zonal household size
3	Percent of HHs with 3 persons	Average zonal household size
4	Percent of HHs with 4+ persons	Average zonal household size

The model was estimated or calibrated using the 1990 Census Transportation Planning Package, Urban Element, Part 1 (tabulations by place of residence). The CTPP data is an aggregate data set with the smallest summary level being CTPP zones. CTPP zones are, in many cases, similar to COG/TPB TAZs. However, there are about 4,000 CTPP zones in the expanded cordon modeled area, but only 2,191 TAZs. The CTPP data is organized as a series of "tables." Two tables were used to develop the household size sub-model: 1) Table 1-11: Persons in households, and 2) Table 1-17: Household size by vehicles available.

The base year for the Version 2.1/TP+ model set is 1994, but the household size sub-model was calibrated using 1990 data. As a reasonableness check, the household size distribution from the 1990 CTPP was compared to that from the 1994 HTS. It was found that the two distributions were quite comparable, despite the time difference.[1]

The household size sub-model was developed using a standard set of procedures which are typically used for developing aggregate share models. The following steps were taken:

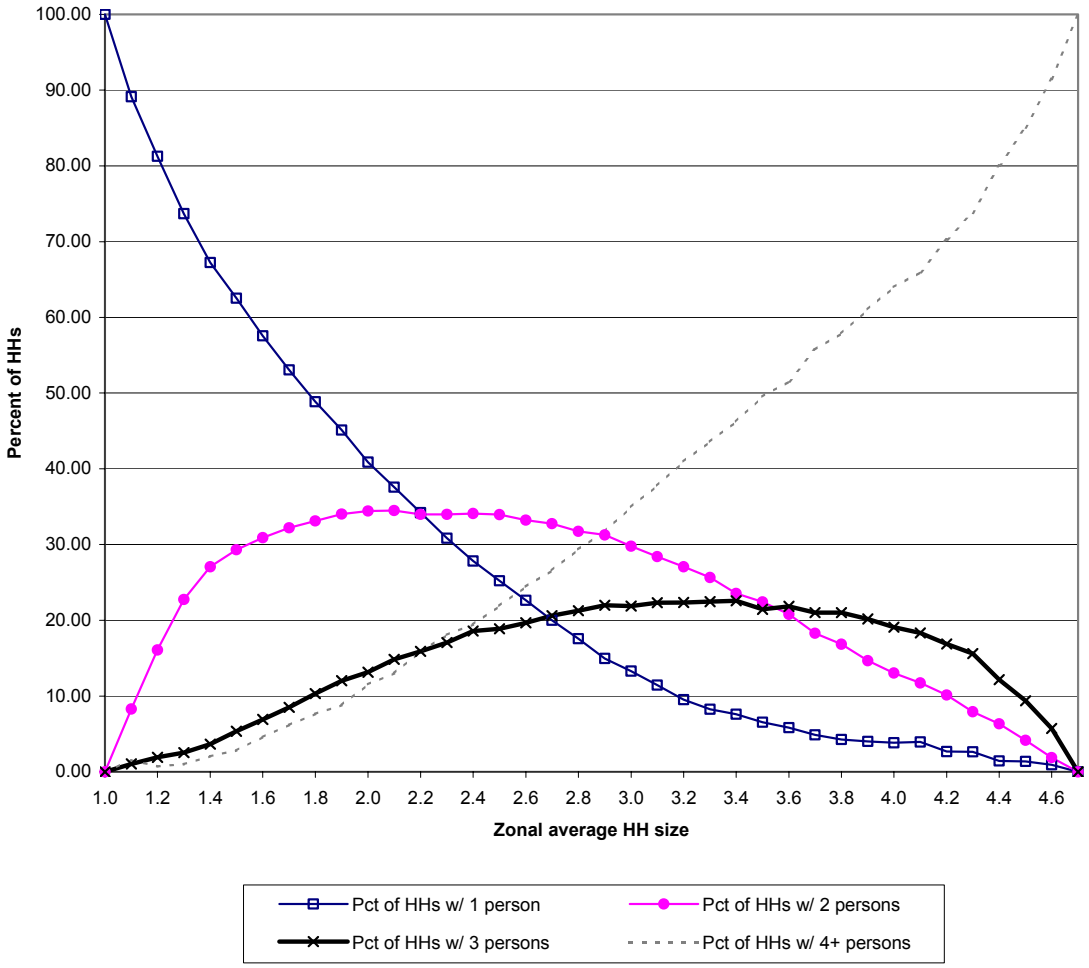
1) Select the following zone-level totals for those CTPP zones that lie within the expanded-cordon modeled area
   a) Number of persons
   b) Number of 1-person households
   c) Number of 2-person households
   d) Number of 3-person households
   e) Number of 4+person households
   f) Total number of households
2) For each zone, compute the average zonal household size:
   avehhsiz = (total HH population in zone) / (total number of HHs in zone)
3) Round the values of average zonal household size to one decimal place.
4) Aggregate data from the CTPP zone level to one observation for each tenth-unit increment of zonal average household size. During this aggregation, the number of households by household size (1, 2, 3, and 4+ persons) is summed.
5) For each average household size value, compute the *percent* of households with 1, 2, 3, and 4+ persons, such that these four percentages add up to 100.0% for each average household size value. Now, there are four percentage curves, one for each of the four auto availability classes.
6) The last step is to smooth the four curves to remove bumpiness. This smoothing, which is typically done by hand, must be done such that
   - For all average household size values, the sum of the households by integer size category must equal 100%

[1] "Development of a household size submodel", Memo from Mark Moran to Project Files, December 11, 1998.

- Using the integer household size percentage distribution, the calculated average persons per household must equal the average household size being used as the independent variable.

The final model is shown in graphical form in Exhibit 3-1and in tabular form in Exhibit 3-2.

Exhibit 3-1 Household size sub-model: Graphical form



Notes:

1. Source: 1990 CTPP, Urban Element, Part 1, Tables 1-17 and 1-11.
2. Study area: COG's expanded cordon (2,191-zone) area.

Ref:Demographicu.1Tpp.xls HHsizg

Exhibit 3-2 Household size sub-model: Tabular form

Ave zonal HH size	Pct of HHs with 1-pers.	Pct of HHs with 2-pers.	Pct of HHs with 3-pers.	Pct of HHs with 4+pers.	Total percent
1.0	100.00	0.00	0.00	0.00	100.00
1.1	89.12	8.29	1.04	1.55	100.00
1.2	81.26	16.11	1.91	0.72	100.00
1.3	73.69	22.76	2.52	1.03	100.00
1.4	67.23	27.07	3.65	2.05	100.00
1.5	62.51	29.31	5.37	2.81	100.00
1.6	57.57	30.92	6.92	4.59	100.00
1.7	53.08	32.21	8.50	6.21	100.00
1.8	48.86	33.14	10.34	7.66	100.00
1.9	45.12	34.04	12.04	8.80	100.00
2.0	40.88	34.43	13.14	11.55	100.00
2.1	37.60	34.52	14.85	13.03	100.00
2.2	34.21	33.98	15.90	15.91	100.00
2.3	30.85	33.98	17.08	18.09	100.00
2.4	27.84	34.09	18.61	19.46	100.00
2.5	25.23	33.96	18.89	21.92	100.00
2.6	22.64	33.23	19.67	24.46	100.00
2.7	20.00	32.77	20.62	26.61	100.00
2.8	17.58	31.75	21.27	29.40	100.00
2.9	14.98	31.28	22.01	31.73	100.00
3.0	13.30	29.81	21.91	34.98	100.00
3.1	11.45	28.43	22.32	37.80	100.00
3.2	9.52	27.09	22.38	41.01	100.00
3.3	8.25	25.66	22.48	43.61	100.00
3.4	7.61	23.57	22.57	46.25	100.00
3.5	6.57	22.45	21.45	49.53	100.00
3.6	5.82	20.79	21.84	51.55	100.00
3.7	4.90	18.31	21.04	55.75	100.00
3.8	4.26	16.85	21.02	57.87	100.00
3.9	4.04	14.68	20.20	61.08	100.00
4.0	3.84	13.05	19.11	64.00	100.00
4.1	3.96	11.73	18.33	65.98	100.00
4.2	2.70	10.14	16.89	70.27	100.00
4.3	2.64	7.93	15.63	73.80	100.00
4.4	1.46	6.33	12.17	80.04	100.00
4.5	1.39	4.17	9.38	85.06	100.00
4.6	0.95	1.90	5.71	91.44	100.00
4.7	0.00	0.00	0.00	100.00	100.00

Ref:Demographicu.1Tpp.xls HHsizT

3.3 Household income sub-model

The household income sub-model was developed as an "aggregate share" model using 1990 CTPP data in the same way as the household size sub-model. Income data was taken from CTPP Table 1-14: Households by number of vehicles available and household income. The analysis was performed at the CTPP zone level.

Before using the 1990 CTPP data, it was compared to the 1994 HTS data, to make sure the two data sets were comparable. The income distributions at the regional level for both data sets were quite similar. The income distribution for the 1994 HTS was shifted slightly to the right of that for the 1990 CTPP data, which was in line with expectations of income growth over the four-year gap. Further details can be found in the memo documenting the calibration of the household income sub-model.[2]

Determination of income quartiles

Both the 1994 Household Travel Survey and the 1990 Census (CTPP) use income ranges or classes to portray income information. The Census data set uses 25 income classes. The size of each income class varies from $2,500 to $25,000, with the mode class size being $2,500. The first class is "less than $5,000" and the last class is "$150,000 or more." By contrast, the 1994 HTS uses only 10 income classes. For the 1994 HTS, the class size varies from $5,000 to $25,000, with the mode size being $10,000. Despite these differences, the income classes in the 1994 HTS were designed to be coterminous with those in the 1990 Census, so the Census income ranges map into the 1994 HTS income ranges.

Income quartiles were determined by computing the cumulative percent of households in each of 25 income ranges used in the 1990 Census Transportation Planning Package (CTPP). The boundaries of these quartiles were then shifted slightly so that they would line up with the income ranges used in the 1994 HTS. The final income "quartile" ranges were as follows:

Quartile	Income range (1994 dollars)
First	Less than $30,000
Second	$30,000 to $49,999
Third	$50,000 to $74,999
Fourth	$75,000 or more

Calibration

The household income sub-model is used to estimate the share of households in each of the four income quartiles in each zone, given the median household income for the zone. As a surrogate for the median zonal household income, the following normalized variable was used as the independent variable for the model:

Income ratio = (zonal median HH income in 1989) / (regional median HH income in 1989)

[2] "Household income tabulations from the 1990 CTPP", Memo from Mark Moran to Project Files, February 17, 1999.

In this case, the "region" is defined to be the Washington MSA, which had a median household income of $46,884.

The household income sub-model was developed using a similar procedure to that used for the household size model. This procedure is typical for aggregate share models:

1) Select the following zone-level totals for those CTPP zones that lie within the expanded-cordon modeled area:
   a) Number of households in income group 1,
   b) Number of households in income group 2,
   c) Number of households in income group 3,
   d) Number of households in income group 4, and
   e) Total number of households.

   This results in one observation for each of the 4,066 CTPP zones in the expanded cordon modeled area.
2) For each zone, calculate the income ratio, as defined above. This results in 42 observations with missing values, since there are 42 CTPP zones with no households. Thus, there are 4,024 usable observations.
3) Round the income ratio to one decimal place. The rounded income ratios range from 0.1 to 3.2. The value of 3.2 comes from the fact that the maximum income range, "$150,000 or more," is coded as 150000 in the data set, and 150,000/46,884 = 3.199.
4) Aggregate observations by rounded income ratio value (summing up the number of households). This reduces the data set to 32 observations (0.1, 0.2, 0.3, …, 3.2).
5) Compute the percent or share of households in each of the four income quartiles.
6) The last step is to smooth the four curves to remove bumpiness. This smoothing, which is typically done by hand, must be done such that
   - For all income ratio values, the sum of the households by income group must equal 100%
   - Using the four household income curves, the calculated average household income must equal the income ratio being used as the independent variable.

The final model is shown in graphical form in Exhibit 3-3 and in tabular form in Exhibit 3-4.

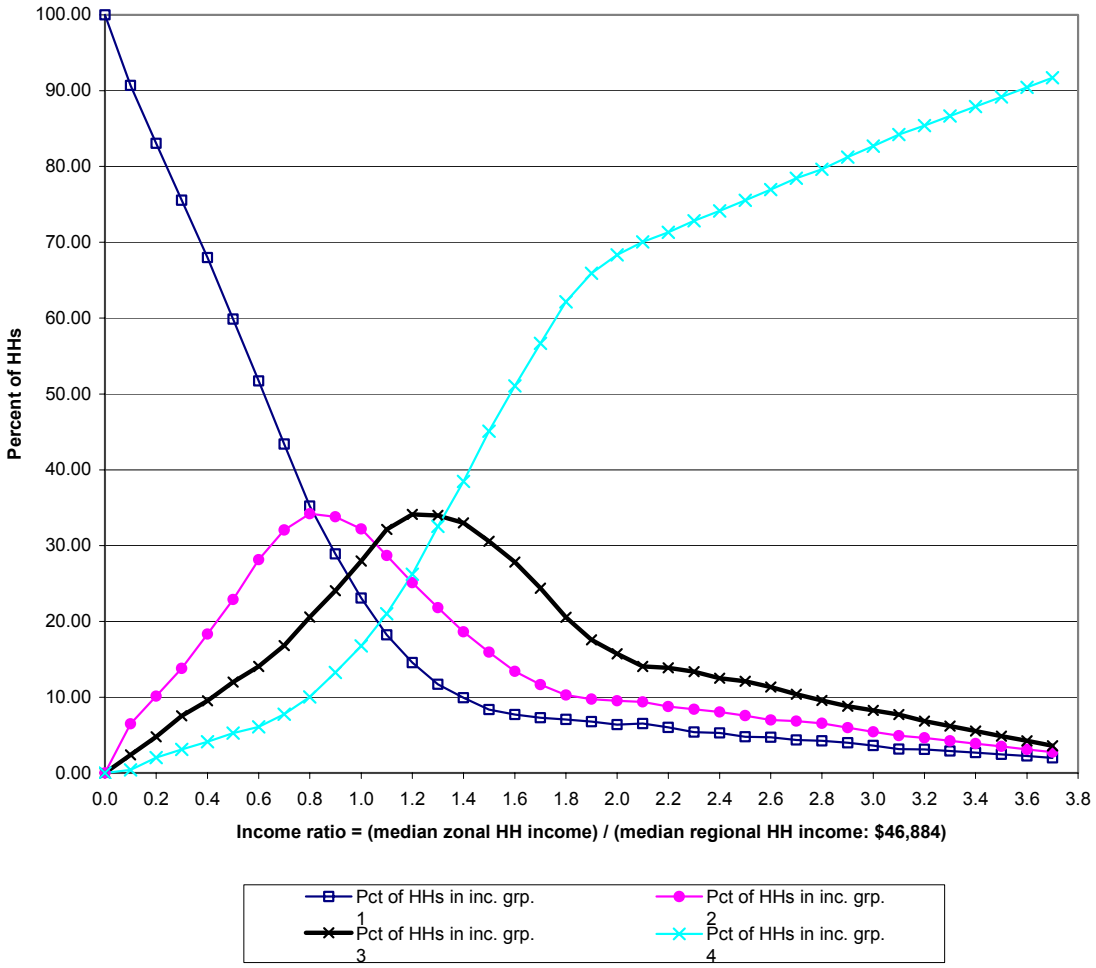
3.4 Vehicle availability sub-model

The vehicle availability sub-model is the last sub-model, which uses household size and income information from the previous models. This section presents the sub-model's development and adjustments made in the migration process to TP+.

Estimation of the model

The vehicle availability (VA) model is used to determine the number of households in each transportation analysis zone with 0, 1, 2, or 3+ vehicles. The model form chosen was the multinomial logit, which is currently a popular model form for vehicle availability models. The model was estimated ("calibrated") using disaggregate, household-level data.

Exhibit 3-3 Household income sub-model: Graphical form



Notes:

1. Source: 1990 CTPP, Urban Element, Part 1, Table 1-14.
2. Study area: COG's expanded cordon (2,191-zone) area.

Ref:Demographicu.1Tpp.xls HHIncG

Exhibit 3-4 Household income sub-model: Tabular form

Income ratio	Pct of HHs in inc. grp. 1	Pct of HHs in inc. grp. 2	Pct of HHs in inc. grp. 3	Pct of HHs in inc. grp. 4	Total percent
0.0	100.00	0.00	0.00	0.00	100.00
0.1	90.70	6.49	2.40	0.41	100.00
0.2	83.05	10.13	4.79	2.03	100.00
0.3	75.55	13.80	7.55	3.10	100.00
0.4	68.00	18.33	9.53	4.14	100.00
0.5	59.88	22.90	11.98	5.24	100.00
0.6	51.72	28.13	14.07	6.08	100.00
0.7	43.39	32.04	16.81	7.76	100.00
0.8	35.20	34.18	20.57	10.05	100.00
0.9	28.89	33.80	24.04	13.27	100.00
1.0	23.07	32.21	27.95	16.77	100.00
1.1	18.21	28.68	32.11	21.00	100.00
1.2	14.55	25.11	34.12	26.22	100.00
1.3	11.69	21.81	33.99	32.51	100.00
1.4	9.92	18.62	33.01	38.45	100.00
1.5	8.38	15.95	30.58	45.09	100.00
1.6	7.70	13.41	27.83	51.06	100.00
1.7	7.28	11.68	24.37	56.67	100.00
1.8	7.05	10.27	20.54	62.14	100.00
1.9	6.76	9.74	17.58	65.92	100.00
2.0	6.39	9.54	15.71	68.36	100.00
2.1	6.53	9.37	14.05	70.05	100.00
2.2	6.03	8.77	13.88	71.32	100.00
2.3	5.38	8.41	13.36	72.85	100.00
2.4	5.30	8.05	12.50	74.15	100.00
2.5	4.79	7.56	12.09	75.56	100.00
2.6	4.72	6.99	11.33	76.96	100.00
2.7	4.33	6.83	10.39	78.45	100.00
2.8	4.25	6.55	9.56	79.64	100.00
2.9	3.98	5.97	8.81	81.24	100.00
3.0	3.62	5.43	8.27	82.68	100.00
3.1	3.16	4.91	7.72	84.21	100.00
3.2	3.13	4.63	6.83	85.41	100.00
3.3	2.90	4.25	6.18	86.67	100.00
3.4	2.68	3.88	5.53	87.91	100.00
3.5	2.45	3.50	4.87	89.18	100.00
3.6	2.23	3.12	4.22	90.43	100.00
3.7	2.00	2.74	3.57	91.69	100.00

Ref:Demographicu.1Tpp.xls HHIncT

The calibration file for the vehicle availability model includes three types of data:

Type of data	Examples	Source
Household	Residence jurisdiction, household size, household income, vehicles available	1994 Household Travel Survey
Accessibility	Number of jobs accessible in 40 minutes travel time by transit	COG's 1994 transit networks (both AM peak and off-peak), as developed in TP+
Land use	Households, employment, land use mix index, area type	1994 Round 6A (interpolated) file

The calibration file (`vacal94u.dat`) contains 22 variables and 4,863 observations (households). Further detail about this file and its development can be found in a May 5, 1999 memo from Ronald Milone to Mark Moran entitled, "Calibration files for vehicle availability, non-motorized trip extraction submodels."

Estimating a logit model is a heuristic, trial-and-error process. A series of candidate models was estimated, each one using a different combination of independent variables. Each candidate model consists of a utility function made up of four utility equations (one for each alternative: 0, 1, 2, and 3+ vehicles available). The Alogit software package (version 3.8f) was used to estimate the coefficient values for each model. Fourteen candidate models were estimated: 01, 01b, 01c, 02, 02b, 03, 04, 04b, 05, 06, 06b, 06c, 06d, 07. The first models were the simplest in structure and the last models were generally the most complicated. Model #06d was judged to be the best of the fourteen and was selected to be the vehicle availability model (See Exhibit 3-5). The other candidate models can be seen in the memo describing the model calibration.[3]

Discussion of the chosen model

Exhibit 3-5 shows both the *structure* of the utility function and the estimated values for the coefficients of the independent variables. The left part of the table shows the structure of the utility function. There are four alternatives (0, 1, 2, and 3+ vehicles) and four utility equations. Each utility equation is represented by a column in the left part of the table. An "x" in one of these columns indicates the presence of an independent variable in the equations. For example, the first term in the 1-vehicle utility equation is an alternative-specific constant with the value of 1.4183. Note that the utility equation for the 0-vehicle alternative has no terms in it. This is because of two rules governing the specification of utility equations for logit models:

- Alternative-specific constants may appear in up to (n - 1) utility equations, where n is the number of alternatives.
- Socioeconomic variables and other variables that do not vary across alternatives may appear in up to (n - 1) utility equations.

Since all the models tested are composed entirely of these two types of terms (alternative-specific constants and socioeconomic variables), no variable can appear in all four alternatives. Instead of alternating which alternative does not include each variable, a typical convention is to pick one alternative (we chose the 0-vehicle alternative) as the "referent," and leave the independent variables out of this alternative. The choice of which alternative to make as the

[3] "Estimation of the vehicle availability model for the Version-2 model set: The best model to date", Memo from Mark Moran to Ron Milone, June 7, 1999.

Exhibit 3-5 Vehicle availability model

No. of vehicles						
0	1	2	3+	Variable name	Coeff.	T-stat
	x			Constant	1.5988	(4.1)
		x		Constant	-1.4608	(-3.5)
			x	Constant	-4.3021	(-9.2)
		x		HH size	0.8700	(21.1)
			x	HH size	1.3026	(24.1)
	x			Income level 2 dummy	1.2376	(7.9)
		x		Income level 2 dummy	1.7892	(10.1)
			x	Income level 2 dummy	1.8221	(8.4)
	x			Income level 3 dummy	1.3285	(7.6)
		x		Income level 3 dummy	2.4831	(13.1)
			x	Income level 3 dummy	2.7395	(12.4)
	x			Income level 4 dummy	1.9991	(8.1)
		x		Income level 4 dummy	3.7372	(14.7)
			x	Income level 4 dummy	4.1987	(15.1)
	x			Tot emp w/in 40 min transit (AM pk)	-1.095E-06	(-3.5)
		x		Tot emp w/in 40 min transit (AM pk)	-1.815E-06	(-5.4)
			x	Tot emp w/in 40 min transit (AM pk)	-2.053E-06	(-5.6)
	x			Area type, 1994 (1 to 7)	0.0668	(0.9)
		x		Area type, 1994 (1 to 7)	0.2783	(3.5)
			x	Area type, 1994 (1 to 7)	0.4093	(5.0)
	x			DC dummy	-0.9246	(-5.5)
		x		DC dummy	-1.0751	(-5.7)
			x	DC dummy	-1.6334	(-6.4)
				Number of obs	4,863	
				LL(0)	-6,742	
				Max. LL	-4,670	
				Rho-sq. wrt zero	0.3073	
				Rho-sq. wrt constants	0.2347	

Notes:
This model corresponds to model #06d. The calibration file used was vacal94u.dat (renamed to vau.dat 7/15/2002). The control file was vau06d.bin.

Ref:Demographicu.1Tpp.xls VA

referent is entirely arbitrary. One can think of the referent as having values of zero for each term.

All coefficient estimates are shown to have the logical signs and have significant t-statistics.[4] The household size variable has values of 1, 2, 3, or 4, where the 4 means 4 or more persons per household. The household size variable is included in only two of the four alternatives (it was included in the 1-vehicle alternative in model #06, but since the t-statistic was equal to 1.0, the term was dropped and the model re-estimated). The t-statistics for these two terms are both above 20, so household size is a very important determinant in vehicle ownership decisions, particularly in the decision of whether to own 2 or 3+ vehicles. Household income is represented with a series of dummy variables. Normally, the number of dummy variables is one fewer than the number of classes being represented. Since there are four household income classes (1, 2, 3, 4), these are represented using three income dummy variables. All of the income dummy terms have high t-statistics. The signs on all of the household income terms are positive, which makes sense, since an increase in household income is likely to increase vehicle ownership.

Transit accessibility is represented in the model with the variable "total employment within 40 minutes transit travel time (AM peak period)." This variable appears in three utility equations. Like the preceding terms, it is included in an alternative-specific manner, so there is a different coefficient estimate for each term. All three coefficient estimates for transit accessibility are negative, which is sensible, since an increase in job accessibility would likely lead to a decrease in vehicle ownership. Area type is represented with the same "area type" variable as is used for highway networks. This variable ranges from 1 to 7, with 1 indicating areas with high employment and population density, and 7 indicating areas with low employment and population density. All three coefficient estimates for area type are positive, since increases in area type (decreases in population and employment density) tend to result in increases in auto ownership. Lastly, the chosen model includes a dummy variable for whether the household is located in DC or not. This was added to the model because models without this term (such as #06c) significantly underestimated 0-vehicle ownership and overestimated 3+vehicle ownership in the District. The coefficient on this variable (all three terms) is negative, since living in DC has a downward effect on the utility of owning vehicles.

Disaggregate validation

Once a logit model has been set up and the coefficients estimated, one may apply the estimated model to the disaggregate (household-level) data to determine how well the model performs for various subgroups of the population. This step is often called disaggregate validation and the results are displayed in validation tables. The validation can be done using either weighted or unweighted observations (estimation was done with unweighted observations, which is the usual procedure). The chosen model was validated for: 1) Residence jurisdiction, 2) Household size, 3) Household income, and 4) Area type.

Both weighted and unweighted validation tables for these subgroups can be found in the calibration memo.[5] Generally, the match between observed data and estimated data was quite

[4] A t-stat of over 1.0 is generally considered significant for logit modeling purposes.

[5] "Estimation of the vehicle availability model for the Version-2 model set: The best model to date", Memo from Mark Moran to Ron Milone, June 7, 1999. An update of this memo is "Re-estimation of the vehicle Availability Model (Due to changes in accessibility file)," Memo from Hamid Humeida to Ron Milone, July 15, 2002.

reasonable. One of the validation tables, vehicles available by residence jurisdiction, is reproduced in Exhibit 3-6. As can be seen in this exhibit, the match between estimated and observed data is reasonable at the jurisdiction level.

3.5 Model application

The three models are applied using two FORTRAN programs. In the first program, the household size sub-model is applied to estimate the number of households in each of the four size classes. Next, the household income model is applied to estimate the number of households in each of the four income classes. This results in the marginal values of a two-way cross classification. Next, iterative proportional fitting (IPF), which is equivalent to the well-known Fratar method for adjusting trip tables, is applied to arrive at a joint size/income distribution. This results in 16 classes of households for each zone. In the second program, the vehicle availability model is applied, which further splits each class into four new classes, resulting in 64 classes of size/income/vehicle-availability per zone.

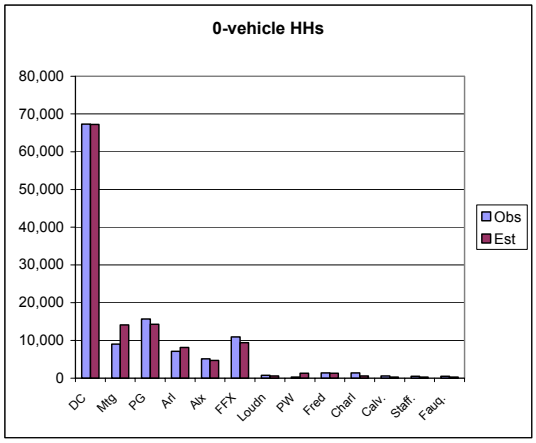
In contrast to a disaggregate validation, which was discussed earlier, an aggregate validation may be conducted by applying the three socioeconomic sub-models to aggregate data using the FORTRAN/TP+ application programs. It is important to underscore that, in application, the TP+-based household size model and the household income model application is the same as that developed using MINUTP. The vehicle availability model software is also the same as that developed previously. However, the transit accessibility information used in the vehicle availability model is now TP+-based instead of MINUTP-based. Any differences to the vehicle availability results would be attributed to the accessibility file differences between the two software packages. It was determined after executing the vehicle availability model with the TP+-based transit accessibility file that the results were not substantially different from the MINUTP-based results, and therefore, no model adjustments were implemented. The performance results are shown on Exhibits 3.7, 3.8, and 3.9 [6]. Exhibit 3-7 shows the performance of the household size sub-model at the regional level. The model appears to be performing well, without any systematic bias. Exhibit 3-8 shows the performance of the household income sub-model at the regional level. The model performance is reasonable, though not as good as for the household size sub-model. According to this exhibit, the model is overestimating the share of households in the two lower income groups and underestimating the share of households in the two upper income groups. Nonetheless, the model performance is deemed to be reasonable, since 1) income data is notoriously difficult to obtain, and 2) the estimated and observed data are for two different years: 1990 for the estimated data and 1994 for the observed data. Exhibit 3-9 shows the performance of the vehicle availability sub-model at the regional level. Like the household size sub-model, this model is performing quite well without any systematic bias. Appendix A contains a jurisdiction level comparison of estimated and observed distributions for each of the demographic variables.

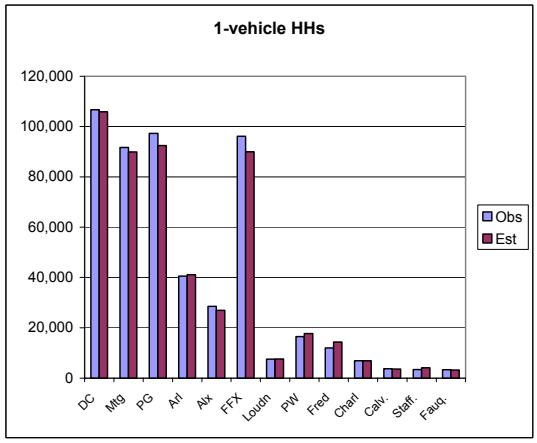
[6] To ensure consistency when comparing estimated and observed data in these three tables, the geographic area for both data sets is the 1994 Household Travel Survey area. This area includes 13 jurisdictions, and is a subset of the 22-jurisdiction area in the expanded cordon.

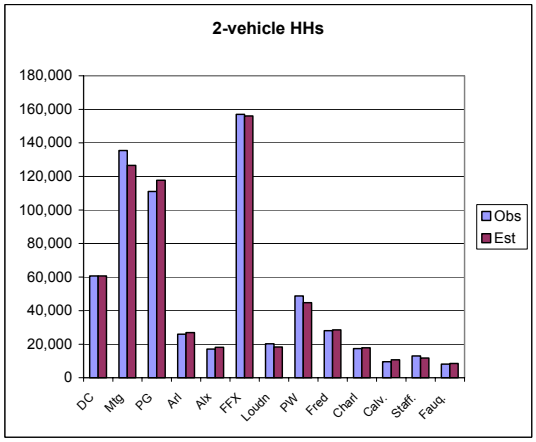
Exhibit 3-6 Disaggregate validation of the chosen vehicle availability model

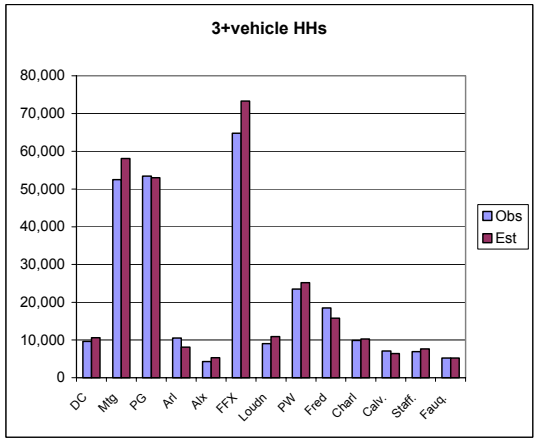
By residence jurisdiction

		DC	Mtg	PG	Arl	Alx	FFX	Loudn	PW	Fred	Charl	Calv.	Staff.	Fauq.	Total
0-veh.	Obs	67,300	9,000	15,700	7,100	5,100	10,900	700	300	1,400	1,400	600	500	500	120,500
	Est	67,200	14,100	14,300	8,100	4,700	9,400	600	1,300	1,300	600	300	300	300	122,600
1-veh.	Obs	106,700	91,700	97,300	40,500	28,500	96,100	7,500	16,500	12,000	6,900	3,700	3,400	3,300	514,200
	Est	105,900	89,900	92,400	41,100	26,900	90,000	7,600	17,700	14,300	6,900	3,600	4,100	3,200	503,500
2-veh.	Obs	60,700	135,500	111,100	26,000	17,000	157,000	20,200	48,700	28,000	17,400	9,500	12,900	8,100	652,000
	Est	60,700	126,600	117,700	26,900	18,100	156,100	18,300	44,700	28,500	17,800	10,600	11,700	8,500	646,200
3+veh.	Obs	9,600	52,500	53,400	10,500	4,300	64,800	9,000	23,500	18,500	9,900	7,100	6,900	5,200	275,300
	Est	10,600	58,100	53,000	8,100	5,300	73,300	10,900	25,200	15,800	10,300	6,400	7,600	5,200	289,800
Total	Obs	244,400	288,600	277,500	84,200	54,900	328,800	37,400	88,900	60,000	35,600	20,900	23,700	17,200	1,562,100
	Est	244,400	288,600	277,500	84,200	54,900	328,800	37,400	88,900	60,000	35,600	20,900	23,700	17,200	1,562,100









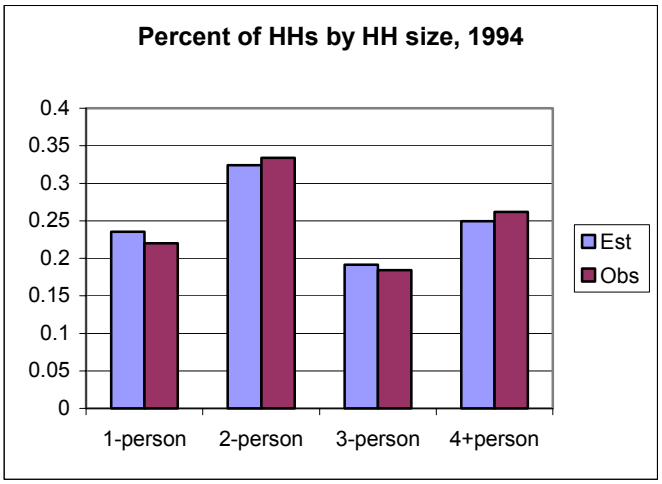
Notes:
Results are weighted, based on VA model #06d.

Ref:Demographic2.1TPP.xls VAval

Exhibit 3-7 Aggregate validation Households by household size, 1994

Estimated vs. Observed

	Number		Percent	
HH size	Est	Obs	Est	Obs
1-person	365,305	343,428	23.5%	22.0%
2-person	502,918	521,849	32.4%	33.4%
3-person	297,452	287,469	19.2%	18.4%
4+person	387,042	409,324	24.9%	26.2%
Total	1,552,717	1,562,070	100.0%	100.0%



Notes:

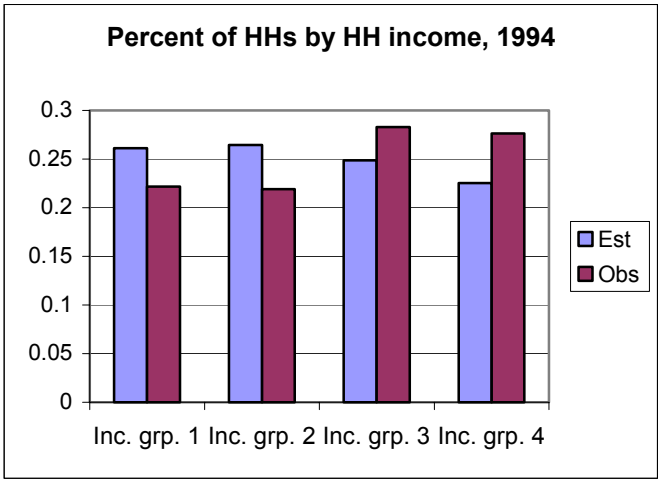
Observed data comes from the 1994 Household Travel Survey. Estimated data comes from an application of the Version 2.1/TP+ socioeconomic submodels.

The geographic areas for the estimated and observed data are the same (i.e., the estimated data includes only the 13 jurisdictions that are in the 1994 HTS area, which is a subset of the 22 jurisdictions included in the expanded cordon area).

Ref:Demographic2.1TPP.xls Apply

Exhibit 3-8 Aggregate validation Households by household income group, 1994 Estimated vs. Observed

	Number		Percent	
HH inc.	Est	Obs	Est	Obs
Inc. grp. 1	405,768	346,504	26.1%	22.2%
Inc. grp. 2	410,862	342,032	26.5%	21.9%
Inc. grp. 3	386,373	441,954	24.9%	28.3%
Inc. grp. 4	349,713	431,577	22.5%	27.6%
Total	1,552,716	1,562,067	100.0%	100.0%



Notes:

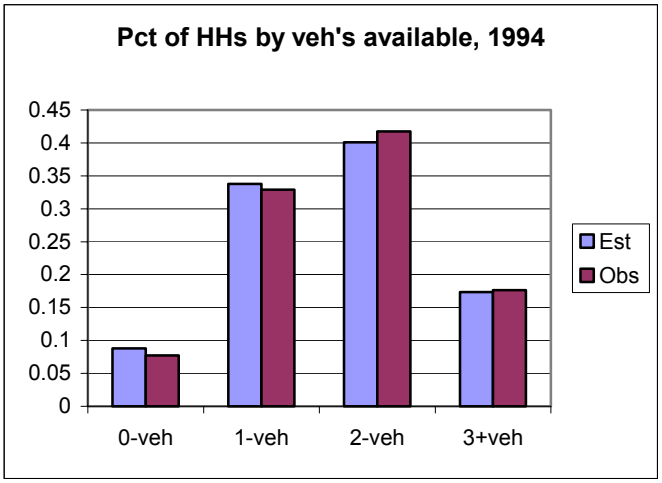
Observed data comes from the 1994 Household Travel Survey. Estimated data comes from an application of the Version 2.1/TP+ socioeconomic submodels.

The geographic areas for the estimated and observed data are the same (i.e., the estimated data includes only the 13 jurisdictions that are in the 1994 HTS area, which is a subset of the 22 jurisdictions included in the expanded cordon area).

Ref:Demographic2.1TPP.xls Apply

Exhibit 3-9 Aggregate validation Households by vehicle availability, 1994 Estimated vs. Observed

	Number		Percent	
Vehicles	Est	Obs	Est	Obs
0-veh	138061	120,538	8.9%	7.7%
1-veh	524954	514,168	33.8%	32.9%
2-veh	620991	652,013	40.0%	41.7%
3+veh	268625	275,347	17.3%	17.6%
Total	1,552,631	1,562,066	100.0%	100.0%



Notes:

Observed data comes from the 1994 Household Travel Survey. Estimated data comes from an application of the Version 2.1/TP+ socioeconomic submodels.

The geographic areas for the estimated and observed data are the same (i.e., the estimated data includes only the 13 jurisdictions that are in the 1994 HTS area, which is a subset of the 22 jurisdictions included in the expanded cordon area).

Ref:Demographic2.1TPP.xls Apply

Chapter 4. Trip Generation

The Version 2.1/TP+ trip generation process is applied to generate trip productions and trip attractions at zone level. Production models have been estimated for the residential purposes using the 1994 HTS data. Truck trip rates in the Version 2.1/TP+ model, however, have been preserved from the Version 1 process. This chapter details the residential trip generation model development process.

4.1 Model Structure

The Version 2.1/TP+ trip generation model is used to compute the number of daily motorized person trips and truck trips produced and attracted to each traffic analysis zone. Motorized person trips are defined as those using automobile, motorcycle, or transit modes. Residential trips are developed for 4 purposes:

- Home-Based Work (HBW)
- Home-Based Shopping (HBS)
- Home-Based Other (HBO)
- Non-Home-Based (NHB)

Truck trips are developed for 2 vehicle types:

- Medium (single unit, 6 or more tires)
- Heavy (all combination vehicles)

Light trucks, including panel trucks, vans, pickups, and tow trucks, are currently subsumed within the NHB purpose. The trip generation process also estimates productions and attractions associated with HBW non-motorized (walk and bicycle) trips. The non-motorized trips are ultimately removed from the 'final' trip-ends as the trip distribution model addresses motorized travel only. The trip generation model produces home-based productions and attractions which are stratified by the 4 income levels.

The trip generation process can be envisioned as a series of five sequential steps. These are: 1) the trip production model, 2) the internal-to-external trip extraction model, 3) the non-motorized HBW trip extraction model, 4) the trip attraction model, and 5) the Home-based attraction income disaggregation model. The development of each model estimation is discussed below.

4.2 Trip Production Model

The trip production model is a cross-classification type model involving the application of trip rates which are applied to households in specific socio-economic categories. The trip rates are developed for each purpose. The classes established for the Version 2.1/TP+ model are structured by three dimensions: 4 household income levels (approximating quartiles), 4 household size levels (1, 2, 3, 4+), and 4 vehicle availability levels (0, 1, 2, 3+). The total number of classes involved, therefore, equals 64 (4x4x4).

Trip production rates for each purpose and cross-class were estimated using the HTS. The rates are based on trip records that, 1) represented internal (I-I) and internal-to-

external (I-X) travel movements with respect to the expanded cordon, and 2) were associated with the motorized modes (in the case of HBW trips motorized and non-motorized modes were selected). These selection criteria reduced the total number of linked trip records in the survey from 41,714 to 40,237 (representing 13,908,198 weighted trips).

The cross classification model is typically estimated using unweighted data. Trip rates are developed by dividing the number of sampled trips accumulated in each cross-class by the corresponding number of sampled households. This calculation method was altered in that instead of using the number of total sampled trips occurring in each cross-class, the sum of 'person weights' was used. Person weights are special trip record factors that are used to account for the effects of non-response (they are developed using a process known as imputation). The weight equals a value of '1' if the traveler matches the socio-economic characteristics of other people in the survey who fully responded to the survey. The weight is marginally greater than '1' for travelers possessing characteristics of other surveyed travelers who chose not to respond. Thus, the use of person weights in the rate calculation is a mechanism for addressing potential non-response bias.

The initial trip rates computed were reviewed and checked for logic and consistency. This review led to a manual adjustment of some rates, as deemed necessary. Such adjustments are common given that household sample sizes in some cells are low and may yield unreasonable rates, in comparison to the rates of adjacent cells with larger samples. Cells associated with low income levels and high family sizes, for example, are usually under-represented in travel surveys. The final trip rates are displayed by purpose, as Exhibit 4-1, Exhibit 4-2, Exhibit 4-3, and Exhibit 4-4.

4.3 The Internal-to-External Trip Extraction Model

External (I-X, X-I) travel developed from the AES is entered exogenously into the trip generation process, by purpose and is passed through to the final trip-ends, unaltered. Since the trip production rates reflect both internal and internal-to-external (I-X) travel generated by households in the modeled area, it is, therefore, necessary to remove the I-X portion of total trip productions to avoid 'double-counting'. According to the HTS, the I-X trips account for about 1.00% of all I-I, I-X trips produced.

MWCOG has developed an I-X extraction model in prior model development work undertaken in FY-97[1]. The final model developed from that work will be used for Version 2.1/TP+. The model was developed using the HTS to compute the percent of I-X travel based on the distance to the nearest external station. The model is specified as follows:

$$IXP = 0.079 Exp(-0.088 * DNE)$$

where:

IXP = the percent of total trip productions which are I-X
DNE = the 'straight-line' distance to the nearest external station (in miles)
Exp = the exponential function

[1] See, FY-97 Models Development Program for COG/TPB Models, MWCOG, 6/30/97, section 3.2.2 b.

Exhibit 4-1 Final HBW Trip Production Rates

Income Level	HH Size	Vehicles				Sub-Total
		0	1	2	3+	
0k - 30k	1	0.69	0.85	0.75	0.96	**0.79**
	2	1.08	1.08	1.41	1.41	**1.22**
	3	1.10	1.52	1.94	1.94	**1.66**
	4+	1.66	1.66	1.94	1.94	**1.81**
	Sub-Total	**0.91**	**1.07**	**1.58**	**1.74**	**1.20**
30k- 50k	1	1.02	1.18	1.30	1.53	**1.17**
	2	1.35	1.35	1.53	2.12	**1.53**
	3	1.66	1.66	1.79	2.12	**1.85**
	4+	1.85	1.85	2.05	2.43	**2.10**
	Sub-Total	**1.21**	**1.34**	**1.73**	**2.23**	**1.61**
50k- 75k	1	1.02	1.22	1.22	1.22	**1.20**
	2	1.46	1.46	1.84	2.15	**1.77**
	3	1.66	1.66	2.02	3.02	**2.36**
	4+	2.30	2.30	2.30	3.08	**2.55**
	Sub-Total	**1.31**	**1.46**	**2.03**	**2.87**	**2.04**
>75k	1	1.33	1.33	1.33	2.00	**1.34**
	2	1.45	1.45	1.84	2.15	**1.80**
	3	1.67	1.67	2.02	3.02	**2.43**
	4+	3.33	3.33	3.33	3.36	**3.35**
	Sub-Total	**1.67**	**1.72**	**2.34**	**3.05**	**2.42**
	TOTAL	**1.05**	**1.33**	**2.02**	**2.72**	**1.85**

Exhibit 4-2 Final HBS Trip Production Rates

Income Level	HH Size	Vehicles				Sub-Total
		0	1	2	3+	
0k - 30k	1	0.22	0.60	0.60	0.63	**0.46**
	2	0.22	0.68	0.68	0.68	**0.60**
	3	0.22	0.68	0.84	0.84	**0.68**
	4+	0.22	0.68	0.96	1.00	**0.76**
	Sub-Total	**0.22**	**0.64**	**0.77**	**0.85**	**0.58**
30k- 50k	1	0.22	0.60	0.60	0.63	**0.55**
	2	0.29	0.68	0.68	0.84	**0.68**
	3	0.40	0.96	0.96	1.04	**0.96**
	4+	0.45	0.96	1.00	1.10	**1.01**
	Sub-Total	**0.27**	**0.70**	**0.83**	**1.01**	**0.76**
50k- 75k	1	0.29	0.67	0.67	0.67	**0.62**
	2	0.43	0.68	0.90	0.96	**0.83**
	3	0.50	0.96	1.00	1.14	**1.05**
	4+	0.60	0.96	1.14	1.40	**1.21**
	Sub-Total	**0.38**	**0.73**	**1.00**	**1.22**	**0.96**
>75k	1	0.43	0.86	0.86	0.86	**0.81**
	2	0.89	0.89	0.96	0.98	**0.95**
	3	0.90	1.04	1.15	1.20	**1.16**
	4+	1.09	1.28	1.33	1.66	**1.46**
	Sub-Total	**0.68**	**0.95**	**1.11**	**1.39**	**1.16**
	TOTAL	**0.27**	**0.72**	**0.97**	**1.22**	**0.88**

Exhibit 4-3 Final HBO Trip Production Rates

Income Level	HH Size	Vehicles				Sub-Total
		0	1	2	3+	
0k - 30k	1	0.42	1.12	1.44	1.44	**0.89**
	2	0.54	1.70	1.77	1.80	**1.54**
	3	1.28	2.40	2.61	2.39	**2.29**
	4+	1.36	2.90	4.27	3.82	**3.29**
	Sub-Total	**0.62**	**1.61**	**2.45**	**2.74**	**1.66**
30k- 50k	1	0.69	1.16	1.47	1.47	**1.12**
	2	0.89	1.89	1.97	2.04	**1.90**
	3	1.35	2.50	3.19	3.47	**3.02**
	4+	0.75	3.49	4.27	5.67	**4.40**
	Sub-Total	**0.81**	**1.72**	**2.88**	**3.99**	**2.42**
50k- 75k	1	0.71	1.04	1.47	1.47	**1.04**
	2	0.89	2.16	2.46	2.66	**2.34**
	3	1.55	2.84	3.19	3.56	**3.28**
	4+	3.45	4.65	5.39	6.50	**5.68**
	Sub-Total	**1.00**	**1.95**	**3.68**	**4.70**	**3.37**
>75k	1	0.71	1.09	1.08	2.00	**1.05**
	2	1.57	1.81	2.46	2.46	**2.28**
	3	3.45	3.45	3.94	3.94	**3.89**
	4+	4.15	4.84	5.92	6.74	**6.17**
	Sub-Total	**1.57**	**2.22**	**3.81**	**5.02**	**3.84**
	TOTAL	**0.75**	**1.81**	**3.40**	**4.52**	**2.88**

Exhibit 4-4 Final NHB Trip Production Rates

Income Level	HH Size	Vehicles				Sub-Total
		0	1	2	3+	
0k - 30k	1	0.20	1.26	1.26	1.26	**0.88**
	2	0.30	1.26	1.43	1.43	**1.17**
	3	0.40	1.43	1.43	1.43	**1.26**
	4+	0.50	1.50	1.60	1.70	**1.42**
	Sub-Total	**0.27**	**1.30**	**1.45**	**1.52**	**1.11**
30k- 50k	1	0.30	1.26	1.40	1.49	**1.14**
	2	0.40	1.26	2.20	2.20	**1.83**
	3	0.50	1.76	2.60	2.80	**2.36**
	4+	0.60	1.98	2.80	2.97	**2.64**
	Sub-Total	**0.36**	**1.39**	**2.42**	**2.69**	**1.90**
50k- 75k	1	0.40	1.52	1.57	1.57	**1.39**
	2	0.50	1.62	2.33	2.54	**2.10**
	3	0.60	2.48	2.89	2.89	**2.83**
	4+	0.61	2.19	2.92	4.20	**3.26**
	Sub-Total	**0.46**	**1.73**	**2.64**	**3.41**	**2.50**
>75k	1	0.60	1.76	1.76	2.40	**1.64**
	2	0.70	1.76	2.40	2.69	**2.30**
	3	0.80	2.72	2.81	3.10	**2.92**
	4+	0.90	1.54	3.35	4.38	**3.62**
	Sub-Total	**0.68**	**1.84**	**2.77**	**3.67**	**2.83**
	TOTAL	**0.33**	**1.50**	**2.48**	**3.21**	**2.13**

4.4 Non-Motorized HBW Trip Extraction Model

The HBW trip rates reflect both motorized and non-motorized travel. The inclusion of non-motorized trips in the Version 2.1/TP+ model was intended to allow the modeler the ability to relate land use policy (e.g. land use mix, density, etc.) to the level of walking and bicycling, and its explicit effect on the reduction of motorized HBW travel. However, the decision was also made early on that non-motorized trips should not be carried forth into trip distribution and mode choice steps given that the non-motorized trips are extremely dissimilar in spatial scale compared to that of motorized travel (non-motorized trips predominantly occur within zones, or between adjacent zones).

Therefore, procedures are needed to remove non-motorized travel from total HBW trips generated. More specifically, non-motorized productions need to be removed from total productions, and, non-motorized attractions need to be removed from total attractions. The 1990 Census (CTPP Urban Element) was used to estimate models, as this source was believed to most thoroughly represent non-motorized travel. Non-motorized travel within the expanded cordon accounts for 4.8% of total motorized/non-motorized travel, according to the CTPP (175,500 out of 3,644,100). This percentage is slightly smaller according to the HTS, about 3.7% (107,500 out of 2,878,000).

Two zonal calibration files were established to test production-end and attraction-end models. The calibration files contained motorized and non-motorized trips and accumulated land use (households, population, employment, and zonal area) within 4 different 'straight-line' distance ranges (0.50, 0.75, 1.00, and 1.25 miles). This method of accumulating proximate zonal land use is sometimes referred to as 'floating' zone data. The calibration file also included the area-type measure used in the highway network development process. The area type variable is an index ranging from 1 to 7 and is based on both population density and employment density within 1 mile of a given zone, as shown in the table below:

Version 2.1/TP+ Highway Network Area Type Definitions
Relationship of Area Type Codes (1-7) to Land Use Density

One-Mile 'Floating' Population Density (pop/sq mi)	One-Mile 'Floating' Employment Density (Emp / Sq mi)						
	0-100	101-500	501-1,500	1,501-5,000	5,001-15,0000	15,001-35,000	35,001+
0-100	7	7	5	5	2	2	2
101-350	7	5	5	5	2	2	2
351-1,500	6	6	5	5	2	2	2
1,501-3,500	6	6	4	3	2	2	2
3,501-6,500	4	4	3	3	2	2	1
6,501-10,000	4	3	3	3	2	2	1
10,0001+	3	3	3	2	2	2	1

The area type code, therefore, represents both the intensity of land use development as well as the mix of home and job locations.

A review of correlation coefficients from the calibration file indicated that a 'share' model performed better for the production-end (i.e. the proportion of non-motorized productions to total productions) , while an 'absolute trip' model appeared more appropriate for the attraction-end (i.e. the number of non-motorized trip attractions).

Several regression models were tested using the production share of non-motorized trips as a function of floating land use variables. The regression tests were based on observations with at least 50 households to exclude locations that were unrepresentative of residential activity. The optimal R-square values of these model tests ranged from 0.60 to 0.62. Another model approach, based on average non-motorized production shares by the density-based area types, was also tested, as shown below.

Area Type	Avg. Share of HBW Non-Motorized Productions
1	0.4033
2	0.1116
3	0.0320
4 – 7	0.0235

The area type-based approach was ultimately selected for several reasons: 1) its overall correlation (R-square) value with observed data was similar to that of the regression models tested, 2) its performance at jurisdiction level was also comparable to the regression models, and 3) its simplicity in explanation, and in application, was appealing.

The development of a model for estimating non-motorized HBW trips at the attraction end first focused on regression tests using the absolute number of non-motorized attractions as a function of the floating land use variables. The regressions produced rather equivocal results, with optimal R-square values ranging for, 0.50 to 0.55. A model was also developed which is quite similar to one used in the San Francisco area. The model is a regression model that estimates the number of non-motorized attractions as a function of the non-motorized productions. The latter approach was ultimately adopted. The model specification is:

MNAttrs = 0.8982 * NMProds (R-square: 0.80)

Where:

MNAttrs = The number of non-motorized attractions
MNProds= The number of non-motorized productions

Subject to following condition:

If MNAttrs > Total Attractions then MNAttrs = Total Attractions * 0.187%

A comparison of estimated and observed non-motorized results of both the production-end and attraction-end models is shown as Exhibit 4-5. Note that the total observed attractions in the exhibit are less than the observed productions (156,500 compared to 173,900). This is because the calibration file for the attraction model was subject to the 50 household minimum (used to develop the production model), which excluded zones where only non-motorized attractions existed. In application, no such minimum will be imposed, and, moreover, the non-motorized attractions will be scaled to match the production total.

4.5 Trip Attraction Model

The HTS was used to estimate the Version 2.1/TP+ trip attraction models. Regression models were developed by purpose to compute the total number of attractions from the HTS as a function of land use, as derived from the Round 6A(Updated) Cooperative Forecasts. The modal conventions established for the development of the trip production model, by purpose were preserved. However, only internal (I-I) trip records from the HTS were selected for model estimation work. NHB trip attractions from the survey were defined as one half of the total trip-ends.

The model estimations were computed at the district level since zonal attraction information from the HTS was judged to be too sparse for the model development. The number of district-level observations varied by purpose from 220 to 266. The final models were developed without Y-intercepts to preclude the possibility of generating attractions were no land activity exists in application.

The selected trip attraction models are shown as Exhibit 4-6. The exhibit indicates that the HBS and NHB trip attraction models vary by area types (as defined above). These area type distinctions were determined to be necessary for problems noted in comparing estimated (non-stratified) and observed results at jurisdiction levels.

4.6 HB Trip Attraction Income Disaggregation Model

The trip attraction model provides the total number of trip attractions for each purpose. In order to support the income stratified trip distribution process (discussed in the next chapter), total home-based attractions must be further distinguished by the 4 income levels. The stratification of trip productions is not a serious issue since income is one of the dimensions used in the cross-class structure.

There are a number of approaches that can be used to accomplish this task ranging from the most basic (e.g. applying regional income distribution to the total attractions of each zone) to the more complex (e.g. determining the zonal attraction shares based on attraction-to-production accessibility measures, for each income group).

Given the limited time to arrive at such a model, a very conservative approach was selected. Income shares were developed by purpose and area type, using the HTS, as shown as Exhibit 4-7.

Exhibit 4-5 Estimated and Observed Non-Motorized Productions and Attractions

Jurisidiction	Non-Motorized Productions			Non-Motorized Attractions		
	Observed	Estimated	Est/Obs	Observed	Estimated	Est/Obs
DC	63,419	59,794	0.94	51,013	54,482	1.07
Montgomery	16,144	24,085	1.49	15,461	14,241	0.92
Pr. George's	19,802	17,815	0.90	19,312	17,517	0.91
Arlington	12,543	12,751	1.02	10,156	10,984	1.08
Alexandria	5,180	7,676	1.48	4,588	4,537	0.99
Fairfax	16,223	22,362	1.38	16,147	14,411	0.89
Loudoun	1,820	1,578	0.87	1,668	1,527	0.92
Pr. William	5,237	4,927	0.94	4,856	4,689	0.97
Frederick	5,016	2,421	0.48	5,029	4,505	0.90
Howard	2,119	3,147	1.49	2,106	1,903	0.90
A. Arundel	16,377	8,821	0.54	16,238	14,710	0.91
Charles	1,314	1,741	1.32	1,282	1,133	0.88
Carroll	2,076	1,388	0.67	2,076	1,865	0.90
Calvert	490	875	1.79	490	440	0.90
St. Mary's	0	347	0.00	0	0	0.00
King Geo.	333	238	0.71	333	299	0.90
Fredbrg.	1,510	440	0.29	1,255	1,356	1.08
Stafford	709	1,055	1.49	766	581	0.76
Spotsyl.	238	740	3.11	422	214	0.51
Fauquier	1,574	867	0.55	1,567	1,414	0.90
Clarke	352	191	0.54	352	257	0.73
Jefferson	1,376	593	0.43	1,364	1,236	0.91
Total	173,852	173,852	1.00	156,481	152,300	0.97

Note: Observations with less than 50 Households have been deleted from file

Exhibit 4-6 Summary of Final Version 2.1/TP+ Trip Attraction Models

Trip Purpose	Area Type	No. of Observations	Independent Variable(s)	Attraction Rates	t -stat.	R Sq.
HBW	All (Area Type 1-7)	253	Total Employment	1.11	54.40	0.92
HBS	Area Type 1	8	Retail Employment	0.29	3.62	0.57
	Area Type 2	32	Retail Employment	2.44	13.47	0.85
	Area Type 3-7	180	Retail Employment	3.35	27.89	0.81
HBO	All (Area Type 1-7)	266	Retail Employment Non-Retail Employment Household Population	1.30 0.30 0.77	3.79 5.51 19.98	0.86
NHB	Area Type 1	9	Non-Retail Employment	0.42	14.50	0.95
	Area Type 2-7	257	Retail Employment Non-Retail Employment Household Population	2.77 0.49 0.28	12.84 10.75 11.61	0.92

Notes:

- HBW model reflects motorized and non-motorized person travel. HBS, HBO, and NHB models reflect motorized person travel only.

- NHB model is based on one half of total trip-ends.

- All models were developed at district level using the 1994 HTS. Models have been developed without Y-intercepts.

- Independent variables are based on Round 6A (interpolated) land use.

The exhibit indicates that the distributions of attractions by income group, for each purpose, generally do not vary dramatically on average.

Exhibit 4-7 Income Distribution (Percents) of Home-Based Trip Attractions

Source: 1994 HTS

Purpose	Area Type Code	Income 1	Income 2	Income 3	Income 4	Total
HBW	1	12.20	17.82	28.97	41.01	100.00
	2	15.59	17.14	30.06	37.21	100.00
	3	15.23	21.53	33.30	29.94	100.00
	4-7	20.62	25.01	32.36	22.01	100.00
HBS	1-2	17.65	17.90	30.66	33.78	100.00
	3	15.01	20.10	37.32	27.57	100.00
	4-7	14.46	20.55	30.51	34.48	100.00
HBO	1-2	15.88	16.65	30.39	37.08	100.00
	3	9.71	16.26	38.42	35.61	100.00
	4-7	13.09	21.19	34.56	31.16	100.00

4.7 Truck Model

The truck trip generation process is based on the rates currently used in the Version 1 process. The rates are based on fixed area types and land activity variables as shown in the table below:

Vehicle Type	Location	Land Use Category				
		Office	Retail	Industrial	Other	HH
Medium Truck (Single Unit 6+ Tires)	Regional. Core	0.01	0.17	0.09	0.04	0.04
	DC Non-Core	0.01	0.17	0.19	0.04	0.04
	VA 10-mi Sq.	0.01	0.17	0.14	0.04	0.04
	Other	0.01	0.17	0.11	0.04	0.04
Heavy Truck (All Combination Vehicles)	Regional. Core	-	0.04	0.03	0.03	-
	DC Non-Core	-	0.04	0.13	0.03	-
	VA 10-mi Sq.	-	0.04	0.04	0.03	-
	Other	-	0.04	0.11	0.03	-

4.8 Model Application

A FORTRAN procedure has been developed to apply the Version 2.1/TP+ trip generation process. The procedure allows for the application of production and attraction rates as developed above. It also allows for the use of aggregate adjustment factors which may be applied globally, by jurisdiction, and/or at the TAZ level. An analysis of estimated and observed P's and A's (weighted) by purpose and income level, at the superdistrict level, indicated that some substantial deviations did exist. This finding is not unexpected.

Since the production rates are developed at the sampled household level. There is no assurance that aggregate estimated and observed results will match. To improve such matches, zone level P/A adjustments were developed by purpose and income level, on the basis of 36 superdistricts. The adjustment factors are entered to the trip generation process in the form of ASCII zone files. A summary of the adjustment factors are shown in Appendix G of this report.

The trip generation procedure processes one purpose at a time. The computation procedure is as follows:

1) Initial internal zonal attractions are computed, based on the modeled rates. Total attractions are accumulated. NHB, Medium Truck, and Heavy Truck internal productions are set equal to attractions.
2) Internal trip productions for the residential purposes are computed based on the modeled trip rates, and if used, adjustment factors. The I-X trips are extracted for the residential purposes. The HBW non-motorized trip productions are also removed from the total productions. Total internal motorized productions are accumulated.
3) Non-motorized HBW attractions are computed, and scaled to match the non-motorized production total from above.
4) External productions and attractions are read in at the external station level.
5) A scaling factor for internal attractions is computed, as follows:

$$SFIA = ((IP + EP) - EA) / IA$$

Where:

SFIA = Scaling factor applied to internal attractions
IP = Total Internal Productions
EP = Total External Productions
EA = Total External Attractions
IA = Total Internal Attractions

6) The scaling factor is applied to internal attractions.
7) Home-based attractions are disaggregated by income level.
8) Final trip-ends (Ps and As) are written out. For the home based purposes, income stratified trip-ends (internal Ps, As only) *and* total trip-ends (internal and external Ps and As) are written. Only total trip-ends (internal and external Ps and As) are written for the NHB and truck purposes.

Chapter 5. Trip Distribution

The Version 2.1/TP+ trip distribution model involves a standard gravity model approach and the use of a composite (highway and transit) travel time impedance measure. The model also employs income stratification as well as special external auto and truck distribution models. At present the current (Version 1) internal truck gravity model parameters (F/K-factors) have been adopted 'as is' for the Version 2.1/TP+ model, but, unlike the district–level application used in Version 1, the model is applied at the zone level. A detailed discussion of the model development follows below.

5.1 Model Structure

The Version 2.1/TP+ trip distribution model is used to develop zonal trip tables corresponding to the 6 basic purposes established above: HBW, HBS, HBO, and NHB motorized person trips and Medium and Heavy truck trips. The Version 2.1/TP+ trip distribution process consists of several different distribution models that are developed for special travel markets within the six basic purposes. The table below indicates the 25 specific trip markets that are modeled.

Purpose	Internal Person Models	External Person Models
HBW	4 Income Strata	2 Facility Types (Interstate /Arterial)
HBS	4 Income Strata	2 Facility Types (Interstate /Arterial)
HBO	4 Income Strata	2 Facility Types (Interstate /Arterial)
NHB	1 (non-stratified)	2 Facility Types (Interstate /Arterial)
Medium Truck	1 (non-stratified)	1 (non-stratified)
Heavy Truck	1 (non-stratified)	1 (non-stratified)
Total Intl./Extl. Models	**15**	**10**
Total Models	**25**	

5.2 Internal Motorized Person Models

The internal trip distribution models have been developed using 1994 HTS. The Home-Based models were developed by four household income strata (1994 dollars), defined as:

- Income Level 1 $ 0 - $29,999
- Income Level 2 $30,000 - $49,999
- Income Level 3 $50,000 - $74,999
- Income Level 4 $75,000 +

It has been speculated that many of the K-factors used in previous (non-stratified) models have been needed to address the special trip patterns of particular income markets. A common bias, for example, is that lower income trips are typically over-estimated to the regional core, while higher income trips (which are relatively longer) are under-estimated. It was expected that these types of biases would be addressed using the income-stratified approach.

Another feature of the model was the use of a composite time formulation involving both highway and transit travel times. The composite time formulation is desirable since many corridors in the Washington region are well served by transit, and the consideration of highway time only (as has been used in previous model versions) has potentially understated accessibility. The definition of the composite impedance is:

$$CT_i = \frac{1.0}{1.0/HT + P_i/TT}$$

Where:

CT_i = composite time for income group 'i' for a given interchange.
HT = un-weighted highway time (including terminal times)
TT = un-weighted transit time (in-vehicle and out-of-vehicle time)
P_i = regional transit share of income group 'i'

The highway and transit times used in the formulation vary by purpose. AM peak highway/transit times are used for the HBW purpose and off-peak highway/transit times are used for the remaining HBS, HBO, and NHB purposes.

The regional transit shares used in the formulation vary by purpose and income group. The transit shares, shown in Exhibit 5.1, have been taken from the HTS. The exhibit indicates the work transit shares (shown as percents) vary by income from 0.1402 to 0.2572. The transit percentages for the remaining purposes vary by income group from 0.0075 to 0.0755. Since these values are relatively small, the effect of highway times will be generally more predominant on the overall composite time function compared to the effect of transit times for most interchanges.

Some points can be made regarding the composite time function. First, for interchanges that are not served by transit, the composite time function reflects highway time. Second, transit time values will generally contribute small effects on the time function, in general, since the regional transit shares are relatively small. Nonetheless, even if transit is not particularly competitive with highway time for a given interchange, the composite time function will still reflect *some* travel time benefit compared to the 'raw' highway time compared to an interchange that is not transit-connected.

In preparation for calibration work observed productions and attractions from the HTS were summarized by purpose and income level. Travel interchanges utilized from the survey file were constrained to those within the HTS area only. The calibration also utilized highway impedances developed from a traffic assignment. The traffic assignment utilized observed trips[1] combined with residual trip tables (such as through trips, and truck trips). The following calibration procedure was undertaken for each purpose and income level.

1) 12 superdistricts were established as a basis for establishing perceived time penalties across physical barriers or between jurisdictions. Time penalties between jursidictions where set to

[1] Prior to the assignment observed internal non-work trips were factored by 1.50 in order to match observed VMT estimates. Underreporting in surveys is typical for non-work travel (particularly short non-work trips).

zero. The 12x12 time penalty file was 'expanded' to TAZ level and added to the composite impedance file.

2) Observed trip lengths were summarized.
3) The gravity model was executed using a 'beginning' set of F-curves. The trip length frequency resulting from the gravity model run was compared to the observed frequency.
4) The beginning set of F-factors was adjusted, for each time increment, as follows:

   $F_{adj} = F_{used} * (OD\%/GM\%)$

   Where: F_{adj} = Adjusted F-Factor
   F_{used} = Initial F-Factor
   OD%= Percentage of observed trips
   GM%= Percentage of estimated trips

5) The resulting F-factors were 'smoothed' using a gamma distribution fitting technique
6) Steps 3 through 5 were repeated 4 more times.
7) The estimated and observed trips were formatted at the superdistrict level and compared. For interchanges that were over estimated, time penalties of between 2 to 10 minutes were inserted. Steps 1 through 7 were repeated several times until estimated and observed movements between the superdistricts match reasonably. The use of time penalties were ultimately used minimally.

Exhibit 5.2 shows a comparison of the final average composite times and travel distance resulting from the calibration. Staff also prepared graphs showing estimated and observed trip length frequencies (shown in Appendix F of this report).

Exhibit 5-1 Summary of Motorized Trips by Purpose, Mode, and Income Level

Source: 1994 COG/TPB Household Travel Survey
All trips geocoded within the HTS survey area

Purpose	Mode	Income Level				Total
		<30k	30k - 50k	50k - 75k	>75k	
HBW	Auto Driver	265,104	402,570	660,332	742,078	2,070,084
	Auto Passenger	41,854	47,055	73,652	76,477	239,038
	Auto Person Subtotal:	306,958	449,625	733,984	818,555	2,309,122
	Average Auto Occupancy	*1.2*	*1.1*	*1.1*	*1.1*	*1.12*
	Transit	106,263	78,376	116,054	133,428	434,121
	Auto Person & Transit Subtotal:	413,221	528,001	850,038	951,983	2,743,243
	Transit Percentage	*25.72%*	*14.84%*	*13.65%*	*14.02%*	*15.83%*
HBS	Auto Driver	179,240	222,468	395,854	361,316	1,158,878
	Auto Passenger	42,034	51,234	85,486	90,586	269,340
	Auto Person Subtotal:	221,274	273,702	481,340	451,902	1,428,218
	Average Auto Occupancy	*1.2*	*1.2*	*1.2*	*1.3*	*1.23*
	Transit	12,092	6,601	4,521	3,435	26,649
	Auto Person & Transit Subtotal:	233,366	280,303	485,861	455,337	1,454,867
	Transit Percentage	*5.18%*	*2.35%*	*0.93%*	*0.75%*	*1.83%*
HBO	Auto Driver	378,412	541,343	1,003,575	1,044,304	2,967,634
	Auto Passenger	158,697	210,756	465,074	478,663	1,313,190
	Auto Person Subtotal:	537,109	752,099	1,468,649	1,522,967	4,280,824
	Average Auto Occupancy	*1.4*	*1.4*	*1.5*	*1.5*	*1.44*
	Transit	43,863	24,177	27,803	38,078	133,921
	Auto Person & Transit Subtotal:	580,972	776,276	1,496,452	1,561,045	4,414,745
	Transit Percentage	*7.55%*	*3.11%*	*1.86%*	*2.44%*	*3.03%*
NHB	Auto Driver	317,239	488,048	859,926	878,859	2,544,072
	Auto Passenger	74,157	108,357	215,941	239,842	638,297
	Auto Person Subtotal:	391,396	596,405	1,075,867	1,118,701	3,182,369
	Average Auto Occupancy	*1.2*	*1.2*	*1.3*	*1.3*	*1.25*
	Transit	28,671	28,320	46,358	58,052	161,401
	Auto Person & Transit Subtotal:	420,067	624,725	1,122,225	1,176,753	3,343,770
	Transit Percentage	*6.83%*	*4.53%*	*4.13%*	*4.93%*	*4.83%*
All Purposes	Auto Driver	1,139,995	1,654,429	2,919,687	3,026,557	8,740,668
	Auto Passenger	316,742	417,402	840,153	885,568	2,459,865
	Auto Person Subtotal:	1,456,737	2,071,831	3,759,840	3,912,125	11,200,533
	Average Auto Occupancy	*1.3*	*1.3*	*1.3*	*1.3*	*1.28*
	Transit	190,889	137,474	194,736	232,993	756,092
	Auto Person & Transit Subtotal:	1,647,626	2,209,305	3,954,576	4,145,118	11,956,625
	Transit Percentage	*11.59%*	*6.22%*	*4.92%*	*5.62%*	*6.32%*

Ref: 94htstrip2.1.xls

Exhibit 5-2 Version 2.1/TP+ Model Trip Distribution Calibration / Internal Travel

Estimated and Observed Travel Times and Distances by

Purpose & Income Strata

Purpose	Income Level	Avg. Composite Time (min.)		Avg. Trip Distance (mi.)		Person Trips
		Observed	Estimated	Observed	Estimated	
HBW Person	1	25.04	24.63	10.58	10.48	**406,769**
	2	29.98	30.91	12.29	13.08	**515,194**
	3	33.72	34.42	13.52	14.12	**826,299**
	4	34.28	35.31	12.97	13.53	**936,533**
HBS Person	1	11.68	11.82	4.40	4.58	**231,032**
	2	11.78	12.03	4.69	4.94	**276,902**
	3	12.80	12.99	5.20	5.39	**479,186**
	4	13.14	13.07	5.32	5.33	**452,506**
HBO Person	1	15.74	15.15	6.61	6.31	**573,617**
	2	14.63	14.04	6.33	6.02	**755,992**
	3	14.86	14.25	6.30	6.01	**1,479,997**
	4	15.22	14.92	6.31	6.22	**1,542,463**
NHB Person		18.41	18.48	6.95	7.11	**3,226,394**

Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Time includes terminal time.
- Includes only trips within the 1994 Household Travel Survey area.
- Calibration subdirectory, cmptlfci.rpt.
- Last time interval is "80 or more" minutes.

* AM peak period highway distance is used for HBW. Off-peak highway distance is used for HBS, HBO, and NHB.

Ref.:Cmptlfci3.xls and cmptlfdi3.xls

5.3 Internal Truck Model

Given that the 1996 truck survey was determined to be insufficient for model calibration work, the existing (Version 1) truck model has been adapted as is for application at the zone level. A description of the internal truck distribution process can be found in prior publications[2].

5.4 External Auto Person / Truck Models

Trip distribution models were calibrated for external auto and truck trips in a similar fashion as the internal models. The external trip distribution models were developed using highway impedances however. The calibration made use of the 1994 Auto External Survey (AES) and the 1996 External Truck Survey. The external auto trips were segmented by purpose and facility 'type', i.e., interstate (or interstate-like facilities) and arterial facilities. The rationale behind this distinction is that arterial facilities tend to serve more localized traffic associated with shorter trip lengths while interstate travel is associated with longer trip lengths. In contrast, the external truck models are simply developed by purpose (i.e., medium, heavy truck).

The modeled network contains 47 external stations, numbered consecutively from 2145 to 2191. Among these stations interstate-type facilities are defined as I-95 north and south (external stations 2149, 2182), US 301 (2146), US 15/29 (2154), I-66 (2156), I-70 east and west (2166, 2180), US 15 north (2179), US 1& I-195 (2183), MD 295 (2184), I-97 (2187), and US50/301, Bay Bridge (2191). All remaining stations are defined as arterial-type facilities.

The highway time is used as the impedance measure in the distribution of external trips. AM peak time is used for the HBW purpose and off-peak times are used for all remaining purposes. The external calibration does not make use of time penalties added into the impedance files. However, the impedances are altered in that extremely large time values were inserted into internal and through (I-I, X-X) interchanges to preclude those types of interchanges from occurring in the trip distribution process.

Exhibit 5.3 shows a comparison of the final estimated and observed highway times and distances resulting from the calibration. Graphs showing estimated and observed trip length frequency distributions are shown in Appendix F.

[2] See, *Version 1 Travel Model User's Guide*, MWCOG, 10/98

Exhibit 5-3 Version 2.1/TP+ Model Trip Distribution Calibration / External Travel

Estimated and Observed Travel Times and Distances by

Purpose & Facility Type

Purpose	Facility Type	Avg. Highway Time (min.)		Auto Person / Truck Trips
		Observed	Estimated	
HBW	**Interstate**	36.33	37.97	243,137
	Arterial	28.93	31.99	160,562
HBS	**Interstate**	23.45	22.87	27,385
	Arterial	16.43	15.94	107,269
HBO	**Interstate**	46.86	46.11	243,852
	Arterial	24.88	26.34	180,589
NHB	**Interstate**	36.96	37.18	131,490
	Arterial	21.65	21.81	84,354
Medium Weight Truck		45.35	48.08	6,264
Heavy Weight Truck		45.89	50.66	41,120

Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Time includes terminal time at attraction end.
- Includes all external trips.

Ref.:cmptlfcx3.xls

5.5 Model Application

The trip generation model procedure is applied in a TP+ routine. Some jurisdiction-to-jurisdiction K-factors have been used in the application to improve estimated and observed trip matches. These are shown in the table below. The K-factors are applied by purpose (across income levels). A listing of the final internal and external F-factors are shown as Exhibit 5.4 and 5.5, respectively. A comparison of estimated and observed trip tables is shown in Appendix B.

K-Factor Listing

HBW	Interchange	HBS	Interchange	HBO	Interchange	NHB	Interchange
2.2	dc cr- dc cr	1.3	dcncr – dcncr	2.0	dcncr-dc cr	2.0	mtg - mtg
2.5	dc cr- dcncr	1.2	dcncr- dc cr	1.3	dcncr – dcncr	0.2	mtg - how
3.0	dcncr- dc cr	2.0	dcncr - mtg	0.5	dcncr – ffx	2.0	pg - pg
2.5	dcncr – dcncr	2.8	mtg – mtg	2.0	mtg – dc cr	0.2	pg - aa
0.1	dcncr – extls	1.8	pg – pg	2.5	mtg – mtg	2.0	arlncr - arlncr
2.9	mtg- dc cr	2.6	arlncr - arlncr	0.2	mtg - how	2.0	alx – alx
2.4	mtg- dcncr	2.3	alx – alx	2.0	pg – dc cr	2.0	ffx – ffx
2.0	mtg – mtg	1.1	ffx – ffx	2.5	pg - pg	2.5	frd – frd
0.2	mtg- how	2.8	frd – frd	0.5	how - mtg	2.5	chs – chs
0.2	mtg- aa	2.5	chs – chs	2.5	aa - aa		
1.8	pg – dc cr	0.5	car – car	0.6	aa - pg		
1.8	pg – dcncr			1.6	arlncr - arlncr		
2.5	pg – pg			1.9	alx - alx		
0.2	pg – aa			2.0	ffx – dc cr		
0.2	pg – how			2.0	ffx - ffx		
0.2	Pg- extls			2.5	frd – frd		
2.5	arl cr- dc cr			2.5	chs – chs		
2.0	arl cr- dcncr						
2.5	arlncr- dc cr						
2.8	alx- dc cr						
2.5	how- pg						
2.5	how- extls/balt						
0.5	aa- aa						
2.8	ffx – dc cr						
2.3	ffx – dcncr						
1.2	ffx – ffx						
1.3	ffx – arlncr						
0.2	frd- aa						
0.2	frd- how						
2.2	chs – dc cr						
2.2	chs – pg						

Exhibit 5-4 F-Factor Specifications for Internal Travel by Trip Purpose and Income Group

Comp. Time	HBW				HBS				HBO				NHB
(min)	Inc 1	Inc 2	Inc 3	Inc 4	Inc 1	Inc 2	Inc 3	Inc 4	Inc 1	Inc 2	Inc 3	Inc 4	
1	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609
2	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609
3	534,862	566,562	586,872	584,487	375,164	376,643	318,181	382,415	416,158	387,467	387,021	382,823	486,880
4	346,225	382,193	405,901	403,096	187,206	188,666	142,136	193,948	225,057	199,164	198,868	195,320	294,634
5	246,589	281,175	304,449	301,683	107,995	109,279	75,734	113,614	139,174	118,391	118,244	115,574	199,021
6	186,490	218,449	240,292	237,689	68,132	69,246	45,071	72,786	93,608	77,092	77,050	75,064	144,039
7	146,952	176,174	196,388	193,977	45,635	46,606	28,927	49,529	66,675	53,422	53,452	51,966	109,278
8	119,294	145,983	164,616	162,394	31,883	32,735	19,608	35,182	49,498	38,721	38,800	37,680	85,782
9	99,042	123,469	140,645	138,600	22,971	23,723	13,848	25,796	37,907	29,031	29,143	28,294	69,089
10	83,678	106,108	121,966	120,081	16,935	17,600	10,098	19,374	29,737	22,343	22,479	21,834	56,765
11	71,688	92,358	107,029	105,291	12,704	13,295	7,552	14,824	23,778	17,557	17,708	17,220	47,384
12	62,115	81,228	94,831	93,226	9,658	10,183	5,764	11,509	19,307	14,030	14,190	13,823	40,064
13	54,323	72,054	84,694	83,208	7,418	7,884	4,475	9,038	15,875	11,366	11,532	11,260	34,232
14	47,879	64,375	76,143	74,767	5,741	6,155	3,522	7,163	13,190	9,314	9,482	9,284	29,506
15	42,476	57,863	68,839	67,564	4,470	4,836	2,805	5,718	11,054	7,705	7,873	7,735	25,619
16	37,892	52,279	62,533	61,349	3,495	3,819	2,256	4,590	9,331	6,424	6,591	6,501	22,381
17	33,964	47,443	57,035	55,935	2,742	3,026	1,829	3,701	7,926	5,393	5,557	5,506	19,656
18	30,566	43,219	52,203	51,181	2,155	2,404	1,494	2,995	6,767	4,554	4,714	4,693	17,339
19	27,605	39,500	47,925	46,974	1,695	1,913	1,227	2,429	5,802	3,864	4,019	4,022	15,355
20	25,006	36,206	44,112	43,228	1,334	1,524	1,014	1,974	4,994	3,292	3,442	3,465	13,641
21	22,711	33,269	40,696	39,873	1,050	1,215	841	1,606	4,312	2,814	2,959	2,997	12,153
22	20,674	30,638	37,618	36,852	826	968	700	1,308	3,733	2,413	2,552	2,602	10,854
23	18,857	28,269	34,833	34,120	648	771	585	1,065	3,239	2,075	2,207	2,267	9,713
24	17,228	26,126	32,302	31,639	508	613	490	867	2,815	1,787	1,914	1,980	8,707
25	15,764	24,182	29,994	29,377	398	487	411	705	2,451	1,543	1,663	1,734	7,817
26	14,442	22,410	27,882	27,309	310	386	346	573	2,136	1,333	1,447	1,522	7,027
27	13,246	20,792	25,944	25,412	242	305	291	466	1,864	1,154	1,261	1,338	6,323
28	12,160	19,309	24,161	23,667	187	241	246	377	1,628	999	1,101	1,179	5,694
29	11,171	17,947	22,517	22,058	145	190	208	306	1,422	866	961	1,039	5,132
30	10,270	16,693	20,997	20,572	112	149	175	247	1,243	751	841	918	4,627
31	9,447	15,536	19,590	19,196	86	117	148	199	1,086	652	735	811	4,174
32	8,693	14,467	18,284	17,919	66	91	125	160	950	565	644	718	3,766
33	8,002	13,477	17,072	16,734	50	71	106	129	830	491	563	635	3,399
34	7,368	12,560	15,943	15,632	38	55	90	103	725	426	493	563	3,067
35	6,785	11,708	14,892	14,605	29	42	76	82	634	369	432	499	2,768
36	6,249	10,916	13,913	13,648	22	33	64	66	554	320	378	442	2,498
37	5,755	10,179	12,998	12,754	16	25	54	52	483	277	331	392	2,254
38	5,300	9,493	12,144	11,920	12	19	46	41	422	240	290	348	2,033
39	4,881	8,854	11,346	11,140	9	15	39	33	367	208	254	309	1,833
40	4,494	8,258	10,599	10,411	7	11	33	26	320	180	222	274	1,652
41	4,137	7,701	9,901	9,729	5	8	28	20	279	156	194	243	1,488
42	3,808	7,181	9,247	9,090	4	6	23	16	242	134	169	215	1,340
43	3,504	6,696	8,635	8,491	3	5	20	12	210	116	148	191	1,206
44	3,223	6,242	8,061	7,931	2	3	16	10	183	100	129	169	1,085
45	2,963	5,818	7,524	7,406	1	3	14	7	158	86	113	150	975
46	2,724	5,422	7,020	6,913	1	2	12	6	137	74	98	133	876
47	2,502	5,051	6,548	6,452	1	1	10	4	119	64	85	117	786
48	2,298	4,704	6,106	6,019	1	1	8	3	103	55	74	104	705
49	2,109	4,380	5,692	5,614	1	1	7	3	88	47	65	92	632
50	1,935	4,077	5,303	5,234	1	1	6	2	76	40	56	81	566
51	1,774	3,793	4,940	4,878	1	1	5	1	66	34	49	72	507
52	1,626	3,528	4,599	4,544	1	1	4	1	56	29	42	63	453
53	1,489	3,280	4,280	4,232	1	1	3	1	48	25	36	56	405
54	1,363	3,049	3,981	3,939	1	1	3	1	42	21	31	49	361
55	1,247	2,832	3,701	3,664	1	1	2	1	36	18	27	43	322
56	1,140	2,630	3,440	3,408	1	1	2	1	30	15	23	38	287
57	1,041	2,441	3,195	3,167	1	1	2	1	26	13	20	34	255
58	951	2,264	2,966	2,942	1	1	1	1	22	11	17	29	227
59	868	2,099	2,752	2,732	1	1	1	1	19	9	15	26	202
60	791	1,945	2,552	2,536	1	1	1	1	16	8	13	23	179
61	721	1,802	2,365	2,352	1	1	1	1	14	7	11	20	158
62	656	1,668	2,191	2,180	1	1	1	1	11	6	9	17	140
63	597	1,544	2,028	2,020	1	1	1	1	10	5	8	15	124
64	543	1,427	1,877	1,871	1	1	1	1	8	4	7	13	110
65	493	1,319	1,735	1,731	1	1	1	1	7	3	6	12	97
66	447	1,219	1,604	1,601	1	1	1	1	6	3	5	10	85
67	406	1,125	1,481	1,480	1	1	1	1	5	2	4	9	75
68	368	1,038	1,367	1,367	1	1	1	1	4	2	4	8	66
69	333	957	1,261	1,262	1	1	1	1	3	2	3	7	58
70	301	882	1,162	1,165	1	1	1	1	3	1	3	6	51

Comp. Time	HBW				HBS				HBO				NHB
(min)	Inc 1	Inc 2	Inc 3	Inc 4	Inc 1	Inc 2	Inc 3	Inc 4	Inc 1	Inc 2	Inc 3	Inc 4	
71	272	812	1,071	1,074	1	1	1	1	2	1	2	5	45
72	246	747	986	990	1	1	1	1	2	1	2	4	39
73	222	688	907	911	1	1	1	1	2	1	2	4	34
74	200	632	834	839	1	1	1	1	1	1	1	3	30
75	180	580	766	771	1	1	1	1	1	1	1	3	26
76	162	533	703	709	1	1	1	1	1	1	1	2	23
77	146	489	645	651	1	1	1	1	1	1	1	2	20
78	131	448	591	598	1	1	1	1	1	1	1	2	17
79	118	411	542	548	1	1	1	1	1	1	1	2	15
80	106	376	496	502	1	1	1	1	1	1	1	1	13
81	95	344	454	460	1	1	1	1	1	1	1	1	11
82	85	314	415	421	1	1	1	1	1	1	1	1	10
83	76	287	379	385	1	1	1	1	1	1	1	1	8
84	68	262	346	352	1	1	1	1	1	1	1	1	7
85	61	239	316	322	1	1	1	1	1	1	1	1	6
86	54	218	288	294	1	1	1	1	1	1	1	1	5
87	48	199	262	268	1	1	1	1	1	1	1	1	5
88	43	181	239	244	1	1	1	1	1	1	1	1	4
89	38	165	217	222	1	1	1	1	1	1	1	1	3
90	34	150	197	202	1	1	1	1	1	1	1	1	3
91	30	136	179	184	1	1	1	1	1	1	1	1	2
92	27	123	163	167	1	1	1	1	1	1	1	1	2
93	24	112	147	152	1	1	1	1	1	1	1	1	2
94	21	101	134	138	1	1	1	1	1	1	1	1	2
95	19	92	121	125	1	1	1	1	1	1	1	1	1
96	16	83	109	113	1	1	1	1	1	1	1	1	1
97	14	75	99	102	1	1	1	1	1	1	1	1	1
98	13	68	89	93	1	1	1	1	1	1	1	1	1
99	11	61	81	84	1	1	1	1	1	1	1	1	1
100	10	55	73	76	1	1	1	1	1	1	1	1	1
101	9	50	66	68	1	1	1	1	1	1	1	1	1
102	8	45	59	62	1	1	1	1	1	1	1	1	1
103	7	41	53	55	1	1	1	1	1	1	1	1	1
104	6	36	48	50	1	1	1	1	1	1	1	1	1
105	5	33	43	45	1	1	1	1	1	1	1	1	1
106	5	29	39	40	1	1	1	1	1	1	1	1	1
107	4	26	35	36	1	1	1	1	1	1	1	1	1
108	3	24	31	33	1	1	1	1	1	1	1	1	1
109	3	21	28	29	1	1	1	1	1	1	1	1	1
110	3	19	25	26	1	1	1	1	1	1	1	1	1
111	2	17	22	23	1	1	1	1	1	1	1	1	1
112	2	15	20	21	1	1	1	1	1	1	1	1	1
113	2	14	18	19	1	1	1	1	1	1	1	1	1
114	1	12	16	17	1	1	1	1	1	1	1	1	1
115	1	11	14	15	1	1	1	1	1	1	1	1	1
116	1	10	13	13	1	1	1	1	1	1	1	1	1
117	1	9	11	12	1	1	1	1	1	1	1	1	1
118	1	8	10	11	1	1	1	1	1	1	1	1	1
119	1	7	9	9	1	1	1	1	1	1	1	1	1
120	1	6	8	8	1	1	1	1	1	1	1	1	1
121	1	5	7	7	1	1	1	1	1	1	1	1	1
122	1	5	6	7	1	1	1	1	1	1	1	1	1
123	1	4	5	6	1	1	1	1	1	1	1	1	1
124	1	4	5	5	1	1	1	1	1	1	1	1	1
125	1	3	4	5	1	1	1	1	1	1	1	1	1
126	1	3	4	4	1	1	1	1	1	1	1	1	1
127	1	3	3	4	1	1	1	1	1	1	1	1	1
128	1	2	3	3	1	1	1	1	1	1	1	1	1
129	1	2	3	3	1	1	1	1	1	1	1	1	1
130	1	2	2	2	1	1	1	1	1	1	1	1	1
131	1	2	2	2	1	1	1	1	1	1	1	1	1
132	1	1	2	2	1	1	1	1	1	1	1	1	1
133	1	1	2	2	1	1	1	1	1	1	1	1	1
134	1	1	1	1	1	1	1	1	1	1	1	1	1
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200	1	1	1	1	1	1	1	1	1	1	1	1	1

Exhibit 5-5 F-Factor Specifications for External Travel by Trip Purpose and Facility Type

HighwayTime (min)	HBW Interstate	HBS Interstate	HBO Interstate	NHB Interstate	HBW Arterial	HBS Arterial	HBO Arterial	NHB Arterial	Medium Truck External	Heavy Truck External
1	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609
2	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609
3	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609	984,609
4	554,679	777,594	615,654	570,003	984,609	984,609	984,609	984,609	539,457	723,621
5	355,325	641,659	427,667	372,910	590,136	709,738	556,119	622,434	338,371	569,788
6	246,882	543,380	317,518	263,572	388,216	539,905	348,612	427,490	231,213	468,652
7	181,418	467,715	246,809	196,487	272,306	425,824	234,823	310,836	167,614	397,234
8	138,887	406,863	198,396	152,294	200,170	344,544	166,714	235,615	126,889	344,185
9	109,702	356,371	163,619	121,600	152,496	284,052	123,206	184,340	99,294	303,267
10	88,811	313,505	137,691	99,391	119,490	237,502	93,977	147,852	79,760	270,769
11	73,343	276,499	117,780	82,787	95,778	200,729	73,538	120,982	65,442	244,351
12	61,571	244,160	102,114	70,039	78,219	171,065	58,769	100,633	54,643	222,462
13	52,404	215,648	89,538	60,031	64,886	146,728	47,805	84,862	46,305	204,035
14	45,127	190,357	79,269	52,027	54,546	126,484	39,474	72,397	39,735	188,314
15	39,254	167,832	70,762	45,522	46,379	109,454	33,020	62,377	34,470	174,746
16	34,444	147,722	63,624	40,161	39,827	94,994	27,933	54,206	30,188	162,919
17	30,457	129,747	57,568	35,689	34,498	82,624	23,864	47,458	26,659	152,520
18	27,114	113,682	52,381	31,919	30,111	71,975	20,567	41,823	23,718	143,305
19	24,284	99,334	47,898	28,709	26,461	62,763	17,863	37,070	21,242	135,084
20	21,868	86,539	43,995	25,954	23,394	54,761	15,623	33,026	19,138	127,704
21	19,787	75,154	40,573	23,571	20,795	47,789	13,749	29,558	17,336	121,043
22	17,983	65,048	37,553	21,495	18,575	41,699	12,169	26,562	15,781	115,001
23	16,410	56,104	34,873	19,675	16,667	36,370	10,826	23,959	14,430	109,495
24	15,028	48,213	32,482	18,071	15,014	31,701	9,676	21,682	13,249	104,457
25	13,808	41,278	30,339	16,650	13,576	27,607	8,686	19,681	12,211	99,829
26	12,727	35,203	28,410	15,384	12,316	24,016	7,828	17,913	11,294	95,564
27	11,763	29,905	26,666	14,252	11,208	20,866	7,080	16,344	10,479	91,619
28	10,901	25,301	25,083	13,235	10,229	18,104	6,426	14,947	9,754	87,961
29	10,126	21,318	23,642	12,319	9,359	15,684	5,850	13,697	9,104	84,558
30	9,427	17,888	22,325	11,489	8,585	13,565	5,341	12,576	8,519	81,385
31	8,795	14,946	21,119	10,736	7,892	11,712	4,890	11,566	7,993	78,419
32	8,221	12,435	20,010	10,051	7,270	10,093	4,488	10,654	7,516	75,641
33	7,699	10,301	18,989	9,425	6,710	8,681	4,129	9,828	7,083	73,032
34	7,222	8,495	18,045	8,852	6,205	7,452	3,807	9,079	6,690	70,577
35	6,785	6,976	17,172	8,326	5,747	6,383	3,517	8,396	6,330	68,264
36	6,384	5,702	16,361	7,841	5,331	5,456	3,256	7,774	6,001	66,080
37	6,016	4,641	15,607	7,395	4,953	4,653	3,019	7,206	5,699	64,014
38	5,676	3,760	14,905	6,982	4,608	3,959	2,805	6,685	5,422	62,057
39	5,362	3,032	14,249	6,600	4,292	3,361	2,610	6,207	5,166	60,201
40	5,071	2,434	13,636	6,245	4,003	2,846	2,432	5,768	4,930	58,437
41	4,802	1,945	13,062	5,916	3,738	2,404	2,270	5,364	4,712	56,759
42	4,552	1,547	12,524	5,609	3,494	2,026	2,121	4,992	4,510	55,161
43	4,319	1,225	12,017	5,323	3,269	1,703	1,985	4,648	4,322	53,636
44	4,101	965	11,541	5,055	3,061	1,428	1,860	4,330	4,147	52,181
45	3,899	757	11,092	4,805	2,869	1,194	1,745	4,037	3,984	50,789
46	3,709	591	10,669	4,571	2,692	996	1,639	3,764	3,833	49,458
47	3,531	459	10,269	4,351	2,527	829	1,540	3,512	3,691	48,182
48	3,365	355	9,890	4,145	2,374	687	1,450	3,278	3,558	46,959
49	3,209	273	9,532	3,951	2,232	569	1,365	3,060	3,434	45,786
50	3,062	209	9,192	3,768	2,100	469	1,287	2,858	3,318	44,658
51	2,924	160	8,869	3,596	1,977	386	1,215	2,670	3,209	43,574
52	2,793	121	8,563	3,434	1,862	317	1,147	2,495	3,106	42,531
53	2,671	91	8,271	3,280	1,755	259	1,084	2,332	3,009	41,526
54	2,555	69	7,994	3,135	1,655	212	1,026	2,180	2,919	40,558
55	2,445	51	7,730	2,998	1,561	172	971	2,038	2,833	39,625
56	2,342	38	7,478	2,868	1,473	140	920	1,905	2,752	38,724
57	2,243	28	7,237	2,745	1,391	113	872	1,782	2,676	37,854
58	2,150	21	7,008	2,628	1,314	91	827	1,666	2,604	37,013
59	2,062	15	6,788	2,518	1,242	73	785	1,558	2,535	36,199
60	1,979	11	6,578	2,412	1,174	59	745	1,458	2,471	35,413
61	1,899	8	6,377	2,312	1,110	47	708	1,363	2,410	34,651
62	1,824	6	6,184	2,217	1,050	38	673	1,275	2,352	33,913
63	1,752	4	5,999	2,127	993	30	641	1,193	2,297	33,198
64	1,683	3	5,822	2,040	940	24	610	1,115	2,245	32,505
65	1,618	2	5,652	1,958	890	19	580	1,043	2,195	31,832
66	1,556	2	5,489	1,880	843	15	553	976	2,148	31,179
67	1,497	1	5,332	1,805	798	12	527	912	2,104	30,544

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HighwayTime (min)	HBW Interstate	HBS Interstate	HBO Interstate	NHB Interstate	HBW Arterial	HBS Arterial	HBO Arterial	NHB Arterial	Medium Truck External	Heavy Truck External
68	1440	1	5181	1733	756	9	502	853	2061	29928
69	1386	1	5035	1665	717	7	479	798	2021	29329
70	1335	1	4895	1600	679	6	457	746	1983	28747
71	1285	1	4761	1538	644	4	436	697	1946	28180
72	1238	1	4631	1478	610	3	417	651	1912	27629
73	1193	1	4506	1421	579	3	398	609	1879	27092
74	1150	1	4385	1366	549	2	380	569	1847	26569
75	1108	1	4269	1314	520	2	363	531	1817	26059
76	1069	1	4156	1264	494	1	348	496	1789	25563
77	1031	1	4047	1216	468	1	332	463	1762	25079
78	994	1	3942	1170	444	1	318	432	1736	24607
79	959	1	3841	1126	421	1	304	404	1711	24146
80	926	1	3743	1084	400	1	291	377	1688	23696
81	893	1	3648	1043	379	1	279	351	1665	23258
82	862	1	3556	1004	360	1	267	328	1644	22829
83	833	1	3467	967	342	1	256	306	1624	22410
84	804	1	3381	931	324	1	245	285	1605	22001
85	776	1	3297	896	308	1	235	266	1587	21602
86	750	1	3216	863	292	1	225	247	1569	21211
87	725	1	3138	831	277	1	216	230	1553	20829
88	700	1	3062	800	263	1	207	215	1537	20455
89	676	1	2988	771	250	1	198	200	1522	20090
90	654	1	2916	742	237	1	190	186	1508	19732
91	632	1	2846	715	225	1	183	173	1495	19382
92	611	1	2779	689	213	1	175	161	1483	19040
93	590	1	2713	664	202	1	168	150	1471	18704
94	571	1	2650	639	192	1	161	139	1460	18376
95	552	1	2588	616	182	1	155	129	1449	18054
96	534	1	2527	594	173	1	149	120	1439	17739
97	516	1	2469	572	164	1	143	112	1430	17430
98	499	1	2412	551	156	1	137	104	1421	17127
99	483	1	2357	531	148	1	132	96	1413	16831
100	467	1	2303	512	140	1	127	89	1406	16540
101	452	1	2250	493	133	1	122	83	1399	16254
102	437	1	2199	475	126	1	117	77	1392	15975
103	423	1	2150	458	120	1	112	71	1386	15701
104	409	1	2101	441	113	1	108	66	1381	15431
105	396	1	2054	425	107	1	104	61	1376	15168
106	383	1	2008	409	102	1	100	56	1372	14909
107	371	1	1964	394	97	1	96	52	1368	14654
108	359	1	1920	380	92	1	92	48	1365	14405
109	347	1	1878	366	87	1	89	45	1362	14160
110	336	1	1836	353	82	1	85	41	1359	13920
111	325	1	1796	340	78	1	82	38	1357	13684
112	315	1	1757	327	74	1	79	35	1356	13452
113	304	1	1718	315	70	1	76	33	1354	13224
114	295	1	1681	304	66	1	73	30	1354	13001
115	285	1	1644	293	63	1	70	28	1353	12781
116	276	1	1608	282	59	1	67	26	1353	12566
117	267	1	1574	272	56	1	65	24	1353	12354
118	259	1	1540	262	53	1	62	22	1353	12146
119	250	1	1507	252	50	1	60	20	1352	11941
120	242	1	1474	243	48	1	58	18	1352	11740
121	235	1	1443	234	45	1	55	17	1352	11543
122	227	1	1412	225	43	1	53	16	1352	11348
123	220	1	1381	217	41	1	51	14	1351	11158
124	213	1	1352	209	38	1	49	13	1351	10970
125	206	1	1323	201	36	1	47	12	1351	10786
126	199	1	1295	193	34	1	46	11	1350	10604
127	193	1	1268	186	32	1	44	10	1350	10426
128	187	1	1241	179	31	1	42	9	1350	10251
129	181	1	1215	173	29	1	41	9	1350	10079
130	175	1	1189	166	27	1	39	8	1349	9909
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200	1	1	1	1	1	1	1	1	1	1

Chapter 6. Mode Choice

The Version 2.1/TP+ mode choice process features both work and non-work models and a more detailed way of addressing walk access markets than was the case for the Version 1 model. The details of the mode choice model development are described in this section.

6.1 Model Structure

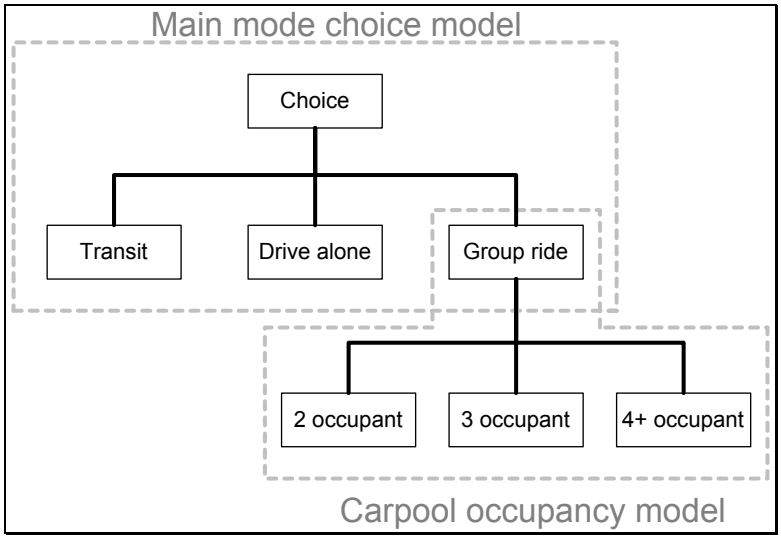
Mode choice is the third step in the four-step process. The mode choice model estimates the share of person trips made by each travel mode. Estimates are made at the zone-to-zone interchange level, but are usually presented at the jurisdiction interchange level or regional level. The following modes are represented in the Version 2.1/TP+ mode choice model:

TR Transit
DA Drive alone
GR2 Group ride, two occupants
GR3 Group ride, three occupants
GR4 Group ride, four or more occupants

The "transit" mode includes local bus, commuter/express bus, commuter rail, Metrorail, and any other future transit service, such as light rail or bus rapid transit (BRT). The Version 2/MINUTP model included two submodels that are not currently part of the Version 2.1/TP+ model, due to time constraints. The first submodel, the "sub-mode choice model," subdivides transit trips to Metrorail and non-Metrorail trips (bus, commuter rail, etc.). The second submodel, the "mode-of-arrival model," predicts the mode of arrival of Metrorail riders to Metrorail stations. Given the production zone for a Metrorail trip and the attraction-end destination station, the model computes the probability that a given production-end station is accessed by a particular mode. Four modes of arrival are considered: walk, bus, auto passenger, and auto driver. The model has a nested logit formulation and the station choice is restricted to the two "best" stations for the walk mode and the six best stations for the other three access modes. It is the intent of COG staff to re-incorporate these two submodels into the model set at some time in the future when resources are made available.

There are four mode choice models -- one for each trip purpose: HBW, HBS, HBO, and NHB. Each of the four models is comprised of two sub-models: a "main mode choice model" and a "carpool occupancy model." The main mode choice model allocates person trips among transit, drive alone, and group ride (carpool) modes. The carpool occupancy model allocates group-ride person trips among 2-person carpool, 3-person carpool, and 4+person carpool modes. The structure of the COG/TPB mode choice model (Versions 1, 2, 2.0, and 2.1) is shown in Exhibit 6-1. Each sub-model is a multinomial logit model. The two sub-models are applied in a sequential manner, so the model form is referred to as a "sequential multinomial logit model." The carpool occupancy model is executed first. The resulting occupancy information is then used within the main model to determine average costs associated with each person in the carpool mode.

Exhibit 6-1 Structure of the COG/TPB mode choice model



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Market segmentation in the Version 2.1/TP+ mode choice models is by vehicle ownership, access mode to transit, and walking distance to/from transit service. Vehicle ownership is defined as the number of vehicles available to a household (0, 1, or 2+). There are three general access mode types:

Access mode	Description
Walk-access	Both ends of the trip are within walking distance of transit
Drive-access	The origin end of the trip is beyond walking distance to transit
No access	The destination end of the trip is beyond walking distance to transit, so transit cannot be used for the trip

Walking distance to/from transit is defined as being either "short" or "long," based on the following definitions:

Distance to a rail station	Distance to a bus stop	Walking distance to/from transit
0 - 0.33 miles	Any	Short
0.33 - 1.00 miles	Any	Long
> 1.00 mile	0 - 0.33 miles	Short
> 1.00 mile	0.33 - 1.00 miles	Long
> 1.00 mile	> 1.00 mile	Beyond walking distance to/from transit

Thus, each zone is made up of zero or more short-walk areas, zero or more long-walk areas, and zero or more beyond-walking-distance areas. This market segmentation by walking distance to/from transit is referred to as the "two-tier walk-access" segmentation, since there are two main types of walk access: short and long. Distances are straight-line distances ("as the crow flies").

Exhibit 6-2 shows the steps involved in developing the mode choice model. Each step is described later in this chapter.

Exhibit 6-2 Steps to develop the mode choice model

Step
Creation of eight calibration files HBW main; HBW carpool occupancy; HBS main; HBS carpool occupancy; HBO main; HBO carpool occupancy; NHB main; NHB carpool occupancy;
Disaggregate estimation of the eight models
System-wide aggregate adjustments, based on an observed trip table
Jurisdiction-level aggregate adjustments, based on an estimated trip table

6.2 Model Estimation

Creation of calibration files

Eight separate calibration files were created: one for each trip purpose (HBW, HBS, HBO, and NHB) and model type (main model and carpool occupancy model). This section provides an overview of the development of these files. A more detailed description of the development of the calibration files can be found in two technical reports listed in the bibliography at the end of this chapter (Milone 1999.04.09; Moran 2002.12.09). The file formats and variable definitions for the eight calibration files can be found in Appendix D. This appendix also includes the minimum and maximum values for each numeric variable in the eight calibration data sets.

Three main data sources were used for developing the calibration files: 1) the 1994 Household Travel Survey, 2) the 1994 highway and transit networks, and 3) GIS-based data about walking distances to/from transit. The 1994 HTS provided information about the chosen and unchosen (but available) travel modes. It also provided information about household characteristics, such as vehicle availability. Each observation from the 1994 HTS represents an observed mode choice decision for a particular person trip. The following observations were deleted from the household travel survey data:

- Trips lacking either an origin TAZ, a destination TAZ, or both;
- Trips that leave the HTS area; and
- Intrazonal (within-zone) trips.

The 1994 highway and transit networks were used to develop zone-to-zone skims (travel times and costs). There are three highway networks (AM peak, off peak, and PM peak) and three corresponding highway skims. On the transit side, there are two transit networks (AM peak and off peak) and two corresponding transit skims. For modeling purposes, the AM peak information is assumed to correspond to HBW travel, while the off-peak information is used for the three other trip purposes. The PM peak highway skims are not used in the mode choice model development process.

Two types of data were generated relating to walking distance to/from transit. First, transit stop nodes were buffered in GIS to generate short-walk and long-walk areas in each TAZ. This resulted in both a geographic file showing the short- and long-walk areas and a text file containing the percent of each zone that is within the short- and long-walk area. Second, by combining the preceding information with the 1994 HTS, it was possible to determine which trips began in short-walk areas and which trips began in long-walk areas. However, since the origin of some trip records could not be geocoded to an exact X-Y coordinate, not all observations in the HTS could be categorized in this manner. In the end, it was possible to categorize 77% of the observations (3,744 out of 4,863).

Rules used to establish short-walk and long-walk times

For the purposes of calibration work, which needed to explicitly address short-walk and long-walk access/egress time, logical rules were established to identify specific walk access/egress times and path type characteristics associated with each individual trip record.

Path characteristics for the home-based purposes were established based on the GIS-based data, which described the location of the surveyed household with respect to short and long walk transit access areas (both for AM and off-peak transit service). The GIS data indicated whether the household was located in the short-walk or long-walk area, and, therefore, the average zonal short/long walk time was used, as appropriate, at the trip production end of all home-based purposes. Walk times at the attraction end of each trip record required some degree of judgment about whether a short or long walk was involved, based on the zonal walk percent information. If a given zone had any short-walk portion (i.e., Percent short-walk = 1 to 100%), it was assumed that the transit walk egress time was equal to the average short walk time. Further, for zones that were comprised of all long-walk area or a combination of long-walk and "no walk," it was assumed that the egress walk time was equal to the average zonal long-walk time.

For the non-home-based purpose, the zonal percent rules established above for the egress end were simply applied to the production end of the trip as well.

Assumptions about using walk-access vs. drive-access times

Regarding the transit path type (walk-access or drive-access), trips originating from short walk locations used walk-access path service levels exclusively. However, in the case of long-walk origins, the minimum of the walk-access and drive-access travel time service levels were used if the surveyed household had at least one vehicle available. Long-walk trip origins associated with households having no vehicles available were constrained to using walk-access service levels. A summary of the walk-access time assumptions for both home-based and non-home-based travel is shown in Exhibit 6-3.

Exhibit 6-3 Rules for transit path types and access/egress walk times used in the calibration files

Home-Based Purposes

Production type (based on HH location)	Attraction type (based on zonal short, long walk percents)	Transit path type (walk/drive access)	Assumed walk access time (short/long)	Assumed walk egress time (short/long)	Inter-change code (slflag)
HH in short walk area	Zone is all or partial short walk	walk-access path	Short	Short	1
HH in short walk area	Zone is all long walk or partial long walk / no walk	walk-access path	Short	Long	2
HH in short walk area	Zone is all no walk	N/A	N/A	N/A	3
HH in long walk area	Zone is all or partial short walk	'Best' walk- / drive- access path (drive access subject to HH with vehicles avail.)	Long	Short	4
HH in long walk area	Zone is all long walk or partial long walk / no walk	'Best' walk- / drive- access path (Drive access subject to HH with vehicles avail.)	Long	Long	5
HH in long walk area	Zone is all no walk	N/A	N/A	N/A	6
HH in no walk area	Zone is all or partial short walk	Drive-access path	N/A	Short	7
HH in no walk area	Zone is all long walk or partial long walk / no walk	Drive-access path	N/A	Long	8
HH in no walk area	Zone is all no walk	N/A	N/A	N/A	9
HH in unknown walk area	Trip Record Unused				10

Non-Home-Based Purpose

Production type (based on HH location)	Attraction type (based on zonal short, long walk percents)	Transit path type (walk/drive access)	Assumed walk access time (short/long)	Assumed walk egress time (short/long)	Inter-change code (slflag)
Zone is all or partial short walk	Zone is all or partial short walk	walk-access path	Short	Short	1
Zone is all long walk or partial long walk / no walk	Zone is all long walk or partial long walk / no walk	walk-access path	Short	Long	2
Zone is all no walk	Zone is all no walk	N/A	N/A	N/A	3
Zone is all or partial short walk	Zone is all or partial short walk	'Best' walk- / drive- access path (drive access subject to HH with vehicles avail.)	Long	Short	4
Zone is all long walk or partial long walk / no walk	Zone is all long walk or partial long walk / no walk	'Best' walk- / drive- access path (Drive access subject to HH with vehicles avail.)	Long	Long	5
Zone is all no walk	Zone is all no walk	N/A	N/A	N/A	6
Zone is all or partial short walk	Zone is all or partial short walk	Drive-access path	N/A	Short	7
Zone is all long walk or partial long walk / no walk	Zone is all long walk or partial long walk / no walk	Drive-access path	N/A	Long	8
Zone is all no walk	Zone is all no walk	N/A	N/A	N/A	9

Parking costs and highway terminal time assumptions

The current mode choice model application program has the capability to generate HBW parking costs and highway terminal times automatically, based on zonal work trip attraction density. Since HBW attraction rates have been found to be declining over time, due to increased trip chaining, the parking cost definition is arguably destabilized, or at least losing its original intended meaning. Therefore, as part of updating done to the application program, the consultant has changed the program so that it uses employment density instead of attraction density as the independent variable for both submodels. The conversion of HBW attractions to employment was done by dividing the attraction values by 1.44 (COG's original regional attraction rate).

A graph of daily HBW and hourly non-HBW parking costs, as a function of zonal employment density, is shown in Exhibit 6-6. 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 sq. mile, which is about the density of downtown Bethesda, Maryland.

It is important to point out that the current mode choice model application program uses the daily parking cost, irrespective of whether it is generated by the parking cost submodel or read directly from the A1 deck (zonal data file), and divides it by 2 when applying it on a per-trip basis, since HBW trips are those from and to the home (i.e. they are non-directional). It is also important to recognize that assumed hourly parking rates also invoke the issue of duration. Exhibit 6-4 shows the parking cost assumptions that are now used for Version 2.1/TP+ modeling.

Exhibit 6-4 Parking cost assumptions in the Version 2.1/TP+ 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

In the last column of the above table, there are two factors of 2.0. The 2.0 factor for HBO trips is due to the assumed 2-hour duration at the trip destination. The 2.0 factor for NHB trips is for an entirely different reason. The issue relates to whether a destination-end parking cost is allocated to a single trip or whether it is spread over two trips. In the case of home-based trips, the parking charge is spread over two trips. So, if a person makes a home-to-work trip with an $8 parking charge and then a work-to-home trip with no parking charge, the model assumes that each trip has a $4 parking charge. This is why the mode choice application program divides parking charges in half. For non-home-based trips, however, it does not make sense to spread the parking charge over two trips – the nominal charge should be associated with only the NHB trip in question. Consequently, to override the default behavior of the model, a factor of 2.0 is applied to NHB parking charges. The 2.0 factor cancels out the division by two, allowing the model to properly represent these NHB parking costs.

Highway terminal time is typically associated with the average time spent parking or un-parking an automobile. The current mode choice model application program considers highway terminal time only at the attraction end (i.e. highway terminal time associated with trip origins is not considered at all). Highway time is calculated as a function of employment density, as shown in Exhibit 6-5.

Exhibit 6-5 Assumed highway terminal times (minutes) as a function of employment density

Employment density range (Emp/Sq. Mi.)	Highway terminal time (minutes)
0 - 4,617	1
4,618 - 6,631	2
6,632 - 11,562	4
11,563 - 32,985	6
32,986 +	8

Exhibit 6-6 Parking cost model for the Version 2.1/TP+ model set

pcostv2.xls

Model estimation: General discussion

Logit model estimation is a heuristic, trial-and-error process. First, one specifies a candidate model. This involves choosing which independent variables to include in each utility equation, what form of the variable is appropriate (e.g., X, X^2, log(X)), and whether the variable should be included as a generic variable (i.e., the variable appears in all of the utility equations) or as an alternative-specific variable (i.e., the variable appears in only one utility equation or a subset of the utility equations). Second, one estimates the coefficient values of the independent variables, typically with special logit model estimation software. We are using Alogit version 3.8f, from the Hague Consulting Group, which is a DOS-based program. This software uses the method of maximum likelihood estimation (MLE) to estimate the coefficient values. Last, one evaluates the estimated model for reasonableness. Generally, one is looking for the following:

- Logical signs on the coefficient estimates. For example, terms that are considered a disbenefit (such as time or cost) should have a negative sign.
- T-statistic values of 1.0 or greater. In linear regression, one typically requires a t-statistic of at least 2.0. In logit model estimation, a value of 1.0 or more is usually considered adequate (Horowitz et al. 1986).
- Logical ratios of certain common coefficient estimates:
  - Ratio of out-of-vehicle time (OVT) to in-vehicle time (IVT). The rule of thumb for work models is 2.0 to 3.0. There is less agreement on the value of this ratio for non-work mode choice models.
  - Calculated value of time (VOT). The rule of thumb for work trips is that the calculated value of time should be between 25% and 50% of the prevailing wage rate. The average wage rate for the Washington area can be calculated using the median household income, the number of work hours per year, and the average number of workers per household. The median household income is obtained from the Census and is always one year in arrears, e.g., the 2000 Census includes the 1999 median household income. As of June 2002, median household income data from the 2000 Census was not available, so the most recent data was from the 1990 Census (1989 median household income = $46,884). Assuming 1,850 work hours per year and 1.705 workers per household, the average wage rate is calculated to be $14.86 in 1989 dollars (Moran 2002.07.11). The parking cost model uses 1980 dollars, so all other cost in the modeling process are brought to 1980 dollars. Assuming a discount factor of 0.6645 (= 82.4/124), the median household income is $9.88 in 1980 dollars, which implies that VOTs coming from work mode choice models should be between $2.47 and $4.94 in 1980 dollars. In year-2001 dollars, this range would be $5.31 to $10.62 since the CPIs for all urban consumers are 177.1 (2001) and 82.4 (1980).
  - Although there are fewer rules of thumb for non-work trips, it is generally agreed that the value of time should be equal to about 25% to 50% of the HBW VOT (i.e., 6.25% to 25% of the average wage rate), which would come to $0.62 to $2.47 for non-work trips in 1980 dollars. In year-2001 dollars, this range would be $1.33 to $5.31.

The formula used to compute value of time is

$$VOT = 0.60 * (B\_IVT / B\_cost)$$

where

VOT	is the calculated value of time (units of dollars per hour)
0.60	is a conversion factor to convert cents per minute into dollars per hour
B_IVT	is the coefficient estimate for the in-vehicle time term (units of 1/minutes)
B_cost	is the coefficient estimate for travel cost (units of 1/cents)

In the case of the HBO and NHB mode choice models, trip cost was included as the natural log of trip cost. This is because, when included simply as cost, the coefficient sign was positive. When included as ln(cost), the coefficient sign is negative, as would be expected. The San Francisco Bay Area's Metropolitan Transportation Commission also uses the ln(cost) in all of its non-work mode choice models. The formula used to compute value of time when time is included as the ln(cost) is

$$VOT = 0.60 * (\text{Average trip cost}) * (B\_IVT / B\_cost)$$

where the average trip cost is 29.44 cents for HBO trips and 37.54 cents for NHB trips (1980 prices).

Model estimation: Selected models

Eight logit models were estimated:

- mhbw Main HBW
- mhbs Main HBS
- mhbo Main HBO
- mnhb Main NHB
- chbw Carpool occupancy HBW
- chbs Carpool occupancy HBS
- chbo Carpool occupancy HBO
- cnhb Carpool occupancy NHB

In general one would specify and estimate a series of candidate models for each final model. For example, one could estimate five candidate models for each final model, resulting in forty models that get estimated. For the Version 2/MINUTP model, over 80 candidate models were estimated. For this current work – the Version 2.1/TP+ model – we estimated fewer candidate models (about 30), since we were able to build upon the experience gained in the previous work. Specifically, in some cases, such as the HBW main model, we estimated eight candidate models and selected the best. In other cases, such as some of the carpool occupancy models, we estimated only one "candidate" model (the one that was found to be the best in previous work) and this model was retained as the "best." The estimation work was documented in a technical report mentioned earlier (Moran 2002.12.09).

Main models

Eight candidate models were tested for the HBW main model. Exhibit 6-7 summarizes the variables in each of these eight candidate models and shows statistics about each model, including the goodness of fit measure (rho squared), the calculated value of time, and the ratio of out-of-vehicle travel time (OVTT) to in-vehicle travel time (IVTT). The table also includes the elasticity of demand with respect to fare for models 22 and 25.

Exhibit 6-7 HBW main model: candidate models and "best" model

	Models							
Variables	hbw 18	hbw 19	hbw 20	hbw 21	hbw 22	hbw 23	hbw 24	hbw 25
IVTT	x	x	x	x	x	x	x	x
OVTT (transit)	x	x	x	x	x	x	x	x
Cost	x	x	x	x	x	x	x	x
Auto ownership dummy: 0-veh HH	x	x	x	x	x	x	x	x
Auto ownership dummy: 1-veh HH	x	x	x	x	x	x	x	x
Auto ownership dummy: 2+veh HH	x	x	x	x	x	x	x	x
Drive-acc transit dummy: 1-veh HH	x	x	x	x	x	x	x	x
Drive-acc transit dummy: 2+veh HH	x	x	x	x	x	x	x	x
Land-use mix index, prod end	x	x	x	x	x	x	x	x
Land-use mix index, attr end	x	x	x	x	x	x	x	x
Metrorail use dummy		x						x
Short walk to short walk dummy	x	x	x				x	
Short walk to long walk dummy	x	x						
Long walk to short walk dummy	x	x	x	x				
Long walk to long walk dummy	x	x	x	x				
Short walk at origin dummy						x		
Long walk at origin dummy						x		
rho squared	0.3133	0.3190	0.3190	0.3130	0.3129	0.3132	0.3132	0.3187
Value of time = 0.6 * (IVTT/cost)	$3.44	$2.79	$3.45	$3.45	$3.49	$3.44	$3.50	$2.78
OVTT / IVTT	1.59	1.30	1.61	1.72	1.66	1.59	1.63	1.50
Coefficients have logical signs?	yes	yes	yes	yes	yes	yes	yes	yes
Coefficient magnitudes logical?	no	no	no	no	yes	yes	yes	yes
T-statistics >= 1.0?	no	no	yes*	no	yes	yes*	no	yes
Elasticity of demand wrt fare					-0.40			-0.43
								best

Notes:

* The t-stat on one or more of the "auto ownership dummy" variables was < 1.0. This can be "ignored" for the time being, since the values of the "auto ownership dummy" coefficients will be adjusted as part of the aggregate adjustment process.

Ref: v2tppMcEstRes4.xls, sum2

The rho squared of all eight candidate models was about 0.31. The conventional wisdom is that the value of time estimate for HBW trips should be equal to about 25% to 50% of the average wage rate, which comes to $2.47 to $4.94 in 1980 dollars (Moran 2002.07.11). For the present work, all of the calculated value of time values fell within this expected range. The conventional wisdom is that the ratio of the coefficients on out-of-vehicle travel time (OVTT) and in-vehicle travel time (IVTT) should be between 2 and 3. In our case, none of the candidate models had calculated values of time that fell within this expected range – they were all about 1.5. Models 22 and 25 were judged to be the best two of the eight. Model 22 and 25 are the same, except that model 25 included a Metrorail use dummy variable (=1 if 25% or more of the IVTT on the

available transit path between i and j is on Metrorail). The elasticity of demand with respect to fare was calculated for these two models to help decide which of the two was the best. Both models had an elasticity of demand with respect to fare of about –0.4, which means that a 10% increase in fare would likely result in a 4% decrease in demand for transit. The well-known rule-of-thumb for transit fare elasticity, the Simpson-Curtin Rule, states that the fare elasticity should be about –0.333. By this measure, our fare elasticities are a bit high. However according to the report *Traveler response to transportation system changes* (Barton-Aschman Associates, Inc. and R.H. Pratt & Co. 1981, p. 239), the average fare elasticity for U.S. case studies is –0.41. By this measure, our calculated elasticities appear to be about right.

HBW main model 25 was judged to be the "best" of the eight candidate models because all the coefficients had logical signs (e.g., negatives on time and cost, etc.), all coefficients had logical magnitudes, and all t-statistics were greater than or equal to 1.0. Although both it and model 22 performed similarly, it was chosen over model 22 because of its inclusion of a Metrorail dummy variable, which is also included in the three other non-work (HBS, HBO, and NHB) models, discussed later in this report. The Metrorail use dummy variable has the following definition: equal to 1 in cases where Metrorail is available for 25% or more of the IVTT for available paths; equal to 0 in all other cases. Model 25 is shown in Exhibit 6-8.

Exhibit 6-8 HBW "main" mode choice model (#mhbw25)

Utility				Alogit		
TR	DA	GR	Variable name	coeff name	Coeff.	T-stat
x	x	x	IVTT	IVTT	-0.03556	(-10.4)
x			OVTT	OVTT	-0.05319	(-7.3)
x	x	x	Cost	Cost	-0.00766	(-11.9)
	x		0-veh HH dummy	ve0dumda	-3.13469	(-9.9)
	x		1-veh HH dummy	ve1dumda	0.32059	(1.6)
	x		2+veh HH dummy	ve2dumda	1.23861	(6.5)
		x	0-veh HH dummy	ve0dumgr	-2.90011	(-10.5)
		x	1-veh HH dummy	ve1dumgr	-1.18315	(-5.9)
		x	2+veh HH dummy	ve2dumgr	-0.75836	(-3.9)
x*			1-veh HH & drv acc dummy	ve1autacc	-0.81043	(-5.1)
x*			2+veh HH & drv acc dummy	ve2autacc	-0.84683	(-6.6)
x			Land-use mix index, prod end	LUmixiTR	1.390E-05	(1.3)
	x		Land-use mix index, attr end	LUmixjDA	-1.825E-05	(-3.6)
x			Metrorail use dummy	metrodum	0.85678	(8.1)
			Value of time**		$2.78	
			OVTT / IVTT		1.50	
			No. of obs.		5,778	
			LL(0)		-5,892	
			Max. LL		-4,014	
			Rho-sq wrt zero		0.3187	
			Rho-sq wrt consts		0.1870	

Notes:

* This variable relates to only drive-access transit trips.

** For the work purpose, one would expect a VOT between $2.47 and $4.94 in 1980 dollars.
VOT = 0.60 * (IVTT/Cost), where 0.60 converts cents/min to dollars/hour

Ref: v2tppMcEstRes4.xls

The independent variables included in the selected HBW "main" mode choice model are

- IVTT (In-vehicle travel time). For drive alone and group ride, this variable includes the attraction-end highway terminal time, which is mainly the time required to park a car. For transit, this variable includes the sum of the Metrorail IVTT (if any), non-Metrorail IVTT (such as bus, if any), and drive-access time to transit (if any).
- OVTT (Out-of-vehicle travel time). For transit, this includes walk time (for access and transfers) and waiting time (initial and transfer). For drive alone and group ride, the modeling process assumes there is no out-of-vehicle travel time component.
- Cost. For drive alone and group ride, cost is the sum of the operating costs (5.3 cents times highway distance), the parking cost, and the toll. For transit, cost is simply the fare.
- Three vehicle ownership dummy variables. These are included in the DA and GR utility equations, giving rise to six coefficient values.
  - 0-veh HH dummy = 1 if the household has zero vehicles available; = 0 otherwise.
  - 1-veh HH dummy = 1 if the household has one vehicle available; = 0 otherwise.
  - 2+veh HH dummy = 1 if the household has two or more vehicles available; = 0 otherwise.
- Two auto-access bias terms included in the TR utility equation
  - 1-veh HH & drive-access dummy = 1 if the household has one vehicle and used auto to access transit; = 0 otherwise.
  - 2+veh HH & drive-access dummy = 1 if the household has two or more vehicles and used auto to access transit; = 0 otherwise.
- Two land-use mix variables, one related to the production zone and one related to the attraction zone of a trip. These two variables are used in both the transit equation and the drive-alone equation, giving rise to four coefficients. The land-use mix variable is defined as

  Land use mix index = (hhpopd * nempd) / (hhpopd + nempd)

  where hhpopd = Household population density
  nempd = Normalized employment density

  This is the same definition used in the current Portland, Oregon travel model set (Metro 1998, p. 7).
- Metrorail use dummy variable (=1 if 25% or more of the IVTT on the available transit path between i and j is on Metrorail).

Note that HBW main model 25 does not include any of the short-walk/long-walk dummy variables. This is because the t-stats of these coefficients were less than 1.0 or the magnitudes of these coefficients were illogical, or both.

Four candidate models were tested for the HBS main model (See Exhibit 6-9).

Exhibit 6-9 HBS main model: candidate models and "best" model

	Models			
Variables	hbs 10	hbs 11	hbs 12	hbs 13
Time	x	x		x
IVTT			x	
OVTT (transit)			x	
Cost	x	x	x	x
Auto ownership dummy: 0-veh HH	x	x	x	x
Auto ownership dummy: 1-veh HH	x	x	x	x
Auto ownership dummy: 2+veh HH	x	x	x	x
Drive-acc transit dummy: 1-veh HH				
Drive-acc transit dummy: 2+veh HH				
Land-use mix index, prod end	x	x	x	x
Land-use mix index, attr end	x	x	x	x
Metrorail use dummy	x		x	x
Short walk to short walk dummy				x
Short walk to long walk dummy				
Long walk to short walk dummy				
Long walk to long walk dummy				
Short walk at origin dummy				
Long walk at origin dummy				
rho squared	0.2566	0.2552	0.2552	0.2567
Value of time = 0.6 * (IVTT/cost)	$1.72	$2.55	-$0.58	$1.69
OVTT / IVTT	n/a	n/a	-6.52	n/a
Coefficients have logical signs?	yes	yes	no	yes
Coefficient magnitudes logical?	yes	yes	no	yes
T-statistics >= 1.0?	yes	yes	no	no
Elasticity of demand wrt fare	-0.29	-0.28		
	best			

Ref: v2tppMcEstRes4.xls, sum2

The rho squared of the four candidate models was about 0.25. Although there are fewer rules of thumb for non-work trips, it is generally agreed that the value of time should be equal to about 25% to 50% of the HBW VOT (i.e., 6.25% to 25% of the average wage rate), which would come to $0.62 to $2.47 in 1980 dollars. Model 10 was judged to be the "best" of the four candidate models because it had an acceptable VOT value, all the coefficients had logical signs, all coefficients had logical magnitudes, and all t-statistics were greater than or equal to 1.0. Model 10 is shown in Exhibit 6-10.

Exhibit 6-10 HBS "main" mode choice model (#mhbs10)

Utility				Alogit		
TR	DA	GR	Variable name	coeff name	Coeff.	T-stat
x	x	x	Time	Time	-0.02168	(-1.9)
x	x	x	Cost	Cost	-0.00758	(-3.7)
	x		0-veh HH dummy	ve0dumDA	-3.00022	(-4.8)
	x		1-veh HH dummy	ve1dumDA	2.31487	(5.7)
	x		2+veh HH dummy	ve2dumDA	3.77539	(8.1)
		x	0-veh HH dummy	ve0dumGR	-0.75413	(-1.8)
		x	1-veh HH dummy	ve1dumGR	1.99206	(4.9)
		x	2+veh HH dummy	ve2dumGR	3.54110	(7.5)
x			Land-use mix index, attr end	LUmixjTR	3.269E-05	(1.1)
	x		Land-use mix index, prod end	LUmixiDA	3.752E-05	(2.0)
	x		Land-use mix index, attr end	LUmixjDA	1.955E-05	(1.7)
x			Metrorail use dummy	metrodum	0.97516	(2.8)
			Value of time**		$1.72	
			No. of obs.		2,754	
			LL(0)		-2,672	
			Max. LL		-1,987	
			Rho-sq wrt zero		0.2566	
			Rho-sq wrt consts		0.0709	

Notes:

** For the non-work purpose, one would expect a VOT between $0.62 and $2.47 in 1980 dollars.
VOT = 0.60 * (IVTT/Cost), where 0.60 converts cents/min to dollars/hour

Ref: v2tppMcEstRes4.xls

This model includes a Metrorail use dummy variable, which is equal to 1 in cases where Metrorail is available for 25% or more of the IVTT for available paths. The Metrorail dummy variable was included in all four of the mode choice models (HBW, HBS, HBO, and NHB). The best HBS main model does not include any of the short-walk/long-walk dummy variables. When the "short-walk-to-short-walk" dummy variable was included in HBS model 13, its t-stat was less than 1.0.

Four candidate models were tested for the HBO main model (See Exhibit 6-11).

Exhibit 6-11 HBO main model: candidate models and "best" model

	Models			
Variables	hbo 1	hbo 9	hbo 10	hbo 11
Alternative-specific constant(s)	x			
Time		x	x	
IVTT	x			x
OVTT (transit)	x			x
Cost	x			
Natural log of cost		x	x	x
Auto ownership dummy: 0-veh HH		x	x	x
Auto ownership dummy: 1-veh HH		x	x	x
Auto ownership dummy: 2+veh HH		x	x	x
Drive-acc transit dummy: 1-veh HH				
Drive-acc transit dummy: 2+veh HH				
Land-use mix index, prod end		x	x	x
Land-use mix index, attr end		x	x	x
Metrorail use dummy		x	x	x
Short walk to short walk dummy		x	x	x
Short walk to long walk dummy				
Long walk to short walk dummy		x		
Long walk to long walk dummy				
Short walk at origin dummy				
Long walk at origin dummy				
rho squared	0.1758	0.2198	0.2198	0.2221
Value of time = 0.6 * (IVTT/cost)	$3.01	$0.63	$0.63	-$0.25
OVTT / IVTT	-7.59	n/a	n/a	-7.18
Coefficients have logical signs?	no	yes	yes	no
Coefficient magnitudes logical?	no	yes	yes	no
T-statistics >= 1.0?	yes	no	yes	yes*
Elasticity of demand wrt fare			-1.89	
			best	

Notes:
* The t-stat on one or more of the "auto ownership dummy" variables was < 1.0. This can be "ignored" for the time being, since the values of the "auto ownership dummy" coefficients will be adjusted as part of the aggregate adjustment process.

Ref: v2tppMcEstRes4.xls, sum2

The rho squared values ranged from 0.18 to 0.22 for the four candidate HBO main models tested. The first model tested, mhbo01, included two alternative-specific constants, IVTT, OVTT, and cost. The coefficient on cost came out positive, which is the wrong sign. Consequently, for the last three HBO main candidate models estimated, we used the natural log of cost (LnCost).[1] The best of the four candidate models was judged to be mhbo10, which is shown in Exhibit 6-12.

[1] In its latest model set (BAYCAST-90), The Metropolitan Transportation Commission (MTC) in Oakland, California found that it needed to use Ln(Cost) in all of the non-work mode choice models.

Exhibit 6-12 HBO "main" mode choice model (#mhbo10)

Utility				Alogit		
TR	DA	GR	Variable name	coeff name	Coeff.	T-stat
x	x	x	Time	Time	-0.02322	(-6.0)
x	x	x	LnCost	LnCost	-0.65329	(-10.6)
	x		0-veh HH dummy	ve0dumda	-2.73139	(-8.0)
	x		1-veh HH dummy	ve1dumda	1.46144	(7.3)
	x		2+veh HH dummy	ve2dumda	1.97545	(10.8)
		x	0-veh HH dummy	ve0dumgr	-1.44046	(-5.3)
		x	1-veh HH dummy	ve1dumgr	1.07560	(4.9)
		x	2+veh HH dummy	ve2dumgr	1.87498	(9.1)
x			Land-use mix index, prod end	LUmixiTR	3.777E-05	(2.6)
x			Land-use mix index, attr end	LUmixjTR	1.941E-05	(1.8)
	x		Land-use mix index, prod end	LUmixiDA	3.196E-05	(3.5)
	x		Land-use mix index, attr end	LUmixjDA	1.694E-05	(2.8)
x			Metrorail use dummy	fmetdum	0.88910	(6.1)
x			Short walk to short walk dummy	SWtoSWmkt	0.42569	(3.1)
			Value of time**		$0.63	
			No. of obs.		8,509	
			LL(0)		-8,210	
			Max. LL		-6,405	
			Rho-sq wrt zero		0.2198	
			Rho-sq wrt consts		0.0670	
			Average cost, cents/trip, 1980 $		29.44	

Notes:

** For the non-work purpose, one would expect a VOT between $0.62 and $2.47 in 1980 dollars.
VOT w/ ln(cost) = 0.60 * (ave. trip cost) * (Time/Cost).
Average trip cost = 29.85 cents/trip, 1980 prices.

Ref: v2tppMcEstRes4.xls

This model and the NHB main model do not use the variable "cost," but instead use the natural log of cost (LnCost).[2] This was tried because models incorporating the straight cost variable resulted in cost coefficients with the wrong sign (positive). The calculated VOT for HBO was $0.63 in 1980 dollars.

[2] See footnote 1.

Four candidate models were tested for the NHB main model (See Exhibit 6-13).

Exhibit 6-13 NHB main model: candidate models and "best" model

	Models			
Variables	nhb 1	nhb 9	nhb 10	nhb 11
Alternative-specific constant(s)	x	x	x	x
Time				x
IVTT	x	x	x	
OVTT (transit)	x	x	x	
Cost	x			
Natural log of cost		x	x	x
Auto ownership dummy: 0-veh HH				
Auto ownership dummy: 1-veh HH				
Auto ownership dummy: 2+veh HH				
Drive-acc transit dummy: 1-veh HH				
Drive-acc transit dummy: 2+veh HH				
Land-use mix index, prod end		x (2)	x (1)	x (1)
Land-use mix index, attr end		x (2)	x (2)	x (2)
Metrorail use dummy		x	x	x
Short walk to short walk dummy		x	x	x
Short walk to long walk dummy				
Long walk to short walk dummy				
Long walk to long walk dummy				
Short walk at origin dummy				
Long walk at origin dummy				
rho squared	0.1565	0.1811	0.1811	0.1803
Value of time = 0.6 * (IVTT/cost)	-$8,430	$0.35	$0.35	$0.84
OVTT / IVTT	6.25	4.49	4.52	n/a
Coefficients have logical signs?	no	yes	yes	yes
Coefficient magnitudes logical?	no	no	no	yes
T-statistics >= 1.0?	no	no	yes	yes
Elasticity of demand wrt fare				-2.42
				best

Ref: v2tppMcEstRes4.xls, sum2

As was the case for the HBO main mode choice model, for the NHB main mode choice model, the coefficient estimated for cost had the wrong sign (positive), so ln(cost) was used for the remaining three candidate NHB main mode choice models. Model mnhb11 was selected as the best of the four and is shown in Exhibit 6-14.

Exhibit 6-14 NHB "main" mode choice model (#mnhb11)

Utility				Alogit		
TR	DA	GR	Variable name	coeff name	Coeff.	T-stat
	x		Constant	DAconst	2.49000	(10.2)
		x	Constant	GRconst	1.61554	(6.3)
x	x	x	Time	Time	-0.02860	(-9.3)
x	x	x	LnCost	LnCost	-0.76830	(-12.1)
x			Land-use mix index, attr end	TRLUmixj	2.156E-05	(2.3)
	x		Land-use mix index, prod end	DALUmixi	1.126E-05	(2.1)
	x		Land-use mix index, attr end	DALUmixj	1.304E-05	(2.1)
x			Metrorail use dummy	Metrodum	1.84313	(11.4)
x			Short walk to short walk dummy	SWtoSWmkt	0.65963	(3.3)
			Value of time**		$0.84	
			No. of obs.		7,853	
			LL(0)		-7,414	
			Max. LL		-6,078	
			Rho-sq wrt zero		0.1803	
			Rho-sq wrt consts		0.0578	
			Average cost, cents/trip, 1980 $		37.54	

Notes:
** For the non-work purpose, one would expect a VOT between $0.62 and $2.47 in 1980 dollars.
VOT w/ ln(cost) = 0.60 * (ave. trip cost) * (Time/Cost).
Average trip cost = 38.28 cents/trip, 1980 prices.

Ref: v2tppMcEstRes4.xls

The calculated VOT for NHB main model #11 is $0.84, which is within the expected range of $0.62 and $2.47 in 1980 prices.

Exhibit 6-19 presents a summary of the "best" main and carpool occupancy mode choice models for the Version 2.1/TP model.

Carpool occupancy models

The four carpool occupancy models that were picked as the best from those estimated are shown in Exhibit 6-15, Exhibit 6-16, Exhibit 6-17, and Exhibit 6-18. A summary of these four models is shown in Exhibit 6-19. The rho squared values ranged from 0.12 for the HBO carpool occupancy model to 0.29 for the HBW carpool occupancy model. The HBW carpool occupancy model has the most terms (opcost, parkcost, toll, timesaved, and four vehicle ownership dummies), but it is also the only one of the four that does not include IVTT.

Exhibit 6-15 HBW carpool occupancy model (#chbw07b)

Utility 2	Utility 3	Utility 4+	Variable name	Alogit coeff name	Coeff.	T-stat
x	x	x	Operating cost	opcost	-0.01388	(-3.0)
x	x	x	Parking cost	pkcost	-0.04190	(-7.0)
x	x	x	Toll	toll	-0.05371	(-1.7)
	x	x	Time saved by HOV3+ relat. to HOV2	timsav	0.05001	(5.9)
	x		1-vehicle HH dummy	Oc31vdum	-1.45273	(-10.0)
	x		2+vehicle HH dummy	Oc32vdum	-1.87733	(-16.0)
		x	1-vehicle HH dummy	Oc41vdum	-3.03413	(-12.2)
		x	2+vehicle HH dummy	Oc42vdum	-2.56171	(-14.5)
			No. of obs.		1,317	
			LL(0)		-1,447	
			Max. LL		-1,028	
			Rho-sq wrt zero		0.2897	
			Rho-sq wrt consts		0.0663	

Ref: v2tppMcEstRes4.xls

Exhibit 6-16 HBS carpool occupancy model (#chbs08)

Utility 2	Utility 3	Utility 4+	Variable name	Alogit coeff name	Coeff.	T-stat
x	x	x	IVTT	IVTT	-0.45633	(-2.1)
	x		1-vehicle HH dummy	Oc31vdum	-0.92201	(-3.5)
	x		2+vehicle HH dummy	Oc32vdum	-0.48966	(-2.1)
		x	1-vehicle HH dummy	Oc41vdum	-1.51854	(-3.1)
		x	2+vehicle HH dummy	Oc42vdum	-0.84071	(-1.9)
			No. of obs.		1,503	
			LL(0)		-1,651	
			Max. LL		-1,263	
			Rho-sq wrt zero		0.2349	
			Rho-sq wrt consts		0.0073	

Ref: v2tppMcEstRes4.xls

Exhibit 6-17 HBO carpool occupancy model (#chbo08)

Utility 2	Utility 3	Utility 4+	Variable name	Alogit coeff name	Coeff.	T-stat
x	x	x	IVTT	IVTT	-0.68530	(-16.4)
	x		1-vehicle HH dummy	Oc31vdum	-0.31756	(-4.1)
	x		2+vehicle HH dummy	Oc32vdum	-0.15151	(-2.8)
		x	2+vehicle HH dummy	Oc42vdum	0.21854	(2.4)
			No. of obs.		5,848	
			LL(0)		-6,425	
			Max. LL		-5,644	
			Rho-sq wrt zero		0.1214	
			Rho-sq wrt consts		0.0001	

Ref: v2tppMcEstRes4.xls

Exhibit 6-18 NHB carpool occupancy model (#cnhb11)

Utility 2	Utility 3	Utility 4+	Variable name	Alogit coeff name	Coeff.	T-stat
	x		Constant	Const3oc	-0.97305	(-11.8)
		x	Constant	Const4oc	-1.42742	(-17.4)
	x	x	IVTT	IVTT	-0.00573	(-1.4)
x	x		Highway distance	hwydst	-0.00151	(-2.3)
			No. of obs.		3,225	
			LL(0)		-3,543	
			Max. LL		-2,934	
			Rho-sq wrt zero		0.1718	
			Rho-sq wrt consts		0.0009	

Ref: v2tppMcEstRes4.xls

Exhibit 6-19 Summary of the "best" main and carpool occupancy models for the Version 2.1/TP mode choice model

Best "main" mode choice models to date

Model Name	No.	Rho squ	Est VOT	Expected VOT	Est OVT/IVT	Expected OVT/IVT	Variables							
hbw main	25	0.3187	$2.78	$2.47 to $4.94	1.50	2 to 3	IVTT	OVTT	cost	veh own (6)	drv acc (2)	LU mx (2)	Mrail dum	
hbs main	10	0.2566	$1.72	$0.62 to $2.47	n/a		time		cost	veh own (6)		LU mx (3)	Mrail dum	
hbo main	10	0.2198	$0.63	$0.62 to $2.47	n/a		time		ln(cost)	veh own (6)		LU mx (4)	Mrail dum	shshwlk
nhb main	11	0.1803	$0.84	$0.62 to $2.47	n/a		time		ln(cost)	consts (2)		LU mx (3)	Mrail dum	shshwlk

Best "carpool occupancy" models to date

Model Name	No.	Rho squ	Variables						
hbw cpoc	07b	0.2897			opcost	parkcost	toll	timesaved	veh own (4)
hbs cpoc	08	0.2349		IVTT					veh own (4)
hbo cpoc	08	0.1214		IVTT					veh own (3)
nhb cpoc	11	0.1718	const(2)	IVTT	hwydist				

Ref: v2tppMcEstRes4.xls

6.3 Model Adjustment Procedures

The output of the disaggregate estimation process is four mode choice models, each comprised of two multinomial logit models. Each of the four models is a *disaggregate* model, based on person-trip-level data. In application, the models will be applied at an *aggregate* (zone interchange) level. Then, results are usually summed to the jurisdiction interchange level, which is also the typical level for presenting mode choice model output. To ensure that each of the four models is able to adequately match observed data at the jurisdiction level, each model usually needs to be adjusted, and this was the case with the four MC models. This adjustment process is sometimes referred to as a calibration.

There are two phases to the mode choice model adjustment process. The first phase, known as "system-wide adjustments," involves adjusting some or all of the constant terms and dummy variables in the mode choice utility equations. The second phase, known as "jurisdiction-level adjustments" or "superdistrict-level adjustments," involves adjusting a 20-by-20 matrix of transit percent adjustment factors (TPAFs) and a 20-by-20 matrix of car occupancy adjustment factors (COAFs). These two adjustments are documented in technical working papers (Moran 2002.12.19; Moran 2002.12.20). The system-wide adjustments were conducted using a surveyed person trip table as the input to the mode choice process. By contrast, the superdistrict-level adjustments will make use of a simulated person trip table.

System-wide adjustments

The system-wide adjustments affect the four main models, but not the four carpool occupancy models. Specifically, the following coefficients may be adjusted:

1) Home-based purposes:
   a) Any or all of the six "auto ownership bias constants." Three of these occur in the drive alone equation (UPARMS 53-55). Three of these occur in the group ride equation (UPARMS 63-65).
   b) Any or all of the three "transit auto connect bias constants" (UPARMS 43-45 in the transit equation).
2) Non-home-based purpose:
   a) One or both of the "mode specific constants": drive-alone constant (UPARM 53) and/or group-ride constant (UPARM 63).
   b) The "transit auto connect bias constant" (UPARM 43 in the transit equation).

The final set of adjusted mode choice models is shown in Exhibit 6-20 through Exhibit 6-23. The COG mode choice model is applied using the Fortran program COGMC.EXE (Allen 1999). In order to run this program, one must develop a "setup" file, which is a text file containing key inputs, such as the coefficient values. The coefficient values are stored in the setup file using "user parameters" or UPARMS, which are numbered 1 to 100. Exhibit 6-20 through Exhibit 6-23 indicate the UPARMS number or variable where each coefficient value should be stored. For example, the estimated coefficient value for IVTT is stored in UPARMS 34, 35, 42, 47, 48, 57, and 58 for the HBW mode choice model.

The adjusted HBW mode choice model is shown in Exhibit 6-20. For this model, all six of the auto ownership bias constants were adjusted from their estimated values. Consequently, the corresponding t-stat. values have been erased from the table, since they are no longer applicable. Similarly, the two transit auto connect bias constants that were estimated have been adjusted and a third transit auto connect bias constant was added. In a similar manner, these same nine constants were adjusted in the HBS and HBO models also (see Exhibit 6-21 and Exhibit 6-22). As for the NHB mode choice model, the utility function includes fewer terms -- only three were adjusted: DA constant, GR constant, and the single transit auto connect bias constant.

Exhibit 6-20 Final adjusted HBW mode choice model (both main model and carpool occupancy model)

Utility				Alogit			UPARMS
TR	DA	GR	Variable name	coeff name	Coeff.	T-stat	No.
x	x	x	IVTT	IVTT	-0.03556	(-10.4)	34,35,42,47,48,57,58
x			OVTT	OVTT	-0.05319	(-7.3)	31-33
x	x	x	Cost	Cost	-0.00766	(-11.9)	40,49-51,59-61
	x		0-veh HH dummy	ve0dumda	-3.87870		53
	x		1-veh HH dummy	ve1dumda	0.13870		54
	x		2+veh HH dummy	ve2dumda	1.11380		55
		x	0-veh HH dummy	ve0dumgr	-3.64700		63
		x	1-veh HH dummy	ve1dumgr	-1.36540		64
		x	2+veh HH dummy	ve2dumgr	-0.86980		65
x*			0-veh HH & drv acc dummy		-2.44550		43
x*			1-veh HH & drv acc dummy	ve1autacc	-0.47660		44
x*			2+veh HH & drv acc dummy	ve2autacc	-0.19470		45
x			Land-use mix index, prod end	LUmixiTR	1.390E-05	(1.3)	46
	x		Land-use mix index, attr end	LUmixjDA	-1.825E-05	(-3.6)	37
x			Metrorail use dummy	metrodum	0.85678	(8.1)	99
			Value of time**		$2.78		
			OVTT / IVTT		1.50		
			No. of obs.		5,778		
			LL(0)		-5,892		
			Max. LL		-4,014		
			Rho-sq wrt zero		0.3187		
			Rho-sq wrt consts		0.1870		

Utility				Alogit			UPARMS
2	3	4+	Variable name	coeff name	Coeff.	T-stat	No.
x	x	x	Operating cost	opcost	-0.01388	(-3.0)	69,75,85
x	x	x	Parking cost	pkcost	-0.04190	(-7.0)	70,76,86
x	x	x	Toll	toll	-0.05371	(-1.7)	71,77,87
	x	x	Time saved by HOV3+ relat. to HO\	timsav	0.05001	(5.9)	98
	x		1-vehicle HH dummy	Oc31vdum	-1.45273	(-10.0)	80
	x		2+vehicle HH dummy	Oc32vdum	-1.87733	(-16.0)	81
		x	1-vehicle HH dummy	Oc41vdum	-3.03413	(-12.2)	90
		x	2+vehicle HH dummy	Oc42vdum	-2.56171	(-14.5)	91
			No. of obs.		1,317		
			LL(0)		-1,447		
			Max. LL		-1,028		
			Rho-sq wrt zero		0.2897		
			Rho-sq wrt consts		0.0663		

Ref: adj_dab_mb.xls, final

Exhibit 6-21 Final adjusted HBS mode choice model (both main model and carpool occupancy model)

Utility				Alogit			UPARMS
TR	**DA**	**GR**	**Variable name**	**coeff name**	**Coeff.**	**T-stat**	No.
x	x	x	Time	Time	-0.02168	(-1.9)	31-35,42,47,48,57,58
x	x	x	Cost	Cost	-0.00758	(-3.7)	40,49-51,59-61
	x		0-veh HH dummy	ve0dumDA	-3.75400		53
	x		1-veh HH dummy	ve1dumDA	1.76290		54
	x		2+veh HH dummy	ve2dumDA	2.99040		55
		x	0-veh HH dummy	ve0dumGR	-1.51110		63
		x	1-veh HH dummy	ve1dumGR	1.43770		64
		x	2+veh HH dummy	ve2dumGR	2.68640		65
x*			0-veh HH & drv acc dummy		-3.82700		43
x*			1-veh HH & drv acc dummy		-0.35460		44
x*			2+veh HH & drv acc dummy		0.80000		45
x			Land-use mix index, attr end	LUmixjTR	3.269E-05	(1.1)	56
	x		Land-use mix index, prod end	LUmixiDA	3.752E-05	(2.0)	36
	x		Land-use mix index, attr end	LUmixjDA	1.955E-05	(1.7)	37
x			Metrorail use dummy	metrodum	0.97516	(2.8)	99
			Value of time**		$1.72		
			No. of obs.		2,754		
			LL(0)		-2,672		
			Max. LL		-1,987		
			Rho-sq wrt zero		0.2566		
			Rho-sq wrt consts		0.0709		

Utility				Alogit			UPARMS
2	**3**	**4+**	**Variable name**	**coeff name**	**Coeff.**	**T-stat**	No.
x	x	x	IVTT	IVTT	-0.45633	(-2.1)	67,68,73,74,83,84
	x		1-vehicle HH dummy	Oc31vdum	-0.92201	(-3.5)	80
	x		2+vehicle HH dummy	Oc32vdum	-0.48966	(-2.1)	81
		x	1-vehicle HH dummy	Oc41vdum	-1.51854	(-3.1)	90
		x	2+vehicle HH dummy	Oc42vdum	-0.84071	(-1.9)	91
			No. of obs.		1,503		
			LL(0)		-1,651		
			Max. LL		-1,263		
			Rho-sq wrt zero		0.2349		
			Rho-sq wrt consts		0.0073		

Ref: adj_dab_mb.xls, final

Exhibit 6-22 Final adjusted HBO mode choice model (both main model and carpool occupancy model)

Utility				Alogit			UPARMS
TR	DA	GR	Variable name	coeff name	Coeff.	T-stat	No.
x	x	x	Time	Time	-0.02322	(-6.0)	31-35,42,47,48,57,58
x	x	x	LnCost	LnCost	-0.65329	(-10.6)	66,82
	x		0-veh HH dummy	ve0dumda	-3.37640		53
	x		1-veh HH dummy	ve1dumda	1.00580		54
	x		2+veh HH dummy	ve2dumda	1.36590		55
		x	0-veh HH dummy	ve0dumgr	-2.09080		63
		x	1-veh HH dummy	ve1dumgr	0.62360		64
		x	2+veh HH dummy	ve2dumgr	1.23120		65
x*			0-veh HH & drv acc dummy		-2.91060		43
x*			1-veh HH & drv acc dummy		-0.40000		44
x*			2+veh HH & drv acc dummy		-0.16190		45
x			Land-use mix index, prod end	LUmixiTR	3.777E-05	(2.6)	46
x			Land-use mix index, attr end	LUmixjTR	1.941E-05	(1.8)	56
	x		Land-use mix index, prod end	LUmixiDA	3.196E-05	(3.5)	36
	x		Land-use mix index, attr end	LUmixjDA	1.694E-05	(2.8)	37
x			Metrorail use dummy	fmetdum	0.88910	(6.1)	99
x			Short walk to short walk dummy	SWtoSWmkt	0.42569	(3.1)	92
			Value of time**		$0.63		
			No. of obs.		8,509		
			LL(0)		-8,210		
			Max. LL		-6,405		
			Rho-sq wrt zero		0.2198		
			Rho-sq wrt consts		0.0670		

Average cost, cents/trip, 1980 $ 29.44

Utility				Alogit			UPARMS
2	3	4+	Variable name	coeff name	Coeff.	T-stat	No.
x	x	x	IVTT	IVTT	-0.68530	(-16.4)	67,68,73,74,83,84
	x		1-vehicle HH dummy	Oc31vdum	-0.31756	(-4.1)	80
	x		2+vehicle HH dummy	Oc32vdum	-0.15151	(-2.8)	81
		x	2+vehicle HH dummy	Oc42vdum	0.21854	(2.4)	91
			No. of obs.		5,848		
			LL(0)		-6,425		
			Max. LL		-5,644		
			Rho-sq wrt zero		0.1214		
			Rho-sq wrt consts		0.0001		

Ref: adj_dab_mb.xls, final

Exhibit 6-23 Final adjusted NHB mode choice model (both main model and carpool occupancy model)

Utility TR	DA	GR	Variable name	Alogit coeff name	Coeff.	T-stat	UPARMS No.
	x		Constant	DAconst	1.74000		53
		x	Constant	GRconst	0.88000		63
x*			Drive-access transit dummy		-0.95940		43
x	x	x	Time	Time	-0.02860	(-9.3)	31-35,42,47,48,57,58
x	x	x	LnCost	LnCost	-0.76830	(-12.1)	66,82
x			Land-use mix index, attr end	TRLUmixj	2.156E-05	(2.3)	56
	x		Land-use mix index, prod end	DALUmixi	1.126E-05	(2.1)	36
	x		Land-use mix index, attr end	DALUmixj	1.304E-05	(2.1)	37
x			Metrorail use dummy	Metrodum	1.84313	(11.4)	99
x			Short walk to short walk dummy	SWtoSWmkt	0.65963	(3.3)	92
			Value of time**		$0.84		
			No. of obs.		7,853		
			LL(0)		-7,414		
			Max. LL		-6,078		
			Rho-sq wrt zero		0.1803		
			Rho-sq wrt consts		0.0578		

Average cost, cents/trip, 1980 $ 37.54

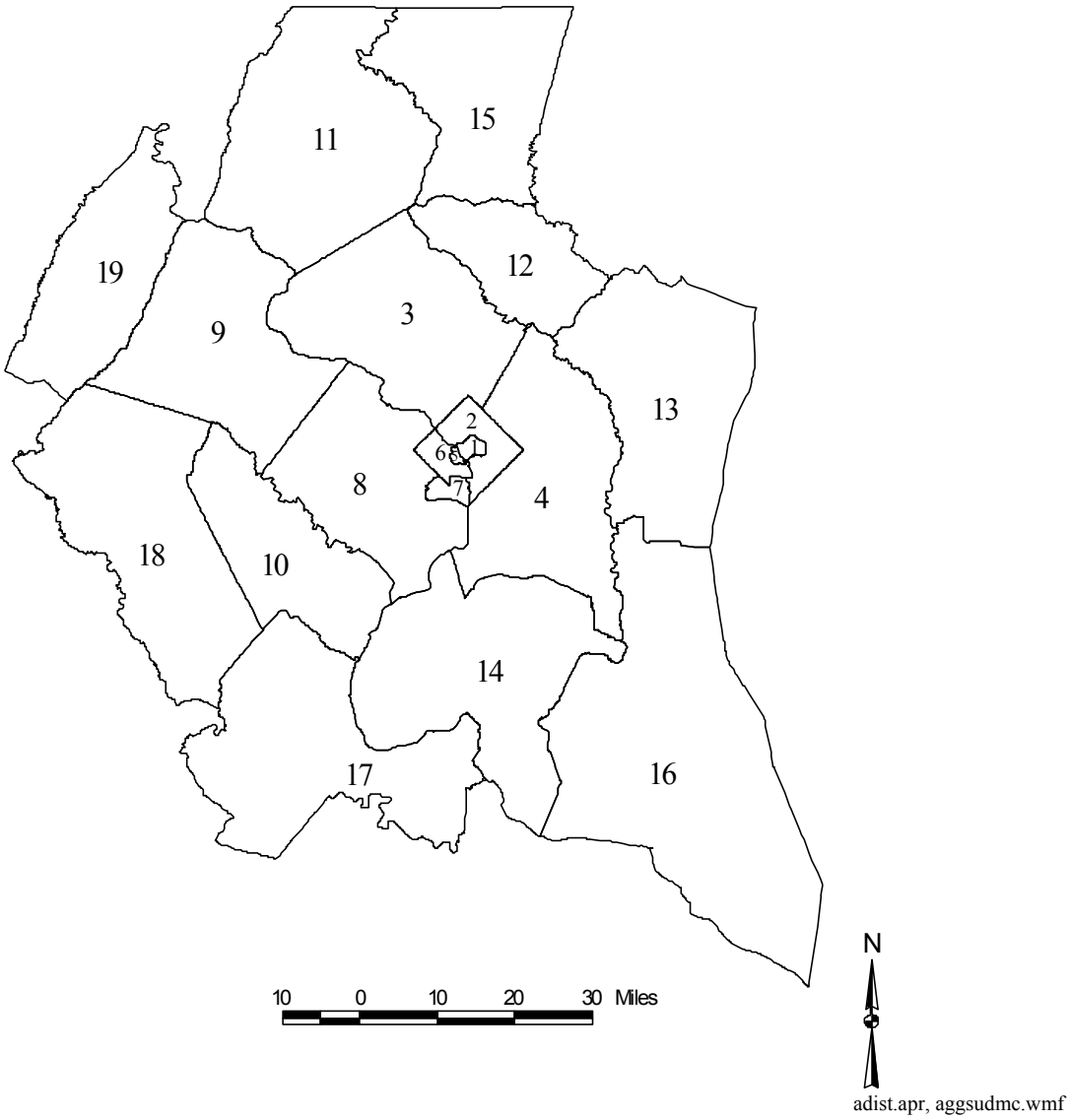
Utility 2	3	4+	Variable name	Alogit coeff name	Coeff.	T-stat	UPARMS No.
	x		Constant	Const3oc	-0.97305	(-11.8)	79
		x	Constant	Const4oc	-1.42742	(-17.4)	89
	x	x	IVTT	IVTT	-0.00573	(-1.4)	67,68,73,74,83,84
x	x		Highway distance	hwydst	-0.00151	(-2.3)	72,78
			No. of obs.		3,225		
			LL(0)		-3,543		
			Max. LL		-2,934		
			Rho-sq wrt zero		0.1718		
			Rho-sq wrt consts		0.0009		

Ref: adj_dab_mb.xls, final

Jurisdiction-level adjustments

The Fortran program used to apply the COG mode choice model, COGMC.EXE, permits the use of two sets of jurisdiction-to-jurisdiction-level adjustment factors. The first type of factors are called "transit percent adjustment factors," or TPAFs. The second type of factors are called "car occupancy adjustment factors," or COAFs. The area system used for both the factor files is the same and is shown in Exhibit 6-24.

Exhibit 6-24 Area system (superdistricts) used for transit percent adjustment factors (TPAFs) and car occupancy adjustment factors (COAFs)



The area system consists of up to 20 superdistricts covering the expanded-cordon modeled area. In the current system, only 19 of the 20 superdistricts are used. Each superdistrict corresponds

roughly to a jurisdiction. For example, superdistrict number 8 corresponds to Fairfax County. In some cases a superdistrict represents only part of a jurisdiction. For example, superdistrict number 5 covers the Arlington County core. In other cases, a superdistrict may cover two or more jurisdictions. For example, superdistricts 16 and 19 each include two jurisdictions, and superdistrict 17 includes four Virginia jurisdictions: Stafford Co., King George Co., Fredericksburg, and the northern half of Spotsylvania County which lies within the expanded cordon. [3]

Initially, both the TPAF and COAF files consist of a 20 x 20 ASCII matrix of ones (1.0000). These values can then be adjusted up or down to ensure that the estimated trips by mode coming from the mode choice model match the observed trips by mode at the jurisdiction-to-jurisdiction level. It is often necessary to use an iterative process to find the right values. Details relating to the process used to calculate the TPAF and COAF values can be found in various internal documents (Moran 2002.12.20; Milone 1999.02.25; Milone 1999.03.22).

The final set of TPAFs and COAFs is shown in Appendix E.

6.4 Model Application and Performance in Base Year

Running the Model

The four mode choice models are applied using the COG mode choice model application program (COGMC.EXE). This Fortran program was written in 1986 by Barton Aschman Associates (BAA) and has been updated numerous times since. Changes may be made to the program either through user-defined parameters, known as UPARMS, or by making changes to the Fortran code. The application program was updated as part of the Version 1 model development work (April 30, 1998 version). The model has also been updated again by a consultant and COG staff and the latest version is dated April 6, 2001 (Allen 1999). Note that, in this latest version of the mode choice model application program, there are no default values of the UPARMs. Consequently, the user must explicitly set all UPARM values in the control setup. The UPARM values corresponding to the four Version 2.1/TP+ mode choice models are listed in Appendix F.

Performance Summaries

The performance results for the mode choice model are comprised of estimated and observed summaries for: 1) transit trips, 2) percent transit, and 3) auto occupancies. Results are presented at both the regional and jurisdictional levels. COG staff developed observed transit trip figures for the entire expanded cordon area using available surveys, such as the 1994 HTS and Baltimore's 1993 HTS, and boarding information from the primary operators in the region. A summary of the estimated and observed transit trips for the entire study area is shown in Exhibit 6-25 and Exhibit 6-26.

[3] In the past, the TPAFs and COAFs each had their own superdistrict boundaries. More recently, the boundaries were changed slightly so that both would share the same area system.

Exhibit 6-25 1994 estimated and observed transit trips, "Unscreened"

Purpose	Est	Obs	Diff. (Est-Obs)	Ratio (Est/Obs)
HBW	476,562	476,499	63	1.00
HBS	32,865	28,530	4,335	1.15
HBO	153,392	141,825	11,567	1.08
NHB	128,578	118,367	10,211	1.09
Total	791,397	765,221	26,176	1.03

Exhibit 6-26 1994 estimated and observed transit trips, "Screened"

Purpose	Est	Obs	Diff. (Est-Obs)	Ratio (Est/Obs)
HBW	452,478	457,306	-4,828	0.99
HBS	26,353	27,825	-1,472	0.95
HBO	134,790	139,367	-4,577	0.97
NHB	119,257	117,963	1,294	1.01
Total	732,878	742,461	-9,583	0.99

Ref: mcsum23_1994_estpsn.xls

*Note about missing observed data and data "screening":

Due to limitations in survey data, it was not possible to obtain observed auto travel for some of the exurban counties in the study area. In particular, the following jurisdiction-level auto person flows were unavailable:
1. For home-based travel: a) external trips, both IX and XI; b) trips FROM the following jurisdictions: St. Mary's, Clarke, Jefferson, Spotsylvania, Fredericksburg, or King George.
2. For non-home-based travel: a) external trips, both IX and XI; b) trips FROM the following jurisdictions: Carroll, Howard, Anne Arundel, St. Mary's, Clarke, Jefferson, Spotsylvania, Fredericksburg, or King George; c) trips TO the following jurisdictions: Carroll, Howard, and Anne Arundel.

These zero-valued cells have been "grayed out" in 23-by-23 tables to indicate the absence of data. To ensure comparability across 23-by-23 trip tables, the corresponding cells in the observed transit trip table have also been set to zero and "grayed out." The process of setting the values of cells in one table to zero based on zero values of corresponding cells in another table is called "screening." Thus, the observed 23-by-23 transit trip table was "screened" by the observed 23-by-23 auto person trip table. In addition, all estimated 23-by-23 trip tables were "screened" by their corresponding observed trip tables. Note that the screening of the estimated data involved one additional level of screening: Any zero-valued cell in an observed 23-by-23 trip table triggered a screening (zeroing out) of the corresponding cell in the estimated 23-by-23 trip table. Such a screening process makes all of the tables comparable and permits valid comparisons. Data that has not undergone this screening process is called "unscreened."

Developing observed auto travel for the entire study area was not possible due to limitations in the information available, particularly in exurban areas. However, the observed auto data that was available for the major jurisdictions was combined with observed transit information and used to develop transit percentages and car occupancy rates to the fullest possible extent. Finally, the simulated person trips used as an input to the mode choice model include some trip generation adjustments (particularly for non-work purposes), which were deemed necessary in order to more accurately match observed total VMT targets. The observed data does not reflect any trip generation adjustments. The estimated and observed totals for transit trips, transit percentages, and automobile occupancies corresponding to the area within the expanded cordon, where 'full' observed information was available, are shown in Exhibit 6-27.

Exhibit 6-27 1994 estimated and observed transit trips, percent transit, and ave. vehicle occupancy, "Screened"

		Est	Obs	Diff. (Est-Obs)	Ratio (Est/Obs)
HBW	Transit person trips	452,478	457,306	-4,828	0.99
	Percent transit	16.94%	17.12%	-0.18%	0.99
	Ave. veh. occupancy	1.12	1.12	0.00	1.00
HBS	Transit person trips	26,353	27,825	-1,472	0.95
	Percent transit	1.21%	1.28%	-0.07%	0.95
	Ave. veh. occupancy	1.24	1.23	0.01	1.01
HBO	Transit person trips	134,790	139,367	-4,577	0.97
	Percent transit	2.07%	2.14%	-0.07%	0.97
	Ave. veh. occupancy	1.44	1.44	-0.01	0.99
NHB	Transit person trips	119,257	117,963	1,294	1.01
	Percent transit	2.51%	2.48%	0.03%	1.01
	Ave. veh. occupancy	1.26	1.25	0.01	1.00
Total	Transit person trips	732,878	742,461	-9,583	0.99
	Percent transit	4.55%	4.61%	-0.06%	0.99
	Ave. veh. occupancy	1.30	1.30	0.00	1.00

Note: In the above table, percent transit = (obs transit person trips) / (est total person trips)
This was done because the final adjustments to the mode choice model were made using an *estimated* total person trip table.

Ref: mcsum23_1994_estpsn.xls

*Note about missing observed data and data "screening":

Due to limitations in survey data, it was not possible to obtain observed auto travel for some of the exurban counties in the study area. In particular, the following jurisdiction-level auto person flows were unavailable:
1. For home-based travel: a) external trips, both IX and XI; b) trips FROM the following jurisdictions: St. Mary's, Clarke, Jefferson, Spotsylvania, Fredericksburg, or King George.
2. For non-home-based travel: a) external trips, both IX and XI; b) trips FROM the following jurisdictions: Carroll, Howard, Anne Arundel, St. Mary's, Clarke, Jefferson, Spotsylvania, Fredericksburg, or King George; c) trips TO the following jurisdictions: Carroll, Howard, and Anne Arundel.

These zero-valued cells have been "grayed out" in 23-by-23 tables to indicate the absence of data. To ensure comparability across 23-by-23 trip tables, the corresponding cells in the observed transit trip table have also been set to zero and "grayed out." The process of setting the values of cells in one table to zero based on zero values of corresponding cells in another table is called "screening." Thus, the observed 23-by-23 transit trip table was "screened" by the observed 23-by-23 auto person trip table. In addition, all estimated 23-by-23 trip tables were "screened" by their corresponding observed trip tables. Note that the screening of the estimated data involved one additional level of screening: Any zero-valued cell in an observed 23-by-23 trip table triggered a screening (zeroing out) of the corresponding cell in the estimated 23-by-23 trip table. Such a screening process makes all of the tables comparable and permits valid comparisons. Data that has not undergone this screening process is called "unscreened."

The above represents the control totals for the jurisdiction-to-jurisdiction level summaries that appear in Appendix C. File format descriptions of the calibration data used in the model estimation work are shown in Appendix D. The final aggregate adjustment factors used in the mode choice model are shown in Appendix E.

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Chapter 7. Time-of-Day Model

The Version 2.1/TP+ time-of-day model is used to apportion daily vehicle trips among three time modeled periods, prior to the traffic assignment step. Peak-hour factors corresponding to the three time periods are also required to support the traffic assignment process. This chapter presents the details of the model and the development of the peaking factors.

7.1 Model Structure

The Version 2.1/TP+ model addresses the temporal dimension of travel subsequent to the mode choice step. The time of day model functions to convert daily trips by purpose and mode to specific time periods, in preparation for the traffic assignment step. The modeled time periods are defined as the AM peak period (6-9AM), PM peak period (4-7PM) and the off-peak period (all remaining hours).

The conversion of daily trips for the residential trip purposes (HBW, HBS, HBO, and NHB) are made with the application of temporal factors that have been developed directly from the HTS. The factors, shown as Exhibit 7.1, have been developed from detailed trips-in-motion summaries. The factors are applied on the basis of purpose, mode, and direction of the trip, with respect to the home-end of the trip. The underlying temporal travel distributions for transit, driver alone, carpool modes are depicted on Exhibits 7.2, 7.3, and 7.4, respectively. The exhibits also display the trip purpose composition over the day.

The truck and various non-modeled auto driver travel markets are also converted from daily trip tables to the three time periods using a system of temporal factors. The factors are summarized on the table below.

Version 2.1/TP+ Temporal Factors (Percentages)
For Truck and Non-Modeled Travel Markets

Time Period	Travel Market							
	XX Truck	Medium Truck	Heavy Truck	XX Auto Dr	Taxi Auto Dr	Tourist Auto Dr	School Auto Dr	Airport Auto Dr
AM	23.00	19.50	15.40	18.00	9.00	33.00	33.00	10.00
PM	11.00	15.20	13.00	22.00	27.00	33.00	33.00	10.00
Off-Pk	66.00	63.30	71.60	60.00	64.00	34.00	34.00	80.00

The temporal medium and heavy truck factors above were derived from the most recent Federal guidance on freight modeling[1]. The through (XX) truck factors where developed from the 1996 COG Truck External Survey. The remaining temporal factors were based on professional judgement.

[1] Quick Response Freight Manual, TMIP, Sept. 1996, (pg 4-38)

In application these factors are assumed to remain constant over time. Although it is reasonable to expect, that congestion will encourage traffic spreading from the AM and PM periods to the off-peak, the peak spreading phenomenon is not well understood in the profession. Instead of addressing this issue in the regional model, MWCOG expects to account for peak spreading in its air quality post processor.

Another important temporal parameter in the traffic assignment process is the peaking factor, which is the proportion of traffic in a given time period which occurs in the peak hour. Link speeds are a function of the Volume-to-Capacity (V/C) ratio. The peaking factor is necessary for converting hourly lane capacities into 'period lane capacities', from which V/C ratios are computed. The Version 2.1 /TP+ model requires peaking factors for the AM, PM, and Off-peak time periods. To arrive at regionally appropriate peaking factors, an analysis of total auto driver trips from the HTS was summarized to the modeled time periods. The maximum hourly volume occurring within each time period was then determined. The resulting peaking factors are shown below.

Peak Hour Factors (Percentages)

AM Period (6:00-9:00AM):	40%
PM Period (4:00-7:00PM):	37%
Off-Peak (All Other Hours):	12%

Exhibit 7-1 Observed Travel Distributions during Peak and Non-Peak Time Periods by purpose, Mode, and Direction

(Source: 1994 COG/TPB Household Travel Survey)

		Home to Non-Home Direction				Non-Home to Home Direction			
Purpose	**Mode**	**AM Pk Prd. 6-9AM**	**PM Pk. Prd. 4-7PM**	**Non-Pk. Prd.**	**Total**	**AM Pk Prd. 6-9AM**	**PM Pk. Prd. 4-7PM**	**Non-Pk. Prd.**	**Total**
HBW	Transit	71%	5%	25%	100%	1%	72%	27%	100%
	Auto Driver	68%	3%	30%	100%	1%	63%	35%	100%
	Auto Passenger	74%	4%	23%	100%	1%	69%	30%	100%
	Auto Person	69%	3%	29%	100%	1%	64%	35%	100%
	Drive Alone	66%	3%	31%	100%	2%	61%	37%	100%
	Carpool Person	75%	3%	22%	100%	1%	72%	27%	100%
	Motorized Person	69%	3%	28%	100%	1%	66%	33%	100%
HBS	Transit	24%	15%	62%	100%	2%	35%	64%	100%
	Auto Driver	11%	21%	69%	100%	2%	32%	67%	100%
	Auto Passenger	5%	28%	68%	100%	0%	32%	67%	100%
	Auto Person	9%	22%	69%	100%	2%	32%	67%	100%
	Drive Alone	13%	18%	69%	100%	2%	32%	66%	100%
	Carpool Person	6%	27%	68%	100%	1%	31%	68%	100%
	Motorized Person	10%	22%	69%	100%	2%	31%	67%	100%
HBO	Transit	38%	13%	49%	100%	2%	35%	63%	100%
	Auto Driver	24%	21%	54%	100%	5%	29%	67%	100%
	Auto Passenger	31%	28%	41%	100%	1%	30%	69%	100%
	Auto Person	27%	23%	50%	100%	4%	29%	67%	100%
	Drive Alone	23%	19%	58%	100%	7%	26%	68%	100%
	Carpool Person	29%	27%	45%	100%	2%	32%	67%	100%
	Motorized Person	34%	21%	46%	100%	3%	28%	69%	100%
NHB	Transit	14%	31%	55%	100%	14%	31%	55%	100%
	Auto Driver	9%	27%	65%	100%	9%	27%	65%	100%
	Auto Passenger	8%	27%	65%	100%	8%	27%	65%	100%
	Auto Person	8%	27%	65%	100%	8%	27%	65%	100%
	Drive Alone	9%	26%	65%	100%	9%	26%	65%	100%
	Carpool Person	7%	28%	65%	100%	7%	28%	65%	100%
	Motorized Person	9%	25%	66%	100%	9%	25%	66%	100%

Note: The distributions shown are based on time-in-motion summaries.

Exhibit 7.2

Time of Day Distribution

Mode: Transit

Source: 1994 HTS

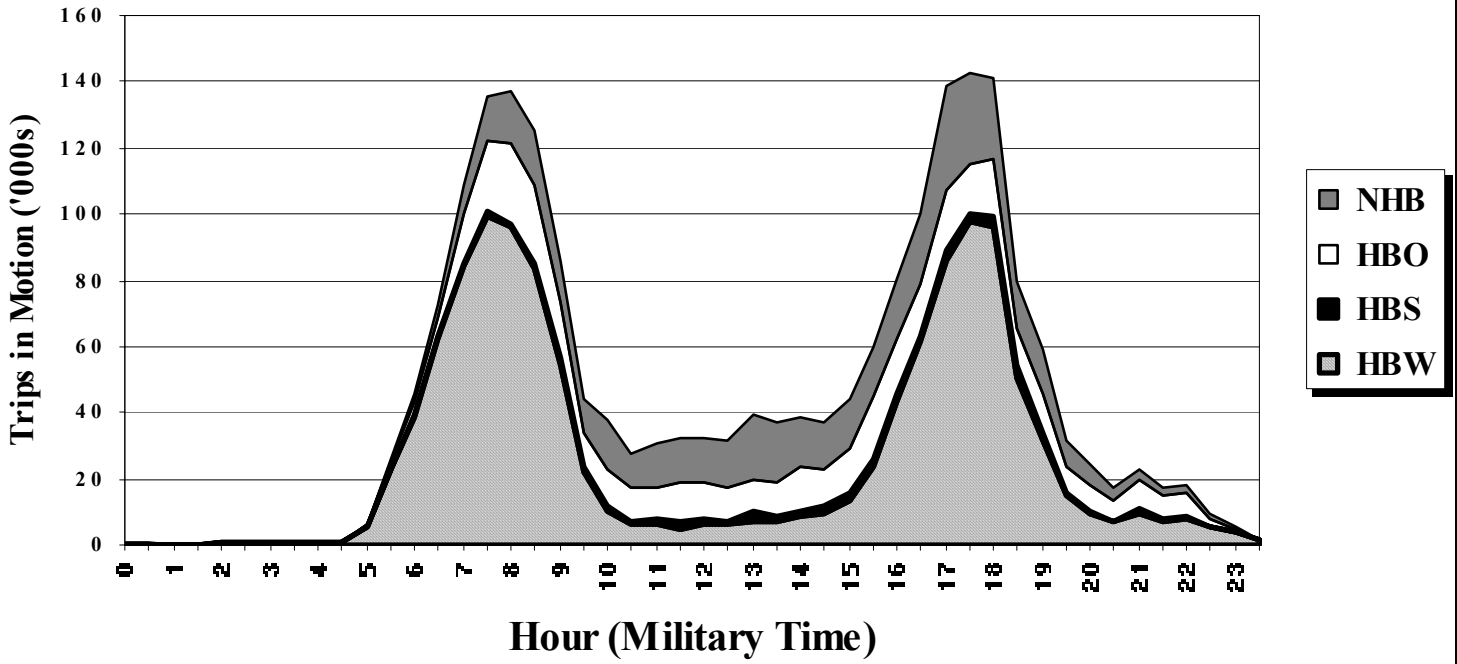


Exhibit 7.3

Time of Day Distribution

Mode: Drive Alone

Source: 1994 HTS

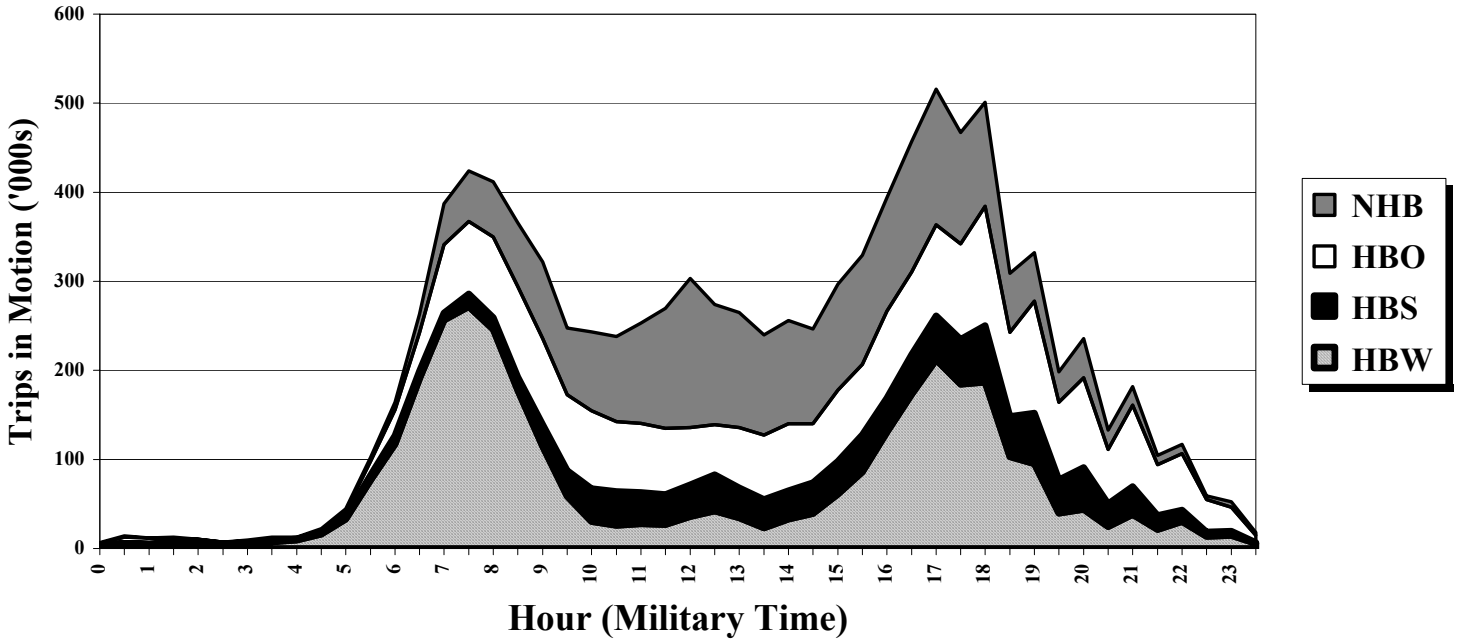
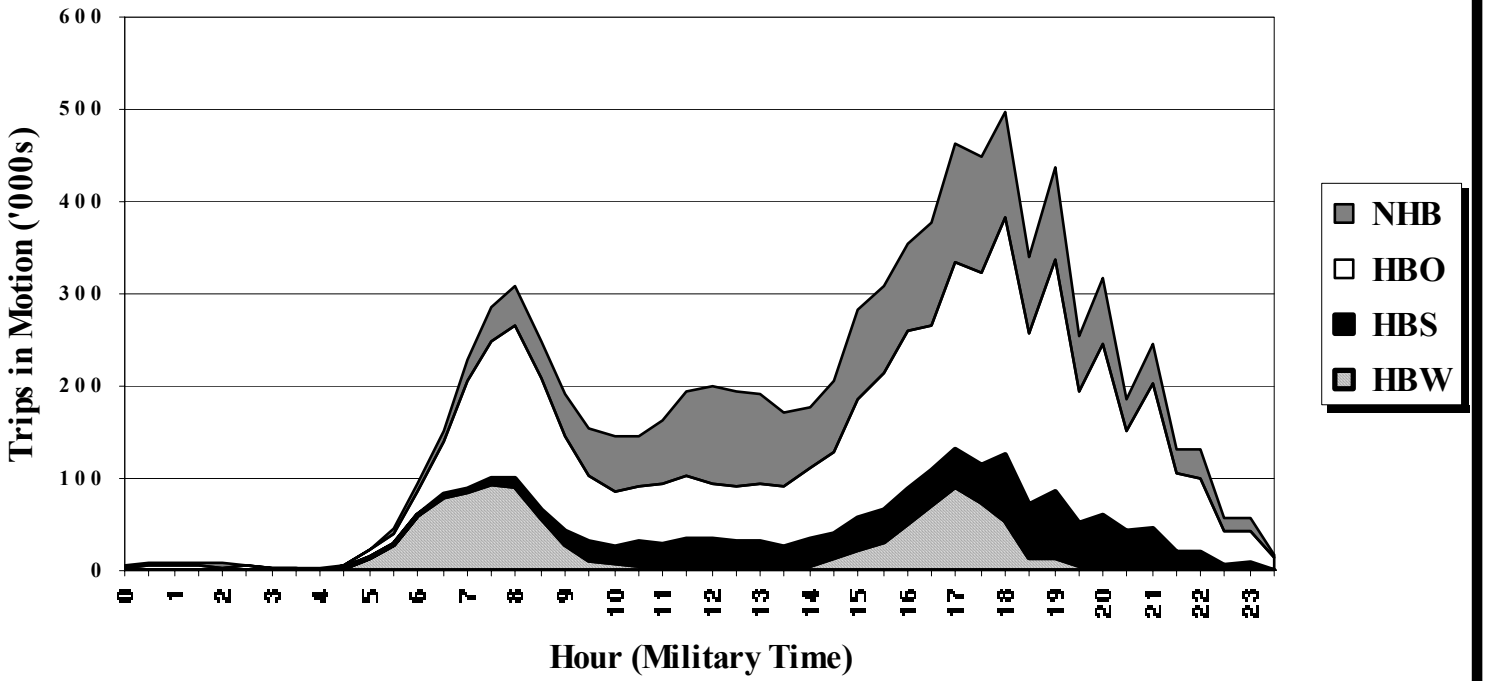


Exhibit 7.4

Time of Day Distribution
Mode: Car Pool

Source: 1994 HTS



Chapter 8. Traffic Assignment / Feedback

The traffic assignment step is used to distribute vehicles between zonal interchanges among specific highway routes. The process culminates in the estimation of network link volumes, which, in turn, enable the estimation of highway link speeds. The traffic assignment process of the Version 2.1/TP+ model is detailed in this chapter.

8.1 Model Structure

The traffic assignment step is executed four times during a given model run, corresponding to the "pump prime," "base," "first," and "second" iterations. The process involves running three individual loadings for the three time periods (AM, PM, and off-peak periods). The trips loaded in each time period are comprised of *all* purposes, as allocated by the time-of-day model. Each individual assignment run utilizes an equilibrium algorithm that is run for 10 iterations. The algorithm used in the equilibrium approach serves to minimize the delay of all trips with each iteration. An important component of the equilibrium assignment process is the Volume Delay Function (or VDF). VDFs are used to calculate the ratio of congested travel time to the free-flow time as a function of the Volume-to-Capacity (V/C) ratio. The function typically varies by facility type. Another important property of the function is that the capacity definition is Level-of-Service (LOS) 'E'. The Version 2.1/TP+ assumptions for capacities and free flow speeds are shown on the tables on the next page.

The MINUTP-based Version 2.0/TP+ model developed previously utilized predetermined VDF functions that had been suggested by Parsons Brinckerhoff. The Version 2.1/TP+ model maintained the same family of functions with one exception. The freeway VDF was recently updated based on observed data obtained via freeway photography[1]. The Version 2.1/TP+ VDFs are shown as Exhibit 8-1.

Each assignment pass involves the loading of five separate trip tables: 1) SOV, 2) HOV 2-occupants, 3) HOV-3+occupants, 4) trucks, and 5) airport passenger vehicles. As explained earlier in this report, a successive volume averaging procedure occurs after the first and second iteration assignments. The averaging process occurs at the link level, for each time period. The 'final' first iteration volume is set to the average of the base and first iteration assignments. The 'final' second iteration assignment is set to 2/3 the final first iteration volume plus 1/3 of the second iteration volume.

The feedback process involves re-running trip distribution using the traffic assignment highway skims from the previous iteration. The Version 2.1/TP+ model feeds back off peak highway skims into the non-work trip distribution models and feeds back AM peak highway skims into the work trip distribution models.

[1] Traffic Quality on the Metropolitan Washington Area Freeway System, MWCOG, Spring 1999 (Appendix B).

Version 2.1/TP+ Freeflow Speed (mph) Table

Area Type	Facility Type					
	Centroids (FT=0)	Freeway (FT=1)	Major Art. (FT=2)	Minor Art. (FT=3)	Collector (FT=4)	Expressway (FT=5)
1	15	65	35	30	25	60
2	15	65	40	35	35	60
3	20	70	40	35	35	65
4	25	70	45	40	35	65
5	30	70	50	40	40	65
6	30	70	50	45	40	65
7	35	70	50	45	40	65

Version 2.1/TP+ LOS 'E' Capacity (veh/lane/hr) Table

Area Type	Facility Type					
	Centroids (FT=0)	Freeway (FT=1)	Major Art. (FT=2)	Minor Art. (FT=3)	Collector (FT=4)	Expressway (FT=5)
1	3,150	1,500	800	400	300	900
2	3,150	1,600	900	500	400	1,000
3	3,150	2,000	1,000	700	500	1,000
4	3,150	2,000	1,200	800	700	1,200
5	3,150	2,100	1,500	900	700	1,500
6	3,150	2,100	1,500	900	700	1,500
7	3,150	2,200	1,500	1,000	800	1,500

In recent months COG staff undertook a series of 'tests' involving the traffic assignment of observed HTS-based auto driver trip tables to the highway network, along with 'off-the-shelf' residual trip tables. The tests indicated that the loading of the 'raw' observed trips resulted in a 19% underestimation of observed VMT. This finding is typical, and usually attributed to the underreporting of short non-work trips by respondents in the travel survey. Further highway assignment tests indicated that by increasing the observed non-work auto drivers by 50%, the resulting VMT would more accurately match the regional observed target. Based on this finding, the Version 2.1/TP+ non-work trip generation process ultimately applied a factor of 1.50 to the internal non-work trip productions, so that regional VMT estimates would match observed figures more closely.

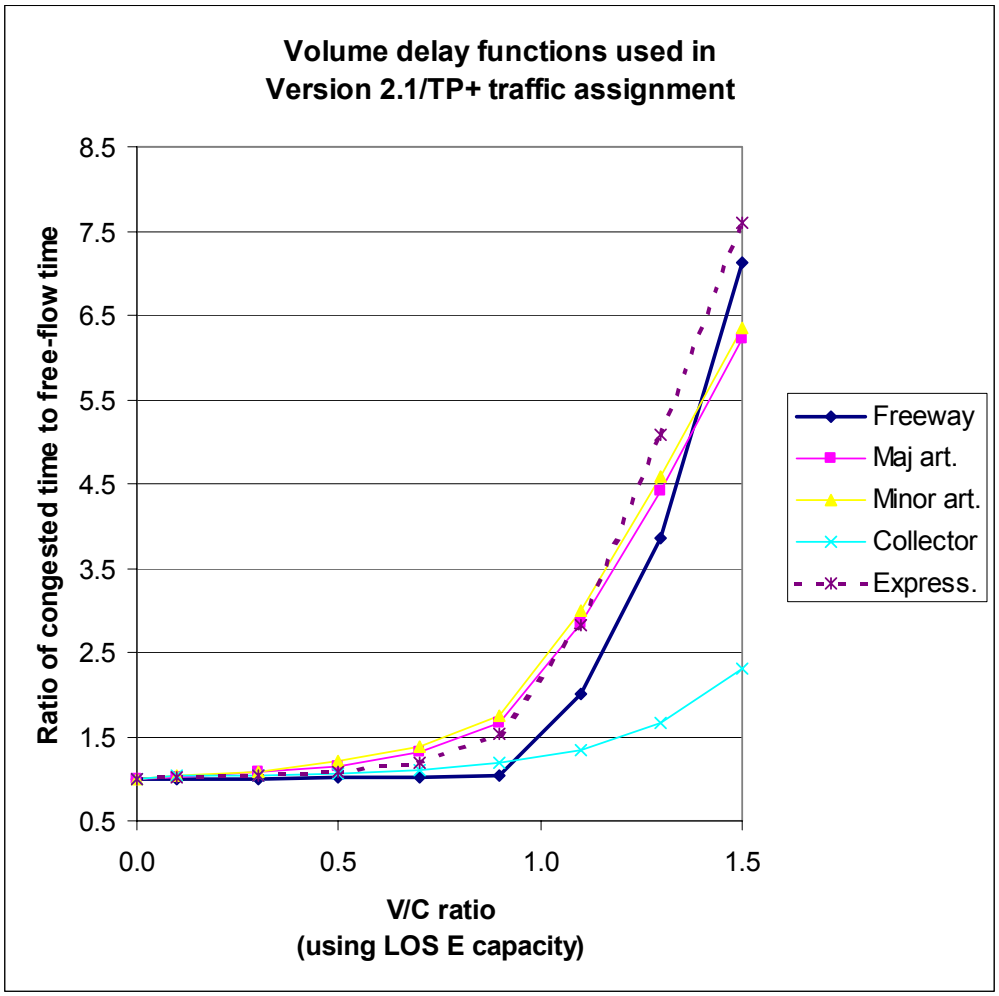
The final performance results of the assignment process are shown as Exhibit 8-2, Exhibit 8-3, and Exhibit 8-4, which include estimated / observed VMT, and screenline crossings summaries, and an RMSE summary. Screenline location maps are shown as Exhibit 8-5 and Exhibit 8-6. The VMT summary indicates the simulation is about 6% higher than the observed data (observed counts exist for about 77 percent of all highway links). The estimated VMT in the District of Columbia is substantially higher than the observed figure, by 20%. The overestimation of VMT is consistent with previous findings. Previous attempts at correcting the over estimation of VMT in the District of Columbia (by modifying trip generation rates) have ultimately proved to be counterproductive. While the VMT performance is admittedly not ideal, staff has concluded that the present model is optimal when taking into account other important performance measures (e.g., the match between

estimated and observed household travel survey patterns by purpose and mode, and the reasonability of restrained highway speeds that are produced over time).

Exhibit 8-1 Volume Delay Functions used for Version 2.1/TP+ Traffic Assignment: Ratio of congested travel time to free-flow travel time

	Ratio of congested travel time to free-flow travel time				
V/C ratio	Freeway	Maj art.	Minor art.	Collector	Express.
0.0	1.000	1.000	1.000	1.000	1.000
0.1	1.000	1.020	1.030	1.030	1.010
0.3	1.003	1.070	1.090	1.040	1.040
0.5	1.007	1.150	1.200	1.060	1.090
0.7	1.014	1.310	1.390	1.100	1.190
0.9	1.040	1.670	1.740	1.180	1.530
1.1	1.998	2.840	3.000	1.340	2.830
1.3	3.851	4.420	4.580	1.660	5.090
1.5	7.129	6.220	6.350	2.300	7.590

Source: highway_assignment.s



Ref: hassamf2.xls

Exhibit 8-2 1994 Estimated and Observed VMT (in thousands) by Jurisdiction

Jurisdiction	Estimated	Observed	Est/Obs Ratio
District of Columbia	9,426	7,875	1.20
Montgomery	19,506	17,129	1.14
Prince George's	20,784	20,333	1.02
Arlington	4,304	4,124	1.04
Alexandria	2,103	2,072	1.01
Fairfax	24,158	22,979	1.05
Loudoun	2,581	2,902	0.89
Prince William	5,974	6,221	0.96
Frederick	6,072	4,879	1.24
COG Member Jurisdictions Subtotal:	*94,908*	*88,514*	*1.07*
Howard	8,536	6,990	1.22
Anne Arundel	8,556	8,580	1.00
Charles	1,832	2,007	0.91
1,478 Zone Cordon Subtotal	*113,832*	*106,091*	*1.07*
Carroll	2,456	2,167	1.13
Calvert	1,245	1,280	0.97
St. Mary's	1,083	1,166	0.93
King George	630	559	1.13
Fredericksburg	496	663	0.75
Stafford	3,080	2,935	1.05
Spotsylvania	1,334	1,940	0.69
Fauquier	1,987	2,104	0.94
Clarke	575	492	1.17
Jefferson	961	601	1.60
Outer Counties Subtotal	*13,847*	*13,907*	*1.00*
Expanded Cordon Total	**127,679**	**119,998**	**1.06**

	MSA Summary		
	Estimated	**Observed**	**Est/Obs Ratio**
DC	**9,426**	**7,875**	**1.20**
MD	**49,439**	**45,628**	**1.08**
VA	**42,200**	**41,233**	**1.02**
Total MSA	**101,065**	**94,736**	**1.07**

The table reflects highway links with coded ground counts.
Source: i2_highway_assignment.rpt (12/19/02)

Exhibit 8-3 1994 Estimated and Observed Screenline Volumes (in thousands)

Screenline No.	Screenline Location	Estimated Volume	Observed Volume	Est./Obs.
1	Ring 1, Virginia	811	802	1.01
2	Ring 1, DC	1115	915	1.22
3	Ring 3, Virginia	971	866	1.12
4	Ring 3, DC	1139	966	1.18
5	Beltway, Virginia	1203	1078	1.12
6	Beltway, Maryland	1753	1591	1.10
7	Ring 5, Virginia	1252	1154	1.08
8	Ring 5, Maryland	1606	1368	1.17
9	Ring 7, Virginia	687	598	1.15
10	Eastern Loudoun Co.	254	230	1.10
11	US 15, Loudoun / Pr. William Co.	164	156	1.05
12	Central Montgomery Co. Radial	548	472	1.16
13	Eastern Montgomery Co. Radial	418	370	1.13
14	NE. Pr.Geo. Co. Radial	324	318	1.02
15	Central Pr.George's Co. Radial	285	238	1.20
16	Southern Pr.George's Co. Radial	254	214	1.19
17	Southern Fairfax / Pr. Wm. Radial	438	390	1.12
18	Central Fairfax Co. Radial	627	544	1.15
19	VA Route 7 Radial	486	466	1.04
20	Beltway & 'Inner' Potomac River Crossings	1096	892	1.23
22	Central Mtg./P.G. Radial	1473	1196	1.23
23	NE Montgomery Co. Radial	179	136	1.32
24	Montgomery / Pr.Geo. Co. border	445	444	1.00
25	Montgomery/ Frederick Co. border	105	78	1.35
26	Montgomery / Howard Co. border	375	256	1.46
27	Pr.Geo. / Anne Arundel Co. Border	302	290	1.04
28	Charles / Pr.Geo. Co. Border	116	108	1.07
	Inner Screenline Subtotal	*18,426*	*16,136*	*1.14*
31	Frederick / Carroll Co. Border	131	58	2.26
32	Western Loudoun Co. Border	96	54	1.78
33	'Outer' Southwestern Circumferential	301	226	1.33
34	'Outer' Southeastern Circumferential	100	94	1.06
35	South of Baltimore City	843	782	1.08
36	'Outer' Northwestern Radial	78	28	2.79
37	'Outer' Western Circumferential	28	24	1.17
38	'Outer' I-95 (South) Radial	124	174	0.71
	Outer Screenline Subtotal	*1,701*	*1,440*	*1.18*
	Grand Total	**20,127**	**17,576**	**1.15**

Notes:

- The estimated figures reflect highway links with coded ground counts only.
- The estimated link volumes that have been rounded to thousands as the observed volumes are coded in thousands.
- Source: i2_highway_assignment.rpt **12/19/02**

Exhibit 8-4 1994 Version 2.1/TP+ RMSE Summary by Facility Type and Volume Range

Facility Type	Volume Range	Links Count	Ave Obs Volume	Ave Est Volume	Diff. (Obs-Est)	Pct Diff.	RMSE	Pct RMSE
Freeways	1.00-9.99K	20	7.10	19.65	-12.55	-176.76	19.34	272.36
	10.00-19.99K	106	14.45	27.15	-12.70	-87.86	17.13	118.53
	20.00-29.99K	143	24.60	34.99	-10.38	-42.21	13.94	56.65
	30.00-39.99K	171	34.56	43.28	-8.72	-25.23	16.75	48.46
	40.00-49.99K	147	45.24	53.23	-7.99	-17.65	19.47	43.03
	50.00-59.99K	84	54.94	71.06	-16.12	-29.34	23.22	42.27
	60.00-69.00K	63	64.05	64.54	-0.49	-0.77	17.59	27.47
	70.00-79.00K	43	72.95	83.44	-10.49	-14.38	20.43	28.01
	80.00-89.99K	81	85.59	87.44	-1.85	-2.16	16.43	19.19
	90.00-99.99K	62	95.08	92.44	2.65	2.78	17.18	18.07
	100.00-109.99K	124	103.97	97.77	6.20	5.96	20.85	20.05
	110.00-119.99K	36	114.61	97.81	16.81	14.66	26.71	23.31
	120.00-129.99K	2	127.00	90.00	37.00	29.13	37.12	29.23
	130.00-139.99K	6	138.00	126.17	11.83	8.57	32.54	23.58
	Subtotal:	***1,088***	***55.58***	***61.14***	***-5.56***	***-10.01***	***18.73***	***33.70***
Maj Arterials	1.00-9.99K	1,493	6.31	10.23	-3.92	-62.04	6.85	108.57
	10.00-19.99K	2,913	14.28	17.03	-2.75	-19.25	7.22	50.57
	20.00-29.99K	1,211	24.10	22.97	1.13	4.68	7.69	31.90
	30.00-39.99K	322	33.06	26.19	6.87	20.79	10.56	31.94
	40.00-49.99K	26	43.38	39.19	4.19	9.66	11.59	26.72
	50.00-59.99K	12	55.33	42.08	13.25	23.95	14.92	26.97
	Subtotal:	***5,977***	***15.50***	***17.17***	***-1.67***	***-10.80***	***7.49***	***48.35***
Minor Arterials	1.00-9.99K	2,695	5.06	6.12	-1.06	-20.97	3.43	67.86
	10.00-19.99K	492	12.28	9.28	3.00	24.44	5.53	45.02
	20.00-29.99K	56	22.11	12.96	9.14	41.36	11.65	52.68
	30.00-39.99K	4	31.00	12.00	19.00	61.29	19.03	61.38
	40.00-49.99K	1	44.00	21.00	23.00	52.27	23.00	52.27
	Subtotal:	***3,248***	***6.49***	***6.73***	***-0.24***	***-3.66***	***4.17***	***64.19***
Collectors	1.00-9.99K	2,605	4.00	5.39	-1.40	-34.93	3.62	90.55
	10.00-19.99K	362	12.55	9.01	3.55	28.26	6.61	52.62
	20.00-29.99K	30	22.47	10.17	12.30	54.75	15.00	66.75
	30.00-39.99K	2	39.00	13.50	25.50	65.38	25.50	65.40
	Subtotal:	***2,999***	***5.24***	***5.88***	***-0.64***	***-12.30***	***4.40***	***83.94***
Expressways	1.00-9.99K	46	7.17	10.74	-3.57	-49.70	6.49	90.52
	10.00-19.99K	120	14.50	20.03	-5.53	-38.16	10.11	69.73
	20.00-29.99K	98	23.92	29.63	-5.71	-23.89	8.84	36.96
	30.00-39.99K	94	33.77	32.62	1.15	3.40	8.22	24.35
	40.00-49.99K	35	42.09	31.31	10.77	25.59	12.83	30.50
	50.00-59.99K	3	56.00	36.00	20.00	35.71	20.00	35.71
	Subtotal:	***396***	***23.31***	***25.43***	***-2.13***	***-9.13***	***9.43***	***40.44***
Grand Total		***13,708***	***14.53***	***15.96***	***-1.43***	***-9.84***	***7.95***	***54.74***

Note:

$$RMSE = \sqrt{\frac{\sum (ObsCount - SimCount)^2}{n}}$$

where n= the number of observations in each facility type / volume range group

Source: rmse.s

Ref: rmsetp94.xls

Exhibit 8-5 Screenline Locations Map 1 of 2

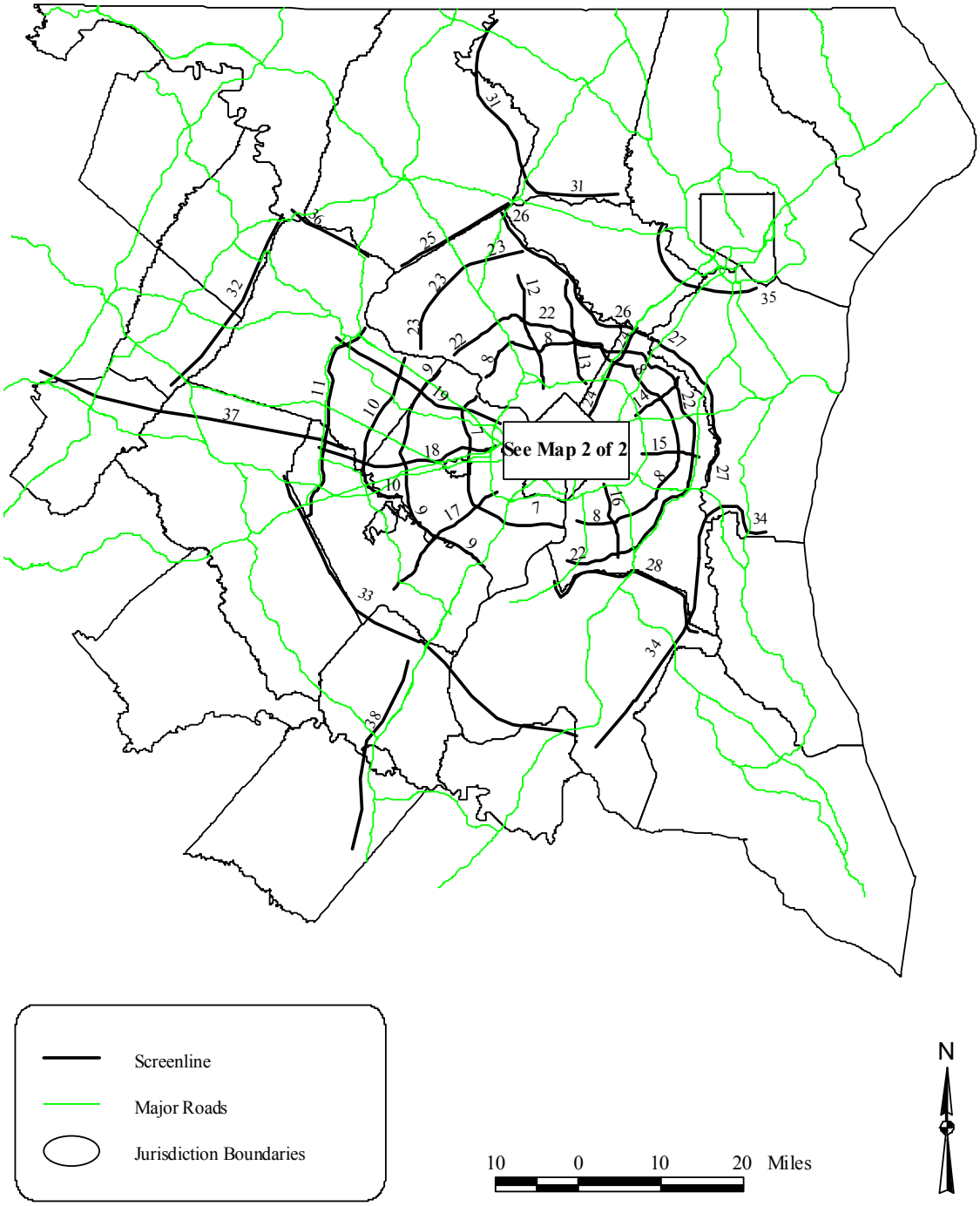
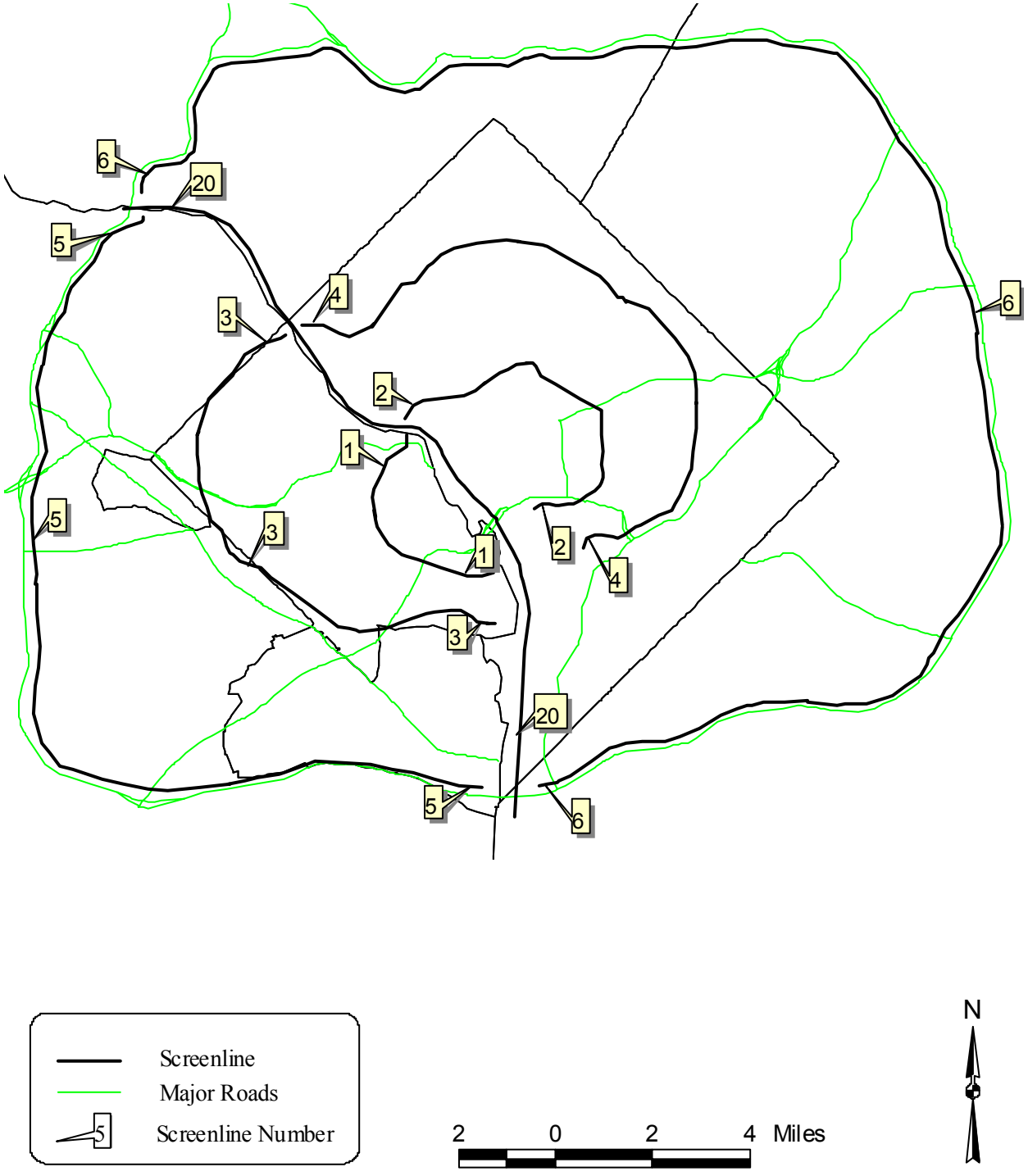


Exhibit 8-6 Screenline Locations Map 2 of 2



Chapter 9. Validation

Model validation checks normally involve applying the calibrated model for a specific year, other than the model calibration year, and checking the model performance against all available observed data. Another important validation check is to apply the model for an out-year and then to assess the results for reasonability.

The Version 2.1/TP+ model was validated using year 2000 data. In anticipation of the validation effort, staff spent several months assembling ground counts for the 2000 highway network and assembling information from area transit service providers that enabled the development of a figure for unlinked regional transit trips. Staff also executed the model for the year 2025. The year 2000 performance results, and model year 2025 forecast results, are summarized in this chapter.

A regional summary of estimated and observed year 2000 transit trips, by purpose, is shown as Exhibit 9-1. As in the previous summary for 1994, there are two estimated and observed comparison tables shown. One shows a trip comparison at the region-wide level (the unscreened summary), and the other shows transit trips for which *both* estimated and observed trips exist at the jurisdiction-level. The latter (screened) comparison is useful for checking estimated and observed figures at finer levels of geography. The unscreened summary indicates that the model is underestimating transit trips by about 4%. There are two possible explanations for the underestimation, both of which are *not* model-related. First, the year-2000 land use (both jobs and households) reflects a decrease of jobs and households for the District of Columbia relative to 1994. Preliminary 2000 Census information suggests that households in the District may have, in fact, increased during the period. Second, the fare input to the mode choice model reflects the tariff in effect for 2000 (WMATA Tariff #19), but does not reflect the effect of the emerging fare subsidy (Metro Check) program. These factors reflect input assumptions rather than modeling issues. Therefore, it is expected that the transit estimate will tend to be lower than the observed figures.

Exhibits 9-2, 9-3, and 9-4 show the jurisdictional VMT, screenline, and RMSE performance summaries for the year 2000. The results are quite consistent with those results for the 1994 calibration year. VMT is shown to be overestimated by about 8%, screenlines estimates are high by 17% overall, and the RMSE is about 51%. Given that the model is performing well in other capacities (transit estimation, restrained speeds, trip distribution patterns), attempts to improve VMT performance results are not warranted in the staff's view. The observed VMT used in this comparison, as in the 1994 calibration comparison, contains data gaps.

Exhibits 9-5 and 9-6 show estimated trip table and modal trip screenline results pertaining to the Metro Core Cordon and the Beltway Cordon, by time periods. Exhibit 9-5 shows a comparison of estimated and observed (HTS survey) *trips* in P/A format that are summarized both to and from the areas defined by the Ring 1 Cordon and the Capital Beltway cordon. Exhibit 9-6 presents a comparison observed trips crossing the Metro Core Cordon and the Beltway Cordon (from COG's travel monitoring program) with simulated highway and transit *link volumes* (resulting from highway and transit assignments). It is important to underscore that for the latter exhibit there are one-year differences between the observed and estimated screenline volumes shown. Furthermore,

the simulated trip tables used in the highway and transit assignments have been processed through a *regional* time of day process, converting daily trips into AM/PM trip patterns. One would expect that differences should be expected when comparing results of regional time of day model with observed crossings at a particular cordon location. Finally, the observed figures are based on one-day counts and are subject to variation. With these factors in mind, the results shown are quite reasonable in staff's judgment.

Observed and estimated volume and speed figures for Maryland permanent counting stations are shown on Exhibits 9-7, 9-8, 9-9 for AM, PM, and off-peak categories, respectively. The observed speeds were developed from weekday observations during May 2000. It is important to understand that speed data is collected placing vehicles into speed 'groups'. Thus the number of vehicles are placed into groups comprising 0-30 mph, 31-35mph, 36-40 mph,…,71-85mph, and 86-100 mph. The exhibits suggest that the Version 2.1/TP+ model matches off-peak observed speeds better than the peak speeds, where the modeled speed estimates are generally lower than the observed values. Clearly, more data is needed in the future to check on the speed performance of the model.

The final exhibits show the model changes for the years 1994, 2000, and 2025. Exhibits 9-10, 9-11, and 9-12 show trip/VMT changes, screenline changes, restrained speed changes, respectively. These results are reasonable in the staff's judgment.

Exhibit 9-1 Estimated and Observed Transit Trips, Year 2000

Transit trips
Unscreened

Purpose	Est	Obs	Diff. (Est-Obs)	Ratio (Est/Obs)
HBW	520,958	560,167	-39,209	0.93
HBS	36,223	33,313	2,910	1.09
HBO	173,029	153,197	19,832	1.13
NHB	141,582	166,534	-24,952	0.85
Total	871,792	913,211	-41,419	0.95

Transit trips
Screened

Purpose	Est	Obs	Diff. (Est-Obs)	Ratio (Est/Obs)
HBW	502,587	538,582	-35,995	0.93
Pct. Transit	*17.08%*	*18.30%*	*-1.06%*	*0.94*
HBS	33,693	33,262	431	1.01
Pct. Transit	*1.40%*	*1.38%*	*0.03%*	*1.02*
HBO	148,298	151,645	-3,347	0.98
Pct. Transit	*2.08%*	*2.13%*	*-0.05%*	*0.98*
NHB	138,301	166,461	-28,160	0.83
Pct. Transit	2.63%	3.17%	-0.56%	0.82
Total	822,879	889,950	-67,071	0.92
Pct. Transit	*4.64%*	*5.02%*	*-0.36%*	*0.93*

Ref: mcsum23_2000_estpsn.xls, sum1

*Note about missing observed data and data "screening":

Due to limitations in survey data, it was not possible to obtain observed auto travel for some of the exurban counties in the study area. In particular, the following jurisdiction-level auto person flows were unavailable:
1. For home-based travel: a) external trips, both IX and XI; b) trips FROM the following jurisdictions: St. Mary's, Clarke, Jefferson, Spotsylvania, Fredericksburg, or King George.
2. For non-home-based travel: a) external trips, both IX and XI; b) trips FROM the following jurisdictions: Carroll, Howard, Anne Arundel, St. Mary's, Clarke, Jefferson, Spotsylvania, Fredericksburg, or King George; c) trips TO the following jurisdictions: Carroll, Howard, and Anne Arundel.

These zero-valued cells have been "grayed out" in 23-by-23 tables to indicate the absence of data. To ensure comparability across 23-by-23 trip tables, the corresponding cells in the observed transit trip table have also been set to zero and "grayed out." The process of setting the values of cells in one table to zero based on zero values of corresponding cells in another table is called "screening." Thus, the observed 23-by-23 transit trip table was "screened" by the observed 23-by-23 auto person trip table. In addition, all estimated 23-by-23 trip tables were "screened" by their corresponding observed trip tables. Note that the screening of the estimated data involved one additional level of screening: Any zero-valued cell in an observed 23-by-23 trip table triggered a screening (zeroing out) of the corresponding cell in the estimated 23-by-23 trip table. Such a screening process makes all of the tables comparable and permits valid comparisons. Data that has not undergone this screening process is called "unscreened."

Exhibit 9-2 2000 Estimated and Observed VMT (in thousands) by Jurisdiction TP+ Model Performance

Jurisdiction	Estimated	Observed	Est/Obs Ratio
District of Columbia	7,211	5,854	1.23
Montgomery	17,127	14,934	1.15
Prince George's	20,104	20,009	1.00
Arlington	3,740	3,555	1.05
Alexandria	1,542	1,254	1.23
Fairfax	25,364	23,050	1.10
Loudoun	4,581	3,821	1.20
Prince William	6,761	6,317	1.07
Frederick	7,527	6,528	1.15
COG Member Jurisdictions Subtotal:	*93,957*	*85,322*	*1.10*
Howard	8,916	8,035	1.11
Anne Arundel	12,349	11,494	1.07
Charles	2,243	2,742	0.82
1,478 Zone Cordon Subtotal	*117,465*	*107,593*	*1.09*
Carroll	2,794	2,496	1.12
Calvert	1,400	1,690	0.83
St. Mary's	1,533	1,628	0.94
King George	606	567	1.07
Fredericksburg	285	534	0.53
Stafford	3,588	3,151	1.14
Spotsylvania	1,520	1,803	0.84
Fauquier	2,420	2,372	1.02
Clarke	730	579	1.26
Jefferson	947	673	1.41
Outer Counties Subtotal	*15,823*	*15,493*	*1.02*
Expanded Cordon Total	**133,288**	**123,086**	**1.08**

	MSA Summary		
	Estimated	**Observed**	**Est/Obs Ratio**
DC	**7,211**	**5,854**	**1.23**
MD	**48,401**	**45,903**	**1.05**
VA	**45,576**	**41,148**	**1.11**
Total MSA	**101,188**	**92,905**	**1.09**

The table reflects highway links with coded ground counts.
Source: i2_highway_assignment.rpt

Ref: v2perf00.xls, eovmt_jur

Exhibit 9-3 2000 Estimated and Observed Screenline Volumes (in thousands)
TP+ Model Performance

Screenline No.	Screenline Location	Estimated Volume	Observed Volume	Est./Obs.
1	Ring 1, Virginia	687	686	1.00
2	Ring 1, DC	914	680	1.34
3	Ring 3, Virginia	709	648	1.09
4	Ring 3, DC	1077	870	1.24
5	Beltway, Virginia	1236	910	1.36
6	Beltway, Maryland	1618	1476	1.10
7	Ring 5, Virginia	1172	1116	1.05
8	Ring 5, Maryland	1533	1268	1.21
9	Ring 7, Virginia	858	716	1.20
10	Eastern Loudoun Co.	414	302	1.37
11	US 15, Loudoun / Pr. William Co.	176	148	1.19
12	Central Montgomery Co. Radial	414	398	1.04
13	Eastern Montgomery Co. Radial	360	314	1.15
14	NE. Pr.Geo. Co. Radial	324	308	1.05
15	Central Pr.George's Co. Radial	306	294	1.04
16	Southern Pr.George's Co. Radial	247	210	1.18
17	Southern Fairfax / Pr. Wm. Radial	449	360	1.25
18	Central Fairfax Co. Radial	760	658	1.16
19	VA Route 7 Radial	571	466	1.23
20	Beltway & 'Inner' Potomac River Crossings	1123	972	1.16
22	Central Mtg./P.G. Radial	1352	1158	1.17
23	NE Montgomery Co. Radial	201	144	1.40
24	Montgomery / Pr.Geo. Co. border	378	392	0.96
25	Montgomery/ Frederick Co. border	132	92	1.43
26	Montgomery / Howard Co. border	402	342	1.18
27	Pr.Geo. / Anne Arundel Co. Border	337	312	1.08
28	Charles / Pr.Geo. Co. Border	158	164	0.96
	Inner Screenline Subtotal	*17,908*	*15,404*	*1.16*
31	Frederick / Carroll Co. Border	147	82	1.79
32	Western Loudoun Co. Border	117	64	1.83
33	'Outer' Southwestern Circumferential	336	226	1.49
34	'Outer' Southeastern Circumferential	118	100	1.18
35	South of Baltimore City	932	886	1.05
36	'Outer' Northwestern Radial	96	42	2.29
37	'Outer' Western Circumferential	38	32	1.19
38	'Outer' I-95 (South) Radial	147	174	0.84
	Outer Screenline Subtotal	*1,931*	*1,606*	*1.20*
	Grand Total	**19,839**	**17,010**	**1.17**

Notes:
- The estimated figures reflect highway links with coded ground counts only.
- The estimated link volumes that have been rounded to thousands as the observed volumes are coded in thousands.
- Source: i2_highway_assignment.rpt **12/19/02**

Ref: v2perf00.xls, eoscreen

Exhibit 9-4 2000 Version 2.1/TP+ RMSE Summary by Facility Type and Volume Range

Facility Type	Volume Range	Links Count	Ave Obs Volume	Ave Est Volume	Diff. (Obs-Est)	Pct Diff.	RMSE	Pct RMSE
Freeways	1.00-9.99K	23	8.04	18.35	-10.30	-128.11	14.04	174.54
	10.00-19.99K	144	15.72	32.47	-16.76	-106.63	20.32	129.30
	20.00-29.99K	64	25.14	39.98	-14.84	-59.04	17.99	71.56
	30.00-39.99K	200	35.17	44.82	-9.65	-27.43	15.70	44.63
	40.00-49.99K	162	43.87	55.74	-11.87	-27.06	21.02	47.92
	50.00-59.99K	119	54.21	67.03	-12.82	-23.66	19.11	35.26
	60.00-69.00K	137	64.67	72.98	-8.31	-12.84	19.06	29.47
	70.00-79.00K	104	73.88	79.92	-6.04	-8.17	21.59	29.22
	80.00-89.99K	90	84.60	87.84	-3.24	-3.84	20.83	24.62
	90.00-99.99K	127	95.09	96.51	-1.42	-1.49	19.10	20.08
	100.00-109.99K	85	104.68	110.48	-5.80	-5.54	18.89	18.05
	110.00-119.99K	47	115.36	121.53	-6.17	-5.35	25.01	21.68
	120.00-129.99K	36	125.06	111.97	13.08	10.46	26.47	21.17
	130.00-139.99K	28	137.86	110.29	27.57	20.00	34.30	24.88
	Subtotal:	***1,366***	***61.18***	***69.05***	***-7.87***	***-12.87***	***20.08***	***32.82***
Maj Arterials	1.00-9.99K	1,315	6.53	10.83	-4.30	-65.91	7.41	113.51
	10.00-19.99K	2,615	14.32	18.06	-3.74	-26.16	7.91	55.24
	20.00-29.99K	1,289	23.67	24.43	-0.76	-3.20	7.36	31.10
	30.00-39.99K	312	32.30	28.36	3.94	12.21	9.31	28.83
	40.00-49.99K	24	42.75	36.21	6.54	15.30	18.02	42.14
	50.00-59.99K	12	52.67	33.00	19.67	37.34	22.99	43.65
	Subtotal:	***5,567***	***15.86***	***18.52***	***-2.66***	***-16.77***	***7.89***	***49.78***
Minor Arterials	1.00-9.99K	1,732	4.91	5.87	-0.95	-19.40	3.48	70.80
	10.00-19.99K	398	12.74	9.88	2.85	22.39	5.41	42.49
	20.00-29.99K	37	22.70	12.65	10.05	44.29	13.08	57.60
	30.00-39.99K	8	35.00	21.00	14.00	40.00	16.67	47.62
	Subtotal:	***2,175***	***6.76***	***6.77***	***-0.01***	***-0.22***	***4.35***	***64.37***
Collectors	1.00-9.99K	1,634	3.76	4.91	-1.15	-30.51	3.23	85.85
	10.00-19.99K	201	12.33	10.34	2.00	16.18	5.59	45.36
	20.00-29.99K	32	21.69	14.78	6.91	31.84	12.12	55.90
	Subtotal:	***1,867***	***4.99***	***5.66***	***-0.67***	***-13.45***	***3.87***	***77.63***
Expressways	1.00-9.99K	26	6.85	11.85	-5.00	-73.03	6.64	97.06
	10.00-19.99K	90	15.44	20.23	-4.79	-31.01	8.22	53.22
	20.00-29.99K	128	24.50	30.52	-6.02	-24.59	9.66	39.42
	30.00-39.99K	86	34.37	33.98	0.40	1.15	9.20	26.76
	40.00-49.99K	44	44.77	33.64	11.14	24.87	13.90	31.04
	50.00-59.99K	28	54.29	34.54	19.75	36.38	21.75	40.06
	Subtotal:	***402***	***27.74***	***28.37***	***-0.63***	***-2.29***	***10.95***	***39.47***
Grand Total		***11,377***	***18.20***	***20.58***	***-2.38***	***-13.09***	***9.44***	***51.91***

Note:

$$RMSE = \sqrt{\frac{\sum (ObsCount - SimCount)^2}{n}}$$

where n= the number of observations in each facility type / volume range group

Source: rmse.s

Ref: rmsetp00.xls

Exhibit 9-5 Estimated and Observed Ring 1 Trips Summary, Year 1994

Metro Core Cordon Location

		Est	Obs	E/O Ratio
From Metro Core to Non-Metro Core				
	Transit	10,136	10,154	1.00
	Auto Driver	13,084	13,468	0.97
	Auto Person	15,236	14,205	1.07
	Auto Occ.	1.16	1.05	1.10
	Transit Pct.	39.9%	41.7%	0.96
From Non-Metro Core to Metro Core				
	Transit	297,020	282,582	1.05
	Auto Driver	285,285	272,449	1.05
	Auto Person	361,502	352,604	1.03
	Auto Occ.	1.27	1.29	0.98
	Transit Pct.	45.1%	44.5%	1.01
Total Metro Core Cordon Crossings				
	Transit	307,156	292,736	1.05
	Auto Driver	298,369	285,917	1.04
	Auto Person	376,738	366,809	1.03
	Auto Occ.	1.26	1.28	0.98
	Transit Pct.	44.9%	44.4%	1.01

Sources: Observed Data- 1994 COG HTS/1994 Auto External Survey
Simulated Data- Version 2.1TP+ / 2nd Iteration HBW Trips (12/19/02)
sqzchksx.s

Beltway Cordon Location

		Est	Obs	E/O Ratio
From Inside Beltway to Outside				
	Transit	10,963	14,888	0.74
	Auto Driver	148,410	140,253	1.06
	Auto Person	163,398	155,160	1.05
	Auto Occ.	1.10	1.11	1.00
	Transit Pct.	6.3%	8.8%	0.72
From Outside the Beltway to Inside				
	Transit	158,823	149,749	1.06
	Auto Driver	533,813	527,478	1.01
	Auto Person	625,288	607,372	1.03
	Auto Occ.	1.17	1.15	1.02
	Transit Pct.	20.3%	19.8%	1.02
Total Beltway Cordon Crossings				
	Transit	169,786	164,637	1.03
	Auto Driver	682,223	667,731	1.02
	Auto Person	788,686	762,532	1.03
	Auto Occ.	1.16	1.14	1.01
	Transit Pct.	17.7%	17.8%	1.00

Sources: Observed Data- 1994 COG HTS/1994 Auto External Survey
Simulated Data- Version 2.1TP+ / 2nd Iteration HBW Trips (12/19/02)
sqzchksx.s

Ref: sqzchksx.xls, trip_cmp

Exhibit 9-6 Estimated and Observed Metro Core and Beltway Cordon Trip Crossings by Time Period

Metro Core Cordon

	Inbound / 6:00 AM to 9:00 AM			Outbound / 4:00 PM - 7:00 PM		
	Estimated (1994)	Observed (1993)	Est/Obs Ratio	Estimated (1994)	Observed (1993)	Est/Obs Ratio
Total Vehicles	240,300	212,000	1.13	309,900	206,800	1.50
Transit Pass.	145,200	166,700	0.87	N/A	175,700	N/A

	Estimated (2000)	Observed (1999)	Est/Obs Ratio	Estimated (2000)	Observed (1999)	Est/Obs Ratio
Total Vehicles	238,300	225,800	1.06	304,800	222,300	1.37
Transit Pass.	152,200	166,000	0.92	N/A	153,900	N/A

Notes:
- Simulated figures from MWCOG Version 2.1 / TP+ model (12/19/02).
- Observed figures from available MWCOG Metro Core Cordon Reports.
  The 1999 figures are currently in draft and unpublished.
- Transit trips include Metrorail, Metrobus, commuter rail, and commuter bus service
- Vehicle trips include autos, buses, trucks and motorcycles
- All figures have been rounded to the nearest hundred
- The 1999 and 2001 figures are currently in draft and unpublished.

Beltway Cordon

	Inbound / 6:00 AM to 9:00 AM			Outbound / 4:00 PM - 7:00 PM		
	Estimated (1994)	Observed (1995)	Est/Obs Ratio	Estimated (1994)	Observed (1995)	Est/Obs Ratio
Total Vehicles	348,900	374,800	0.93	474,700	399,000	1.19
Transit Pass.	58,500	63,600	0.92	N/A	61,800	N/A

	Estimated (2000)	Observed (2001)	Est/Obs Ratio	Estimated (2000)	Observed (2001)	Est/Obs Ratio
Total Vehicles	334,100	376,700	0.89	522,600	400,700	1.30
Transit Pass.	65,900	75,400	0.87	N/A	75,200	N/A

Notes:
- Simulated figures from MWCOG Version 2.1 / TP+ model (12/19/02).
- Observed figures from available MWCOG Beltway Cordon Reports.
  The 2001 figures are currently in draft and unpublished.
- Transit trips include Metrorail, Metrobus, commuter rail, and commuter bus service
- Vehicle trips include autos, buses, trucks and motorcycles
- All figures have been rounded to the nearest hundred

Ref: sqzchksx.xls, crdn_modelTP

Exhibit 9-7 Observed and Estimated AM Peak Period Speeds, Year 2000

AM PEAK					AM PERIOD				
					Volume			Speed	
Route	Location	DIR	Faciliy Type	Area Type	Obs	Est	E/O	Obs	Est
US 270	South of Middlebrook Rd	SB	Interstate	3	15,095	17,079	1.13	40	30
US 270	South of Middlebrook Rd	NB	Interstate	3	13,832	13,199	0.95	62	69
US 50	West of MD 202	WB	Interstate	3	9,073	10,983	1.21	25	35
US 50	West of MD 202	EB	Interstate	3	3,911	8,088	2.07	62	68
US 95	South of MD 214	NB	Interstate	3	19,664	20,606	1.05	60	42
US 95	South of MD 214	SB	Interstate	3	14,842	18,817	1.27	62	57
US 95	at Temple Hill Rd	SB	Interstate	3	14,067	15,365	1.09	66	68
US 95	at Temple Hill Rd	NB	Interstate	3	10,692	14,123	1.32	65	69
US 495	at Perisimmon Tree Rd	EB	Interstate	6	23,051	22,583	0.98	38	37
US 495	at Perisimmon Tree Rd	WB	Interstate	6	21,049	21,704	1.03	59	42
US 70	East of MD 17	EB	Interstate	6	5,584	4,523	0.81	71	70
US 70	East of MD 17	WB	Interstate	6	4,430	9,060	2.05	67	68
MD 210	South of Old Fort Rd	NB	Maj. Arterial	6	10,547	8,901	0.84	46	14
MD 210	South of Old Fort Rd	SB	Maj. Arterial	6	2,780	4,763	1.71	61	40
US 301	South of MD 227	NB	Maj. Arterial	6	4,219	2,781	0.66	62	46
US 301	South of MD 227	SB	Maj. Arterial	6	3,081	1,691	0.55	59	48
US 15	North of MD 355	SB	Expressway	3	5,824	4,995	0.86	62	30
US 15	North of MD 355	NB	Expressway	3	2,283	2,500	1.10	64	60
MD 4	North of Patuxen River Bric	NB	Expressway	5	10,015	3,196	0.32	64	61
MD 4	North of Patuxen River Bric	SB	Expressway	5	2,060	8,357	4.06	65	22
Total AM Period					196,099	213,314	1.09	58	49

Ref: obsspdu.xls

Exhibit 9-8 Observed and Estimated PM Peak Period Speeds, Year 2000

PM PEAK					PM PERIOD				
					Volume			Speed	
Route	Location	DIR	Facility Type	Area Type	Obs	Est	E/O	Obs	Est
US 270	South of Middlebrook Rd	SB	Interstate	3	11,074	19,851	1.79	46	62
US 270	South of Middlebrook Rd	NB	Interstate	3	19,983	19,859	0.99	49	22
US 50	West of MD 202	WB	Interstate	3	5,212	10,389	1.99	67	53
US 50	West of MD 202	EB	Interstate	3	12,462	13,548	1.09	57	20
US 95	South of MD 214	NB	Interstate	3	17,534	23,311	1.33	62	37
US 95	South of MD 214	SB	Interstate	3	19,240	24,240	1.26	57	32
US 95	at Temple Hill Rd	SB	Interstate	3	14,837	19,389	1.31	68	67
US 95	at Temple Hill Rd	NB	Interstate	3	13,739	19,234	1.40	66	67
US 495	at Persimmon Tree Rd	EB	Interstate	6	20,595	24,452	1.19	28	37
US 495	at Persimmon Tree Rd	WB	Interstate	6	17,729	25,324	1.43	41	33
US 70	East of MD 17	EB	Interstate	6	6,568	9,509	1.45	71	68
US 70	East of MD 17	WB	Interstate	6	4,926	5,787	1.17	66	69
MD 210	South of Old Fort Rd	NB	Maj. Arterial	6	4,007	7,968	1.99	59	23
MD 210	South of Old Fort Rd	SB	Maj. Arterial	6	10,406	11,418	1.10	60	9
US 301	South of MD 227	NB	Maj. Arterial	6	3,980	2,701	0.68	63	46
US 301	South of MD 227	SB	Maj. Arterial	6	5,383	4,094	0.76	60	43
US 15	North of MD 355	SB	Expressway	3	2,926	3,890	1.33	61	53
US 15	North of MD 355	NB	Expressway	3	6,407	5,427	0.85	65	29
MD 4	North of Patuxen River Bric	NB	Expressway	5	2,703	9,704	3.59	64	17
MD 4	North of Patuxen River Bric	SB	Expressway	5	9,822	6,207	0.63	61	50
Total PM Period					209,533	266,302	1.27	59	42

Source: Observed data from MD SHA, Permanent Count Stations.
The above computations of observed volumes & speeds, reflect conditions of a typical weekday (Mon, Tue, or Wed) in May, 2000.

Ref: obsspdu.xls

Exhibit 9-9 Observed and Estimated Off-Peak Speeds, Year 2000

OFF-PEAK					OFF-PEAK PERIOD				
					Volume			Speed	
Route	Location	DIR	Facility Type	Area Type	Obs	Est	E/O	Obs	Est
US 270	South of Middlebrook Rd	SB	Interstate	3	36,923	57,529	1.56	42	68
US 270	South of Middlebrook Rd	NB	Interstate	3	48,483	59,509	1.23	64	67
US 50	West of MD 202	WB	Interstate	3	22,852	30,311	1.33	66	65
US 50	West of MD 202	EB	Interstate	3	25,276	32,814	1.30	60	48
US 95	South of MD 214	NB	Interstate	3	55,537	59,517	1.07	62	67
US 95	South of MD 214	SB	Interstate	3	56,856	59,465	1.05	60	67
US 95	at Temple Hill Rd	SB	Interstate	3	48,309	40,462	0.84	67	69
US 95	at Temple Hill Rd	NB	Interstate	3	42,753	40,767	0.95	66	69
US 495	at Persimmon Tree Rd	EB	Interstate	6	73,390	64,573	0.88	50	61
US 495	at Persimmon Tree Rd	WB	Interstate	6	64,686	67,186	1.04	61	53
US 70	East of MD 17	EB	Interstate	6	15,673	17,124	1.09	70	70
US 70	East of MD 17	WB	Interstate	6	17,533	16,878	0.96	65	70
MD 210	South of Old Fort Rd	NB	Maj. Arterial	6	17,969	21,581	1.20	58	31
MD 210	South of Old Fort Rd	SB	Maj. Arterial	6	19,793	22,931	1.16	60	28
US 301	South of MD 227	NB	Maj. Arterial	6	13,156	5,651	0.43	62	48
US 301	South of MD 227	SB	Maj. Arterial	6	12,675	5,697	0.45	59	48
US 15	North of MD 355	SB	Expressway	3	10,933	10,949	1.00	61	56
US 15	North of MD 355	NB	Expressway	3	11,809	11,090	0.94	64	55
MD 4	North of Patuxen River Bric	NB	Expressway	5	12,408	17,219	1.39	64	55
MD 4	North of Patuxen River Bric	SB	Expressway	5	14,767	16,089	1.09	65	56
Total Off-Peak Period					621,781	657,342	1.06	61	58

Source: Observed data from MD SHA, Permanent Count Stations.
The above computations of observed volumes & speeds, reflect conditions of a typical weekday (Mon, Tue, or Wed) in May, 2000.

Ref: obsspdu.xls

Exhibit 9-10 Comparison of Regional Demographic and Travel Trends Over Time

		1994	2000	CLRP Full CPI 2025	Pct Change '94 - '00	Pct Change '94 - 25
Land Use		*Rnd 6.0 Update*	*Rnd 6.2*	*Rnd 6.2*		
	Households	1,912,782	2,109,413	2,839,161	10.3%	48.4%
	Employment	3,049,559	3,410,173	4,690,137	11.8%	53.8%
	Population	5,168,380	5,629,070	7,354,140	8.9%	42.3%
Motorized Trips / Trip Rates	HBW	3,689,242	4,095,958	5,799,481	11.0%	57.2%
Motorized Person Travel	HBS	2,763,003	3,060,567	4,155,826	10.8%	50.4%
(Internal & External)	HBO	8,457,680	9,294,329	12,511,235	9.9%	47.9%
	NHB	6,155,306	6,818,708	9,198,561	10.8%	49.4%
	Total Person Trips	21,065,231	23,269,562	31,665,103	10.5%	50.3%
Motorized Person Trips per HH		*11.01*	*11.03*	*11.15*	*0.2%*	*1.3%*
Motorized Person Trips per Capita		*4.08*	*4.13*	*4.31*	*1.4%*	*5.6%*
Non-Motorized HBW Trips		160,558	174,474	250,581	8.7%	56.1%
Auto Driver Travel	HBW	2,854,183	3,186,399	4,411,664	11.6%	54.6%
(Internal & External)	HBS	2,163,139	2,388,114	3,241,450	10.4%	49.8%
	HBO	5,792,871	6,322,910	8,534,331	9.1%	47.3%
	NHB	4,813,152	5,326,189	7,216,438	10.7%	49.9%
	Total Auto Dr.	15,623,345	17,223,612	23,403,883	10.2%	49.8%
Auto Passenger Travel	HBW	358,497	388,601	550,860	8.4%	53.7%
(Internal & External)	HBS	566,999	636,230	862,300	12.2%	52.1%
	HBO	2,511,417	2,798,390	3,739,188	11.4%	48.9%
	NHB	1,213,576	1,350,937	1,793,892	11.3%	47.8%
	Total Auto Pass.	4,650,489	5,174,158	6,946,240	11.3%	49.4%
Auto Occupancies	*HBW*	*1.13*	*1.12*	*1.12*	*-0.3%*	*-0.1%*
(Internal & External)	*HBS*	*1.26*	*1.27*	*1.27*	*0.3%*	*0.3%*
	HBO	*1.43*	*1.44*	*1.44*	*0.6%*	*0.3%*
	NHB	*1.25*	*1.25*	*1.25*	*0.1%*	*-0.3%*
	Total Auto Occ.	*1.30*	*1.30*	*1.30*	*0.2%*	*-0.1%*
Transit Travel	HBW	476,562	520,958	836,957	9.3%	75.6%
(Internal Only)	HBS	32,865	36,223	52,076	10.2%	58.5%
	HBO	153,392	173,029	237,716	12.8%	55.0%
	NHB	128,578	141,582	188,231	10.1%	46.4%
	Total Int'l Transit	791,397	871,792	1,314,980	10.2%	66.2%
Transit Percentage	*HBW*	*12.92%*	*12.72%*	*14.43%*	*-1.5%*	*11.7%*
	HBS	*1.19%*	*1.18%*	*1.25%*	*-0.5%*	*5.3%*
	HBO	*1.81%*	*1.86%*	*1.90%*	*2.6%*	*4.8%*
	NHB	*2.09%*	*2.08%*	*2.05%*	*-0.6%*	*-2.0%*
	Total Transit Pct.	*3.76%*	*3.75%*	*4.15%*	*-0.3%*	*10.5%*
Truck Travel	Medium Wgt.	266,077	300,694	410,920	13.0%	54.4%
	Heavy Wgt.	135,222	157,699	253,219	16.6%	87.3%
Miscellaneous & Through	Misc. Auto Dr.	483,178	583,852	803,686	20.8%	66.3%
	Through Auto Dr.	31,815	40,704	79,585	27.9%	150.1%
	Through Trucks	26,195	32,745	65,609	25.0%	150.5%
	Airport Auto Drs.	n/a	22,499	51,010		
TOTAL VEHICLE TRIPS		16,565,832	18,361,805	25,067,912	10.8%	51.3%
Vehicle-Miles-Traveled						
Regional VMT		135,984,130	153,448,685	218,987,837	12.8%	61.0%
VMT per Capita		*26.31*	*27.26*	*29.78*	*3.6%*	*13.2%*
VMT per HH		*71.09*	*72.74*	*77.13*	*2.3%*	*8.5%*

Ref: v2tptab.xls, trip tot v2.1 f2
12/20/02

Exhibit 9-11 Estimated Volumes Across Regional Screenlines Over Time: 1994, 2000, and 2025 (in thousands)

		1994		2000		2025		% Change	
No.	Screenline Location	Volume	Link Count	Volume	Link Count	Volume	Link Count	94-'00	94-'25
1	Ring 1, Virginia	811	40	847	40	973	40	4.4%	20.0%
2	Ring 1, DC	1,121	74	1,127	74	1,246	74	0.5%	11.2%
3	Ring 3, Virginia	971	56	1,016	56	1,107	56	4.6%	14.0%
4	Ring 3, DC	1,139	68	1,139	68	1,304	68	0.0%	14.5%
5	Beltway, Virginia	1,215	52	1,277	54	1,505	58	5.1%	23.9%
6	Beltway, Maryland	1,776	98	1,884	100	2,292	104	6.1%	29.1%
7	Ring 5, Virginia	1,252	60	1,334	62	1,609	66	6.5%	28.5%
8	Ring 5, Maryland	1,633	94	1,805	96	2,323	104	10.5%	42.3%
9	Ring 7, Virginia	702	40	901	44	1,300	44	28.3%	85.2%
10	Eastern Loudoun Co.	254	14	416	20	764	22	63.8%	200.8%
11	US 15, Loudoun / Pr. William Co.	166	16	180	16	409	16	8.4%	146.4%
12	Central Montgomery Co. Radial	548	30	574	30	624	30	4.7%	13.9%
13	Eastern Montgomery Co. Radial	418	16	470	16	560	18	12.4%	34.0%
14	NE. Pr.Geo. Co. Radial	329	16	339	16	388	16	3.0%	17.9%
15	Central Pr.George's Co. Radial	291	10	322	12	409	12	10.7%	40.5%
16	Southern Pr.George's Co. Radial	256	16	252	16	369	16	-1.6%	44.1%
17	Southern Fairfax / Pr. Wm. Radial	438	26	492	28	652	30	12.3%	48.9%
18	Central Fairfax Co. Radial	677	36	760	36	1,047	38	12.3%	54.7%
19	VA Route 7 Radial	493	34	587	38	952	38	19.1%	93.1%
20	Beltway & 'Inner' Potomac Riv. Crossings	1,096	14	1,123	14	1,369	18	2.5%	24.9%
22	Central Mtg./P.G. Radial	1,490	108	1,664	114	2,183	122	11.7%	46.5%
23	NE Montgomery Co. Radial	187	24	210	24	277	24	12.3%	48.1%
24	Montgomery / Pr.Geo. Co. border	445	26	480	26	564	26	7.9%	26.7%
25	Montgomery/ Frederick Co. border	120	8	132	8	161	8	10.0%	34.2%
26	Montgomery / Howard Co. border	377	20	413	20	622	20	9.5%	65.0%
27	Pr.Geo. / Anne Arundel Co. Border	302	14	348	14	484	14	15.2%	60.3%
28	Charles / Pr.Geo. Co. Border	120	10	160	10	238	10	33.3%	98.3%
	Inner Screenline Subtotal	**18,627**	***1,020***	**20,252**	***1,052***	**25,731**	***1,092***	*8.7%*	*38.1%*
31	Frederick / Carroll Co. Border	131	20	147	20	229	20	12.2%	74.8%
32	Western Loudoun Co. Border	96	8	117	8	186	8	21.9%	93.8%
33	'Outer' Southwestern Circumferential	301	14	336	14	502	14	11.6%	66.8%
34	'Outer' Southeastern Circumferential	100	12	118	12	158	12	18.0%	58.0%
35	South of Baltimore City	843	38	978	42	1,513	42	16.0%	79.5%
36	'Outer' Northwestern Radial	78	6	96	6	150	6	23.1%	92.3%
37	'Outer' Western Circumferential	34	10	38	10	78	10	11.8%	129.4%
38	'Outer' I-95 (South) Radial	124	20	153	20	214	20	23.4%	72.6%
	Outer Screenline Subtotal	1,707	128	1,983	132	3,030	132	*16.2%*	*77.5%*
	Grand Total	***20,334***	***1,148***	***22,235***	***1,184***	***28,761***	***1,224***	***9.3%***	***41.4%***

Source: scrnsum.s, scrnsum.rpt (12/20/02)

Ref: scrnsum.xls, screen

Exhibit 9-12 Estimated VMT by Jurisdiction :1994, 2000, and 2025 (in thousands)

	VMT			Percent change	
Jurisdiction	1994	2000	2025	94 to 00	94 to 25
0 Washington DC	9,729	9,694	11,079	-0.4%	13.9%
1 Montgomery Co.	20,388	21,866	26,433	7.2%	29.6%
2 Prince George's Co.	21,675	22,837	30,191	5.4%	39.3%
3 Arlington Co.	4,488	4,690	5,312	4.5%	18.4%
4 Alexandria	2,184	2,349	2,843	7.6%	30.2%
5 Fairfax Co.	25,483	28,346	37,996	11.2%	49.1%
6 Loudoun Co.	3,036	5,158	10,807	69.9%	256.0%
7 Prince William Co.	6,282	7,452	11,840	18.6%	88.5%
9 Frederick Co.	6,534	7,997	13,207	22.4%	102.1%
10 Howard Co.	8,933	10,673	17,358	19.5%	94.3%
11 Anne Arundel Co.	10,495	13,259	20,160	26.3%	92.1%
12 Charles Co.	2,158	2,516	3,903	16.6%	80.9%
14 Carroll Co.	2,595	3,004	5,330	15.8%	105.4%
15 Calvert Co.	1,255	1,403	1,775	11.8%	41.4%
16 St Mary's Co.	1,305	1,603	2,227	22.8%	70.7%
17 King George Co.	637	601	1,186	-5.7%	86.2%
18 Fredericksburg	508	297	526	-41.5%	3.5%
19 Stafford Co.	3,222	3,666	5,490	13.8%	70.4%
20 Spotsylvania Co.	1,383	1,700	3,163	22.9%	128.7%
21 Fauquier Co.	2,104	2,435	4,790	15.7%	127.7%
22 Clarke Co.	572	740	1,427	29.4%	149.5%
23 Jefferson Co.	1019	1,166	1,946	14.4%	91.0%
Total	135,985	153,452	218,989	12.8%	61.0%

Source: scrnsum.s, scrnsum.rpt (12/20/02)

Ref: scrnsum.xls, juris

Exhibit 9-13 Average Link Speeds by Jurisdiction for the Final (Iteration #2) Traffic Assignment (in mph)

					Change	
		1994	2000	2025	94 to 25	00 to 25
AM	DC	30.39	30.54	28.24	-2.15	-2.30
	Mtg	36.67	37.07	31.25	-5.42	-5.82
	Pg	41.61	40.82	34.58	-7.03	-6.24
	Arl	35.20	34.42	32.02	-3.18	-2.40
	Alx	30.33	29.29	27.41	-2.92	-1.88
	Ffx	36.78	35.54	32.87	-3.91	-2.67
	Ldn	40.59	45.83	32.85	-7.74	-12.98
	Pw	44.59	43.65	39.81	-4.78	-3.84
	Frd	54.89	52.41	38.56	-16.33	-13.85
	How	43.96	43.98	35.36	-8.60	-8.62
	AA	43.07	45.43	30.02	-13.05	-15.41
	Chs	42.15	41.13	38.72	-3.43	-2.41
	Car	40.97	40.17	34.04	-6.93	-6.13
	Cal	47.76	47.15	42.51	-5.25	-4.64
	St M	43.26	41.02	37.19	-6.07	-3.83
	KG	43.36	43.00	39.63	-3.73	-3.37
	Fbg	57.32	54.13	42.97	-14.35	-11.16
	Staf	57.46	54.77	39.58	-17.88	-15.19
	Spots	58.92	55.77	46.41	-12.51	-9.36
	Fau	52.26	51.95	46.77	-5.49	-5.18
	Clk	44.35	43.01	36.91	-7.44	-6.10
	Jef	45.40	44.86	41.15	-4.25	-3.71
	TOTAL	40.84	40.80	34.40	-6.44	-6.40
PM	DC	25.15	25.64	22.21	-2.94	-3.43
	Mtg	28.87	27.87	21.99	-6.88	-5.88
	Pg	33.94	32.52	26.18	-7.76	-6.34
	Arl	24.52	23.34	21.01	-3.51	-2.33
	Alx	22.76	21.69	19.33	-3.43	-2.36
	Ffx	27.96	26.59	23.21	-4.75	-3.38
	Ldn	38.56	42.44	27.42	-11.14	-15.02
	Pw	40.65	39.63	35.96	-4.69	-3.67
	Frd	52.04	48.36	32.55	-19.49	-15.81
	How	36.89	36.89	26.03	-10.86	-10.86
	AA	34.06	36.07	22.04	-12.02	-14.03
	Chs	40.65	39.06	35.08	-5.57	-3.98
	Car	38.42	37.70	29.54	-8.88	-8.16
	Cal	46.42	45.26	40.46	-5.96	-4.80
	St M	42.24	39.81	34.86	-7.38	-4.95
	KG	41.59	40.79	34.47	-7.12	-6.32
	Fbg	55.40	50.95	38.79	-16.61	-12.16
	Staf	51.33	48.96	34.59	-16.74	-14.37
	Spots	57.32	53.92	40.72	-16.60	-13.20
	Fau	50.95	50.26	43.86	-7.09	-6.40
	Clk	43.89	41.88	33.43	-10.46	-8.45
	Jef	44.12	43.54	37.66	-6.46	-5.88
	TOTAL	33.93	33.54	26.80	-7.13	-6.74
Off-Pk	DC	36.85	36.34	33.97	-2.88	-2.37
	Mtg	43.24	41.88	36.46	-6.78	-5.42
	Pg	48.53	47.58	41.72	-6.81	-5.86
	Arl	42.01	39.68	39.00	-3.01	-0.68
	Alx	38.63	36.19	35.34	-3.29	-0.85
	Ffx	45.16	43.14	40.07	-5.09	-3.07
	Ldn	44.40	50.64	43.86	-0.54	-6.78
	Pw	53.02	52.07	51.57	-1.45	-0.50
	Frd	59.57	58.60	52.29	-7.28	-6.31
	How	53.98	52.64	47.07	-6.91	-5.57
	AA	49.99	51.42	43.24	-6.75	-8.18
	Chs	43.72	42.88	42.13	-1.59	-0.75
	Car	43.84	43.16	39.73	-4.11	-3.43
	Cal	49.20	48.71	44.91	-4.29	-3.80
	St M	45.12	44.33	42.67	-2.45	-1.66
	KG	44.20	44.28	42.36	-1.84	-1.92
	Fbg	58.86	56.53	48.43	-10.43	-8.10
	Staf	61.14	60.27	42.16	-18.98	-18.11
	Spots	60.51	57.79	53.77	-6.74	-4.02
	Fau	53.40	53.25	50.33	-3.07	-2.92
	Clk	45.82	45.06	41.69	-4.13	-3.37
	Jef	47.62	47.27	44.04	-3.58	-3.23
	TOTAL	47.30	46.65	42.46	-4.84	-4.19

(from the report file i2_highway_assignment.rpt) 12/19/02

Ref: spditr.xls

Appendix A
Demographic Model Performance Summaries

Comparsion of 1994 estimated and observed distributions of households by vehicle availability and jurisdiction

	Estimated number of households					Estimated distribution of households					Observed distribution of households				
Jurisdiction	**0 Veh**	**1 Veh**	**2 Veh**	**3+ Veh**	**Total**	**0 Veh**	**1 Veh**	**2 Veh**	**3+ Veh**	**Total**	**0 Veh**	**1 Veh**	**2 Veh**	**3+ Veh**	**Total**
District of Columbia	73,419	100,200	52,842	9,000	235,461	31.2%	42.6%	22.4%	3.8%	100.0%	27.6%	43.7%	24.8%	3.9%	100.0%
Montgomery Co., MD	14,449	95,813	129,301	55,390	294,953	4.9%	32.5%	43.8%	18.8%	100.0%	3.1%	31.8%	46.9%	18.2%	100.0%
Prince George's Co.	16,979	94,620	112,563	49,288	273,450	6.2%	34.6%	41.2%	18.0%	100.0%	5.7%	35.1%	40.0%	19.2%	100.0%
Arlington Co., VA	9,310	42,366	25,692	7,499	84,867	11.0%	49.9%	30.3%	8.8%	100.0%	8.5%	48.1%	30.9%	12.5%	100.0%
Alexandria, city of	5,577	28,442	16,950	4,684	55,653	10.0%	51.1%	30.5%	8.4%	100.0%	9.3%	51.7%	31.2%	7.8%	100.0%
Fairfax Co., VA	11,666	96,892	146,725	67,325	322,608	3.6%	30.0%	45.5%	20.9%	100.0%	3.3%	29.2%	47.8%	19.7%	100.0%
Loudoun Co., VA	691	8,582	18,925	10,388	38,586	1.8%	22.2%	49.0%	26.9%	100.0%	1.9%	20.1%	53.9%	24.2%	100.0%
Prince William Co., VA	2,013	21,492	43,480	22,997	89,982	2.2%	23.9%	48.3%	25.6%	100.0%	0.4%	18.5%	54.7%	26.4%	100.0%
Frederick Co., MD	1,534	15,815	28,057	14,779	60,185	2.5%	26.3%	46.6%	24.6%	100.0%	2.4%	20.1%	46.7%	30.8%	100.0%
Howard Co., MD	1,594	20,079	37,731	18,957	78,361	2.0%	25.6%	48.2%	24.2%	100.0%	n/a	n/a	n/a	n/a	n/a
Anne Arundel Co., MD	3,936	41,717	75,455	38,634	159,742	2.5%	26.1%	47.2%	24.2%	100.0%	n/a	n/a	n/a	n/a	n/a
Charles Co., MD	701	7,979	17,905	10,219	36,804	1.9%	21.7%	48.6%	27.8%	100.0%	3.9%	19.3%	48.9%	27.9%	100.0%
Carroll Co., Md	895	9,953	22,754	13,501	47,103	1.9%	21.1%	48.3%	28.7%	100.0%	n/a	n/a	n/a	n/a	n/a
Calvert Co., MD	360	4,163	9,890	5,863	20,276	1.8%	20.5%	48.8%	28.9%	100.0%	2.7%	17.7%	45.5%	34.1%	100.0%
St. Mary's Co., MD	651	6,529	12,900	7,384	27,464	2.4%	23.8%	47.0%	26.9%	100.0%	n/a	n/a	n/a	n/a	n/a
King George Co., VA	122	1,206	2,359	1,323	5,010	2.4%	24.1%	47.1%	26.4%	100.0%	n/a	n/a	n/a	n/a	n/a
Fredericksburg, city of	450	3,349	2,917	1,019	7,735	5.8%	43.3%	37.7%	13.2%	100.0%	n/a	n/a	n/a	n/a	n/a
Stafford Co., VA	371	4,291	10,749	6,468	21,879	1.7%	19.6%	49.1%	29.6%	100.0%	2.1%	14.5%	54.3%	29.1%	100.0%
Spotsylvania Co., VA	258	2,925	7,745	4,883	15,811	1.6%	18.5%	49.0%	30.9%	100.0%	n/a	n/a	n/a	n/a	n/a
Fauquier Co., VA	287	3,450	8,775	5,416	17,928	1.6%	19.2%	48.9%	30.2%	100.0%	3.0%	19.4%	47.0%	30.6%	100.0%
Clarke Co., VA	107	1,086	2,112	1,207	4,512	2.4%	24.1%	46.8%	26.8%	100.0%	n/a	n/a	n/a	n/a	n/a
Jefferson Co., WV	407	3,972	6,539	3,438	14,356	2.8%	27.7%	45.5%	23.9%	100.0%	n/a	n/a	n/a	n/a	n/a
Total	145,777	614,921	792,366	359,662	1,912,726	7.6%	32.1%	41.4%	18.8%	100.0%	8.6%	31.6%	41.0%	18.8%	100.0%

Note: The observed data shown is from 1994 HTS.

Comparsion of 1994 estimated and observed distributions of households by household size and jurisdiction

Jurisdiction	Jur cd	Estimated number of households					Estimated distribution of households					Observed distribution of households				
		1 Psn	2 Psn	3 Psn	4+Psn	Total	1 Psn	2 Psn	3 Psn	4+Psn	Total	1 Psn	2 Psn	3 Psn	4+Psn	Total
District of Columbia	0	82,256	80,993	36,656	35,604	235,509	34.9%	34.4%	15.6%	15.1%	100.0%	36.8%	35.1%	13.2%	14.9%	100.0%
Montgomery Co., MD	1	58,987	96,889	60,813	78,295	294,984	20.0%	32.8%	20.6%	26.5%	100.0%	17.6%	33.9%	17.6%	30.9%	100.0%
Prince George's Co.	2	56,903	87,991	54,770	73,782	273,446	20.8%	32.2%	20.0%	27.0%	100.0%	20.5%	32.6%	20.3%	26.6%	100.0%
Arlington Co., VA	3	32,766	28,107	12,000	12,006	84,879	38.6%	33.1%	14.1%	14.1%	100.0%	39.6%	31.9%	16.8%	11.8%	100.0%
Alexandria, city of	4	22,328	19,099	7,622	6,613	55,662	40.1%	34.3%	13.7%	11.9%	100.0%	42.0%	33.6%	10.6%	13.8%	100.0%
Fairfax Co., VA	5	66,543	101,878	64,596	89,548	322,565	20.6%	31.6%	20.0%	27.8%	100.0%	16.7%	33.7%	21.2%	28.4%	100.0%
Loudoun Co., VA	6	6,950	12,311	8,157	11,168	38,586	18.0%	31.9%	21.1%	28.9%	100.0%	16.4%	30.1%	20.3%	33.3%	100.0%
Prince William Co., VA	7	12,314	26,864	19,618	31,214	90,010	13.7%	29.8%	21.8%	34.7%	100.0%	10.5%	30.4%	22.4%	36.7%	100.0%
Frederick Co., MD	9	11,892	19,572	12,367	16,346	60,177	19.8%	32.5%	20.6%	27.2%	100.0%	15.5%	33.8%	21.0%	29.7%	100.0%
Howard Co., MD	10	15,797	25,230	15,904	21,420	78,351	20.2%	32.2%	20.3%	27.3%	100.0%	n/a	n/a	n/a	n/a	n/a
Anne Arundel Co., MD	11	28,614	49,843	32,895	48,385	159,737	17.9%	31.2%	20.6%	30.3%	100.0%	n/a	n/a	n/a	n/a	n/a
Charles Co., MD	12	5,699	11,174	7,857	12,078	36,808	15.5%	30.4%	21.3%	32.8%	100.0%	9.3%	34.7%	18.7%	37.4%	100.0%
Carroll Co., Md	14	7,302	14,617	10,139	15,042	47,100	15.5%	31.0%	21.5%	31.9%	100.0%	n/a	n/a	n/a	n/a	n/a
Calvert Co., MD	15	3,018	6,024	4,324	6,915	20,281	14.9%	29.7%	21.3%	34.1%	100.0%	8.0%	32.1%	26.8%	33.1%	100.0%
St. Mary's Co., MD	16	4,827	8,441	5,654	8,532	27,454	17.6%	30.7%	20.6%	31.1%	100.0%	n/a	n/a	n/a	n/a	n/a
King George Co., VA	17	825	1,598	1,070	1,518	5,011	16.5%	31.9%	21.4%	30.3%	100.0%	n/a	n/a	n/a	n/a	n/a
Fredericksburg, city of	18	2,051	2,663	1,431	1,588	7,733	26.5%	34.4%	18.5%	20.5%	100.0%	n/a	n/a	n/a	n/a	n/a
Stafford Co., VA	19	2,834	6,461	4,801	7,782	21,878	13.0%	29.5%	21.9%	35.6%	100.0%	9.2%	33.0%	13.8%	44.0%	100.0%
Spotsylvania Co., VA	20	1,855	4,554	3,488	5,914	15,811	11.7%	28.8%	22.1%	37.4%	100.0%	n/a	n/a	n/a	n/a	n/a
Fauquier Co., VA	21	2,815	5,555	3,871	5,691	17,932	15.7%	31.0%	21.6%	31.7%	100.0%	14.2%	38.1%	16.0%	31.7%	100.0%
Clarke Co., VA	22	916	1,486	916	1,195	4,513	20.3%	32.9%	20.3%	26.5%	100.0%	n/a	n/a	n/a	n/a	n/a
Jefferson Co., WV	23	3,548	4,788	2,708	3,311	14,355	24.7%	33.4%	18.9%	23.1%	100.0%	n/a	n/a	n/a	n/a	n/a
Total		431,040	616,138	371,657	493,947	1,912,782	22.5%	32.2%	19.4%	25.8%	100.0%	22.0%	33.4%	18.4%	26.2%	100.0%

Comparsion of 1994 estimated and observed distributions of households by household income and jurisdiction

Jurisdiction	Jur cd	Estimated number of households					Estimated distribution of households					Observed distribution of households				
		Inc 1	Inc 2	Inc 3	Inc 4	Total	Inc 1	Inc 2	Inc 3	Inc 4	Total	Inc 1	Inc 2	Inc 3	Inc 4	Total
District of Columbia	0	107,132	60,537	40,580	27,261	235,510	45.5%	25.7%	17.2%	11.6%	100.0%	36.9%	19.6%	19.4%	24.2%	100.0%
Montgomery Co., MD	1	57,563	71,560	76,510	89,351	294,984	19.5%	24.3%	25.9%	30.3%	100.0%	18.8%	19.7%	27.9%	33.6%	100.0%
Prince George's Co.	2	80,026	79,003	66,388	48,029	273,446	29.3%	28.9%	24.3%	17.6%	100.0%	23.5%	29.4%	32.0%	15.0%	100.0%
Arlington Co., VA	3	23,096	24,815	20,906	16,060	84,877	27.2%	29.2%	24.6%	18.9%	100.0%	23.9%	22.3%	24.5%	29.3%	100.0%
Alexandria, city of	4	16,628	17,019	13,064	8,951	55,662	29.9%	30.6%	23.5%	16.1%	100.0%	26.6%	19.7%	25.8%	27.9%	100.0%
Fairfax Co., VA	5	51,667	73,588	91,246	106,065	322,566	16.0%	22.8%	28.3%	32.9%	100.0%	12.6%	17.0%	31.7%	38.7%	100.0%
Loudoun Co., VA	6	7,134	10,044	11,683	9,725	38,586	18.5%	26.0%	30.3%	25.2%	100.0%	19.5%	18.6%	28.3%	33.6%	100.0%
Prince William Co., VA	7	20,860	25,603	24,957	18,591	90,011	23.2%	28.4%	27.7%	20.7%	100.0%	16.6%	26.8%	29.2%	27.4%	100.0%
Frederick Co., MD	9	17,887	19,151	14,598	8,541	60,177	29.7%	31.8%	24.3%	14.2%	100.0%	25.7%	26.6%	31.0%	16.6%	100.0%
Howard Co., MD	10	12,815	19,918	24,450	21,166	78,349	16.4%	25.4%	31.2%	27.0%	100.0%	n/a	n/a	n/a	n/a	n/a
Anne Arundel Co., MD	11	39,799	47,974	43,168	28,796	159,737	24.9%	30.0%	27.0%	18.0%	100.0%	n/a	n/a	n/a	n/a	n/a
Charles Co., MD	12	9,112	10,830	10,045	6,819	36,806	24.8%	29.4%	27.3%	18.5%	100.0%	26.0%	22.5%	30.3%	21.2%	100.0%
Carroll Co., Md	14	13,563	15,446	11,569	6,522	47,100	28.8%	32.8%	24.6%	13.8%	100.0%	n/a	n/a	n/a	n/a	n/a
Calvert Co., MD	15	4,845	6,138	5,580	3,718	20,281	23.9%	30.3%	27.5%	18.3%	100.0%	23.4%	22.7%	36.8%	17.1%	100.0%
St. Mary's Co., MD	16	10,086	8,623	5,692	3,053	27,454	36.7%	31.4%	20.7%	11.1%	100.0%	n/a	n/a	n/a	n/a	n/a
King George Co., VA	17	1,980	1,656	932	443	5,011	39.5%	33.0%	18.6%	8.8%	100.0%	n/a	n/a	n/a	n/a	n/a
Fredericksburg, city of	18	4,356	1,947	997	433	7,733	56.3%	25.2%	12.9%	5.6%	100.0%	n/a	n/a	n/a	n/a	n/a
Stafford Co., VA	19	5,396	7,017	5,935	3,530	21,878	24.7%	32.1%	27.1%	16.1%	100.0%	19.2%	28.7%	30.9%	21.3%	100.0%
Spotsylvania Co., VA	20	4,202	5,163	4,088	2,359	15,812	26.6%	32.7%	25.9%	14.9%	100.0%	n/a	n/a	n/a	n/a	n/a
Fauquier Co., VA	21	4,422	5,557	4,881	3,072	17,932	24.7%	31.0%	27.2%	17.1%	100.0%	27.2%	22.4%	29.1%	21.3%	100.0%
Clarke Co., VA	22	1,958	1,446	759	350	4,513	43.4%	32.0%	16.8%	7.8%	100.0%	n/a	n/a	n/a	n/a	n/a
Jefferson Co., WV	23	6,709	4,343	2,268	1,035	14,355	46.7%	30.3%	15.8%	7.2%	100.0%	n/a	n/a	n/a	n/a	n/a
Total		501,236	517,378	480,296	413,870	1,912,780	26.2%	27.0%	25.1%	21.6%	100.0%	23.7%	21.9%	27.4%	27.0%	100.0%

Appendix B
Trip Distribution Model Performance Summaries

1994 Estimated HBW Motorized Person Trips

Note: Some trips were removed for IJs with no observed data

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	20119	8986	2019	1442	1445	2161	866	2233	73	50	11	0	385	940	10	2	35	3	3	2	1	2	1316	42104
2DCNCR	128956	69588	18959	11128	6404	9526	5277	13463	515	285	147	14	3468	7881	108	19	381	16	19	4	30	4	1098	277290
3MTG	125432	53664	253436	16846	9282	13604	5270	27478	1725	416	4201	604	4490	3609	118	17	324	49	13	163	23	3	22921	543688
4PG	94547	54380	30545	216498	10445	17567	7944	24184	689	633	235	42	4418	17785	1636	574	6444	30	38	5	67	145	5024	493875
5ARLCR	3082	902	332	176	664	885	291	809	31	16	5	0	35	112	1	0	6	2	1	0	1	0	183	7534
6ARLNCR	48253	7494	6983	3068	9211	22102	8463	22583	925	488	72	4	706	1886	28	3	99	48	31	4	49	3	3360	135863
7ALX	30154	4338	3061	2534	4754	10793	13902	18278	387	566	22	2	365	1266	34	11	163	23	35	1	61	3	1894	92647
8FFX	113061	38213	24768	9039	22417	63018	36050	298516	19559	10206	491	10	2254	3992	151	25	668	1110	499	155	925	56	11072	656255
9LDN	3196	1320	4517	621	1224	2632	1103	26342	28421	1302	2803	112	613	269	0	0	7	764	12	1141	18	0	1878	78295
10PW	9564	3996	4413	2514	4524	10829	9971	60678	5235	54371	111	0	219	505	19	10	96	2871	2258	91	3866	250	3540	179931
11FRD	2465	1545	24405	1373	659	1357	304	2967	3494	77	63589	5286	2619	204	1	0	5	42	0	1796	1	0	9710	121899
12CAR	94	86	3482	265	26	60	18	219	281	1	8239	49774	7760	448	0	0	0	2	0	181	0	0	12886	83822
13HOW	4542	2542	11365	10944	673	960	425	1741	170	24	2217	1049	53842	15069	20	1	56	2	0	96	0	0	31366	137104
14AAR	10171	5548	6634	20249	1861	3380	1182	3444	76	65	44	16	16625	165324	1524	252	1149	2	3	4	2	13	35964	273532
15CAL	2529	1474	744	3716	453	850	550	811	8	16	0	1	364	5821	13719	5852	1690	1	1	0	5	77	414	39096
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	284	284
17CHS	9010	2527	969	13359	745	1432	1286	1821	18	54	2	0	404	3596	1578	2648	28514	2	27	0	82	1183	739	69996
18FAU	93	59	164	44	64	218	196	7013	2224	4594	81	2	13	25	1	2	9	11499	898	217	1309	70	973	29768
19STA	1532	613	519	360	693	1660	1684	7347	113	7467	0	0	24	57	12	66	240	711	7213	1	9738	833	1968	42851
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3952	3952
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4766	4766
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	251	251
23EXTL	7722	5360	18694	16360	1707	3696	2435	19982	5072	6589	17953	17420	26722	71950	517	532	1462	5076	1806	7675	8538	858	0	248126
TOTAL	614522	262635	416009	330536	77251	166730	97217	539909	69016	87220	100223	74336	125326	300739	19477	10014	41348	22253	12857	11536	24716	3500	155559	3562929

1994 Observed HBW Motorized Person Trips

NOTE: Non-Wk Obs Trips Ftrd by 1.50 to Account for Under-Reporting

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	20769	8122	1870	1541	0	1182	1468	6179	0	0	0	0	0	0	0	0	0	0	0	0	0	0	918	42049
2DCNCR	128982	70048	28579	12144	6205	6974	2630	9712	0	632	0	0	562	562	0	0	0	0	0	0	0	0	624	267654
3MTG	110067	49962	263802	25834	8186	11825	7286	29623	0	0	4035	607	5754	1803	0	0	0	1190	0	0	0	0	10740	530714
4PG	101269	62380	42840	202304	7135	17651	924	19490	0	0	0	604	6499	15273	0	2260	10386	0	0	0	1408	0	6110	496533
5ARLCR	4128	367	684	0	652	1408	310	310	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7859
6ARLNCR	48271	13132	6320	3031	7730	30255	5021	20197	679	0	0	0	0	0	0	0	0	0	0	0	0	0	408	135044
7ALX	26684	6443	3588	1690	5129	9695	19678	17255	205	426	207	0	213	0	0	0	0	0	0	0	0	0	1451	92664
8FFX	103655	26554	21364	6079	27373	62495	46336	309728	25482	11041	0	0	0	1282	0	646	0	0	0	0	0	0	4767	646802
9LDN	4215	709	1877	355	2143	2957	154	28494	34180	2002	564	0	0	0	0	0	282	1676	0	0	0	0	1447	81055
10PW	16368	6190	3320	1348	4560	7171	5819	58744	4867	58322	0	0	0	957	0	0	0	2307	2022	0	0	638	2759	175392
11FRD	2092	240	25532	1374	448	1790	0	3056	337	0	71995	1113	676	224	0	0	0	0	0	0	0	0	8809	117686
12CAR	500	278	3377	6209	0	0	0	0	0	0	0	36272	3050	8714	0	0	0	0	0	0	0	0	25915	84315
13HOW	8251	3394	8062	14066	0	0	0	2316	0	0	0	1372	50688	19555	0	0	0	0	0	0	0	0	35324	143028
14AAR	13800	4820	3586	38253	0	0	0	4284	0	0	0	1594	14544	150621	0	0	498	0	0	0	0	0	39355	271355
15CAL	3016	2081	1238	7673	0	1112	352	176	0	0	0	0	0	1345	15452	1568	468	0	0	0	0	298	133	34912
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	293	293
17CHS	7591	3262	500	15099	2690	2466	1404	2875	0	0	0	0	556	850	568	1606	30177	0	0	0	0	1752	780	72176
18FAU	1163	445	314	140	143	552	0	6975	1396	2952	0	0	0	0	0	0	0	15048	256	0	0	132	1885	31401
19STA	1203	710	168	0	1241	2676	1040	9390	0	12771	0	0	0	179	0	0	0	346	13328	0	8219	862	1532	53665
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7517	7517
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4286	4286
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	498	498
23EXTL	6370	5049	15904	16109	1257	3434	1056	16487	4507	5361	14695	14988	36359	80534	42	263	656	5372	2370	8691	6202	2442	0	248148
TOTAL	608394	264186	432925	353249	74892	163643	93478	545291	71653	93507	91496	56550	118901	281899	16062	6343	42467	25939	17976	8691	15829	6124	155551	3545046

1994 Difference (Estimated - Observed) HBW Motorized Person Trips

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	-650	864	149	-99	1445	979	-602	-3946	73	50	11	0	385	940	10	2	35	3	3	2	1	2	398	55
2DCNCR	-26	-460	-9620	-1016	199	2552	2647	3751	515	-347	147	14	2906	7319	108	19	381	16	19	4	30	4	474	9636
3MTG	15365	3702	-10366	-8988	1096	1779	-2016	-2145	1725	416	166	-3	-1264	1806	118	17	324	-1141	13	163	23	3	12181	12974
4PG	-6722	-8000	-12295	14194	3310	-84	7020	4694	689	633	235	-562	-2081	2512	1636	-1686	-3942	30	38	5	-1341	145	-1086	-2658
5ARLCR	-1046	535	-352	176	12	-523	-19	499	31	16	5	0	35	112	1	0	6	2	1	0	1	0	183	-325
6ARLNCR	-18	-5638	663	37	1481	-8153	3442	2386	246	488	72	4	706	1886	28	3	99	48	31	4	49	3	2952	819
7ALX	3470	-2105	-527	844	-375	1098	-5776	1023	182	140	-185	2	152	1266	34	11	163	23	35	1	61	3	443	-17
8FFX	9406	11659	3404	2960	-4956	523	-10286	-11212	-5923	-835	491	10	2254	2710	151	-621	668	1110	499	155	925	56	6305	9453
9LDN	-1019	611	2640	266	-919	-325	949	-2152	-5759	-700	2239	112	613	269	0	0	-275	-912	12	1141	18	0	431	-2760
10PW	-6804	-2194	1093	1166	-36	3658	4152	1934	368	-3951	111	0	219	-452	19	10	96	564	236	91	3866	-388	781	4539
11FRD	373	1305	-1127	-1	211	-433	304	-89	3157	77	-8406	4173	1943	-20	1	0	5	42	0	1796	1	0	901	4213
12CAR	-406	-192	105	-5944	26	60	18	219	281	1	8239	13502	4710	-8266	0	0	0	2	0	181	0	0	-13029	-493
13HOW	-3709	-852	3303	-3122	673	960	425	-575	170	24	2217	-323	3154	-4486	20	1	56	2	0	96	0	0	-3958	-5924
14AAR	-3629	728	3048	-18004	1861	3380	1182	-840	76	65	44	-1578	2081	14703	1524	252	651	2	3	4	2	13	-3391	2177
15CAL	-487	-607	-494	-3957	453	-262	198	635	8	16	0	1	364	4476	-1733	4284	1222	1	1	0	5	-221	281	4184
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-9	-9
17CHS	1419	-735	469	-1740	-1945	-1034	-118	-1054	18	54	2	0	-152	2746	1010	1042	-1663	2	27	0	82	-569	-41	-2180
18FAU	-1070	-386	-150	-96	-79	-334	196	38	828	1642	81	2	13	25	1	2	9	-3549	642	217	1309	-62	-912	-1633
19STA	329	-97	351	360	-548	-1016	644	-2043	113	-5304	0	0	24	-122	12	66	240	365	-6115	1	1519	-29	436	-10814
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3565	-3565
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	480	480
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-247	-247
23EXTL	1352	311	2790	251	450	262	1379	3495	565	1228	3258	2432	-9637	-8584	475	269	806	-296	-564	-1016	2336	-1584	0	-22
TOTAL	6128	-1551	-16916	-22713	2359	3087	3739	-5382	-2637	-6287	8727	17786	6425	18840	3415	3671	-1119	-3686	-5119	2845	8887	-2624	8	17883

1994 Ratio (Estimated / Observed) HBW Motorized Person Trips

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	0.97	1.11	1.08	0.94	0.00	1.83	0.59	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.43	1.00
2DCNCR	1.00	0.99	0.66	0.92	1.03	1.37	2.01	1.39	0.00	0.45	0.00	0.00	6.17	14.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.76	1.04
3MTG	1.14	1.07	0.96	0.65	1.13	1.15	0.72	0.93	0.00	0.00	1.04	1.00	0.78	2.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	2.13	1.02
4PG	0.93	0.87	0.71	1.07	1.46	1.00	8.60	1.24	0.00	0.00	0.00	0.07	0.68	1.16	0.00	0.25	0.62	0.00	0.00	0.00	0.05	0.00	0.82	0.99
5ARLCR	0.75	2.46	0.49	0.00	1.02	0.63	0.94	2.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96
6ARLNCR	1.00	0.57	1.10	1.01	1.19	0.73	1.69	1.12	1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.24	1.01
7ALX	1.13	0.67	0.85	1.50	0.93	1.11	0.71	1.06	1.89	1.33	0.11	0.00	1.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31	1.00
8FFX	1.09	1.44	1.16	1.49	0.82	1.01	0.78	0.96	0.77	0.92	0.00	0.00	0.00	3.11	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	2.32	1.01
9LDN	0.76	1.86	2.41	1.75	0.57	0.89	7.16	0.92	0.83	0.65	4.97	0.00	0.00	0.00	0.00	0.00	0.02	0.46	0.00	0.00	0.00	0.00	1.30	0.97
10PW	0.58	0.65	1.33	1.86	0.99	1.51	1.71	1.03	1.08	0.93	0.00	0.00	0.00	0.53	0.00	0.00	0.00	1.24	1.12	0.00	0.00	0.39	1.28	1.03
11FRD	1.18	6.44	0.96	1.00	1.47	0.76	0.00	0.97	10.37	0.00	0.88	4.75	3.87	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	1.04
12CAR	0.19	0.31	1.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.37	2.54	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.99
13HOW	0.55	0.75	1.41	0.78	0.00	0.00	0.00	0.75	0.00	0.00	0.00	0.76	1.06	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89	0.96
14AAR	0.74	1.15	1.85	0.53	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.01	1.14	1.10	0.00	0.00	2.31	0.00	0.00	0.00	0.00	0.00	0.91	1.01
15CAL	0.84	0.71	0.60	0.48	0.00	0.76	1.56	4.61	0.00	0.00	0.00	0.00	0.00	4.33	0.89	3.73	3.61	0.00	0.00	0.00	0.00	0.26	3.11	1.12
16STM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97	0.97
17CHS	1.19	0.77	1.94	0.88	0.28	0.58	0.92	0.63	0.00	0.00	0.00	0.00	0.73	4.23	2.78	1.65	0.94	0.00	0.00	0.00	0.00	0.68	0.95	0.97
18FAU	0.08	0.13	0.52	0.31	0.45	0.39	0.00	1.01	1.59	1.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	3.51	0.00	0.00	0.53	0.52	0.95
19STA	1.27	0.86	3.09	0.00	0.56	0.62	1.62	0.78	0.00	0.58	0.00	0.00	0.00	0.32	0.00	0.00	0.00	2.05	0.54	0.00	1.18	0.97	1.28	0.80
20CL&JEF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.53
21FBG&SP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11	1.11
22KGEO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50
23EXTL	1.21	1.06	1.18	1.02	1.36	1.08	2.31	1.21	1.13	1.23	1.22	1.16	0.73	0.89	12.31	2.02	2.23	0.94	0.76	0.88	1.38	0.35	0.00	1.00
TOTAL	1.01	0.99	0.96	0.94	1.03	1.02	1.04	0.99	0.96	0.93	1.10	1.31	1.05	1.07	1.21	1.58	0.97	0.86	0.72	1.33	1.56	0.57	1.00	1.01

1994 Estimated HBS Motorized Person Trips

Note: Some trips were removed for IJs with no observed data

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	3630	4264	1275	1966	343	1689	913	2058	8	64	3	7	28	96	3	46	14	1	5	9	36	2	10	16470
2DCNCR	14335	86214	28021	26743	1518	6035	4959	12033	46	234	24	27	303	1071	17	168	165	1	20	27	123	2	254	182340
3MTG	951	7805	456464	12759	217	1603	493	5623	97	73	1444	85	3450	1231	24	244	47	6	22	34	190	4	2311	495177
4PG	2117	4963	9113	313870	244	1304	3448	6463	26	309	47	48	2844	15034	290	379	13068	7	44	58	293	5	2788	376762
5ARLCR	500	642	231	198	845	1533	494	1782	7	27	0	1	4	5	0	8	2	0	1	1	7	0	0	6288
6ARLNCR	1790	2527	1379	1007	1165	52075	6089	24101	69	346	6	2	15	32	3	37	8	1	5	1	42	1	11	90712
7ALX	689	986	308	1022	372	4909	40770	20455	12	522	5	4	7	27	2	33	20	3	14	4	40	2	10	70216
8FFX	1330	3369	8443	2953	914	9984	17227	489490	13138	11057	128	90	95	448	69	863	158	214	306	125	909	22	229	561561
9LDN	42	85	591	164	15	184	78	9878	36979	427	1079	34	95	231	28	232	81	91	37	1120	251	10	504	52236
10PW	28	65	150	105	15	159	510	11632	527	120622	49	47	43	188	29	370	57	1374	2339	63	4227	5	215	142819
11FRD	40	69	3444	271	5	42	64	572	115	80	67339	962	710	244	17	29	105	15	27	95	126	2	5020	79393
12CAR	92	117	956	545	17	67	100	980	98	142	625	35585	2063	373	24	32	123	17	49	12	266	0	20497	62780
13HOW	4	44	3119	4329	2	12	8	82	5	13	865	676	65530	4204	20	184	29	7	22	31	134	2	9570	88892
14AAR	80	147	659	12470	10	50	89	440	40	68	55	45	3936	190980	578	322	340	11	53	46	343	5	11235	222002
15CAL	28	53	190	1336	6	22	37	264	26	35	21	10	76	534	24199	1475	214	5	26	13	129	3	3	28705
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	12
17CHS	50	66	357	962	9	36	58	529	53	67	19	1	159	191	325	355	48105	11	28	2	117	27	32	51559
18FAU	40	62	366	264	9	37	54	938	798	2030	34	18	150	240	25	95	75	16658	1020	59	1307	5	838	25122
19STA	3	5	22	17	0	4	12	157	2	1358	0	0	6	16	0	12	2	8	16406	2	15379	4	193	33608
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8647	8647
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	536	536
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	524	524
23EXTL	4	152	1836	4597	1	13	11	331	92	619	2729	10677	8686	30473	2	5	34	1724	907	1895	6138	332	0	71258
TOTAL	25753	111635	516924	385578	5707	79758	75414	587808	52138	138093	74472	48319	88200	245618	25655	4889	62647	20154	21331	3597	30057	433	63439	2667619

1994 Observed HBS Motorized Person Trips

NOTE: Non-Wk Obs Trips Ftrd by 1.50 to Account for Under-Reporting

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	2758	4806	2056	1056	780	394	0	612	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	12484
2DCNCR	12003	92774	27993	29780	0	3994	897	3586	0	0	0	0	390	597	0	0	0	0	0	0	0	0	710	172724
3MTG	0	6478	466383	13462	1776	2118	0	926	0	0	870	0	0	0	0	0	0	0	0	0	0	0	1952	493966
4PG	1772	0	12861	325604	0	2079	0	8361	0	2732	0	0	1316	6765	0	0	16684	0	0	0	0	0	1099	379272
5ARLCR	465	0	0	0	1491	465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2421
6ARLNCR	489	465	1443	0	2878	58330	6405	24057	465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94533
7ALX	164	154	0	320	0	4480	45852	17052	0	1010	0	0	0	0	0	0	0	0	0	0	0	0	0	69032
8FFX	2894	0	3896	0	2769	8558	19077	500487	10676	6519	0	0	0	0	0	0	0	0	0	0	0	0	269	555143
9LDN	0	0	208	0	0	0	0	6016	42236	208	1713	0	0	0	212	0	0	0	0	0	0	0	719	51312
10PW	0	0	0	0	0	0	0	7911	234	130164	0	0	0	0	0	0	0	1173	0	0	0	0	0	139482
11FRD	0	0	6316	0	0	0	0	0	0	0	69753	1328	0	0	0	0	0	0	0	0	0	0	2340	79737
12CAR	0	0	705	1017	0	0	0	0	0	0	0	24417	0	861	0	0	0	0	0	0	0	0	22107	49107
13HOW	0	0	1064	1064	0	0	0	0	0	0	0	531	70172	3722	0	0	399	0	0	0	0	0	12481	89431
14AAR	0	0	441	7341	0	0	0	0	0	0	0	0	2055	188355	0	0	1908	0	0	0	0	0	10769	210869
15CAL	0	114	0	552	0	0	0	0	0	0	0	0	0	897	21638	843	420	264	0	0	0	0	0	24728
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	84
17CHS	0	208	0	2444	0	0	0	417	0	0	0	0	0	0	0	104	54202	0	0	0	0	206	0	57580
18FAU	192	0	0	210	0	0	0	644	0	2112	0	0	0	0	0	0	0	18201	0	0	384	0	1354	23096
19STA	252	0	0	0	0	520	0	756	0	1600	0	0	0	0	0	0	0	0	22092	0	9496	537	0	35254
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8163	8163
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	802	802
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	507	507
23EXTL	0	375	776	1088	0	148	0	1108	58	1119	2931	10777	8081	35334	0	0	0	1196	156	1560	6570	0	0	71277
TOTAL	20988	105375	524142	383936	9694	81088	72231	571933	53668	145464	75267	37052	82013	236530	21849	946	73614	20834	22248	1560	16450	742	63377	2621004

1994 Difference (Estimated - Observed) HBS Motorized Person Trips

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	872	-542	-782	910	-437	1294	913	1446	8	64	3	7	28	96	3	46	14	1	5	9	36	2	-11	3986
2DCNCR	2332	-6560	28	-3036	1518	2040	4062	8446	46	234	24	27	-87	474	17	168	165	1	20	27	123	2	-456	9616
3MTG	951	1326	-9919	-704	-1559	-515	493	4698	97	73	574	85	3450	1231	24	244	47	6	22	34	190	4	359	1212
4PG	346	4963	-3748	-11734	244	-775	3448	-1898	26	-2422	47	48	1528	8269	290	379	-3616	7	44	58	293	5	1689	-2510
5ARLCR	35	642	231	198	-646	1068	494	1782	7	27	0	1	4	5	0	8	2	0	1	1	7	0	0	3867
6ARLNCR	1301	2062	-64	1007	-1714	-6256	-316	44	-396	346	6	2	15	32	3	37	8	1	5	1	42	1	11	-3821
7ALX	526	832	308	702	372	428	-5082	3403	12	-488	5	4	7	27	2	33	20	3	14	4	40	2	10	1184
8FFX	-1564	3369	4548	2953	-1855	1426	-1850	-10997	2462	4538	128	90	95	448	69	863	158	214	306	125	909	22	-40	6418
9LDN	42	85	382	164	15	184	78	3862	-5256	218	-634	34	95	231	-184	232	81	91	37	1120	251	10	-215	924
10PW	28	65	150	105	15	159	510	3721	293	-9542	49	47	43	188	29	370	57	201	2339	63	4227	5	215	3337
11FRD	40	69	-2872	271	5	42	64	572	115	80	-2414	-366	710	244	17	29	105	15	27	95	126	2	2680	-344
12CAR	92	117	251	-472	17	67	100	980	98	142	625	11168	2063	-488	24	32	123	17	49	12	266	0	-1610	13673
13HOW	4	44	2056	3266	2	12	8	82	5	13	865	145	-4642	482	20	184	-370	7	22	31	134	2	-2911	-539
14AAR	80	147	218	5129	10	50	89	440	40	68	55	45	1881	2625	578	322	-1568	11	53	46	343	5	466	11133
15CAL	28	-61	190	784	6	22	37	264	26	35	21	10	76	-363	2562	632	-206	-259	26	13	129	3	3	3978
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-72	-72
17CHS	50	-142	357	-1482	9	36	58	112	53	67	19	1	159	191	325	252	-6098	11	28	2	117	-178	32	-6022
18FAU	-152	62	366	54	9	37	54	294	798	-82	34	18	150	240	25	95	75	-1543	1020	59	923	5	-516	2026
19STA	-249	5	22	17	0	-516	12	-599	2	-242	0	0	6	16	0	12	2	8	-5686	2	5882	-533	193	-1646
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	484	484
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-266	-266
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	17
23EXTL	4	-223	1060	3509	1	-135	11	-777	34	-500	-202	-100	605	-4861	2	5	34	528	751	335	-432	332	0	-19
TOTAL	4765	6260	-7218	1642	-3988	-1330	3183	15875	-1530	-7371	-795	11266	6187	9088	3806	3942	-10967	-680	-917	2037	13606	-310	62	46614

1994 Ratio (Estimated / Observed) HBS Motorized Person Trips

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	1.32	0.89	0.62	1.86	0.44	4.28	0.00	3.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	1.32
2DCNCR	1.19	0.93	1.00	0.90	0.00	1.51	5.53	3.36	0.00	0.00	0.00	0.00	0.78	1.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	1.06
3MTG	0.00	1.20	0.98	0.95	0.12	0.76	0.00	6.08	0.00	0.00	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	1.00
4PG	1.20	0.00	0.71	0.96	0.00	0.63	0.00	0.77	0.00	0.11	0.00	0.00	2.16	2.22	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.00	2.54	0.99
5ARLCR	1.08	0.00	0.00	0.00	0.57	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60
6ARLNCR	3.66	5.43	0.96	0.00	0.40	0.89	0.95	1.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96
7ALX	4.21	6.38	0.00	3.20	0.00	1.10	0.89	1.20	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02
8FFX	0.46	0.00	2.17	0.00	0.33	1.17	0.90	0.98	1.23	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	1.01
9LDN	0.00	0.00	2.83	0.00	0.00	0.00	0.00	1.64	0.88	2.05	0.63	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	1.02
10PW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.47	2.25	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.17	0.00	0.00	0.00	0.00	0.00	1.02
11FRD	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.15	1.00
12CAR	0.00	0.00	1.36	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	1.28
13HOW	0.00	0.00	2.93	4.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	0.93	1.13	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.77	0.99
14AAR	0.00	0.00	1.49	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92	1.01	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	1.04	1.05
15CAL	0.00	0.46	0.00	2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	1.12	1.75	0.51	0.02	0.00	0.00	0.00	0.00	0.00	1.16
16STM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.14
17CHS	0.00	0.32	0.00	0.39	0.00	0.00	0.00	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.43	0.89	0.00	0.00	0.00	0.00	0.13	0.00	0.90
18FAU	0.21	0.00	0.00	1.26	0.00	0.00	0.00	1.46	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00	0.00	3.40	0.00	0.62	1.09
19STA	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.21	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.00	1.62	0.01	0.00	0.95
20CL&JEF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	1.06
21FBG&SP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.67
22KGEO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03	1.03
23EXTL	0.00	0.41	2.37	4.23	0.00	0.09	0.00	0.30	1.59	0.55	0.93	0.99	1.07	0.86	0.00	0.00	0.00	1.44	5.81	1.21	0.93	0.00	0.00	1.00
TOTAL	1.23	1.06	0.99	1.00	0.59	0.98	1.04	1.03	0.97	0.95	0.99	1.30	1.08	1.04	1.17	5.17	0.85	0.97	0.96	2.31	1.83	0.58	1.00	1.02

1994 Estimated HBO Motorized Person Trips

Note: Some trips were removed for IJs with no observed data

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	14798	18909	3830	5027	974	4205	1585	3373	81	101	6	0	145	234	4	2	17	5	14	2	2	0	1058	54372
2DCNCR	116825	389783	68639	29120	6299	17674	14389	9849	916	837	97	17	2817	1669	98	12	210	16	79	34	53	9	16578	676020
3MTG	30983	640871	272717	46131	2535	9805	5756	16240	2717	611	4551	766	3874	6964	32	53	54	14	43	650	59	20	33280	1501942
4PG	25673	90804	50978	861693	2999	6998	9665	13596	346	1013	81	41	15535	29215	1240	338	7579	3	128	34	60	81	26487	1144587
5ARLCR	1973	3048	954	632	2536	3439	1109	2279	46	62	5	0	13	32	0	0	2	2	3	0	3	0	301	16439
6ARLNCR	17911	18230	9263	6706	8808	202198	16089	40000	1509	1549	45	9	159	540	28	7	43	46	135	17	118	8	6452	329870
7ALX	6176	8777	3458	4526	2348	12155	79063	30731	276	1247	8	3	86	209	22	5	38	16	109	4	67	1	2929	152254
8FFX	45402	14361	19433	10448	6237	42745	437211	287433	21884	11716	134	39	447	705	60	48	159	641	623	174	411	26	25913	1532760
9LDN	563	1110	2749	306	185	1490	528	20058	131923	1945	2568	50	158	50	4	16	24	1232	14	4542	16	10	3266	172807
10PW	4740	5720	3437	2683	1180	7589	9527	46752	7118	316333	25	37	81	194	26	60	39	2543	8579	421	6681	111	9553	433429
11FRD	204	702	13785	383	50	317	106	977	2452	27	231591	4664	3764	81	11	23	26	9	13	4465	17	13	11042	274722
12CAR	140	311	3141	356	34	122	90	364	91	95	7579	141324	8731	140	13	18	97	34	24	95	17	4	20090	182910
13HOW	763	3487	9882	14275	72	278	198	418	121	15	1653	2830	199566	13585	15	24	14	3	6	244	15	13	18500	265977
14AAR	1705	11767	8691	28103	368	867	949	1415	55	88	28	19	19742	645834	1707	79	610	17	22	41	21	10	45571	767709
15CAL	521	1389	466	7399	61	265	410	605	26	59	21	11	135	3583	75748	8178	2348	26	13	22	18	24	1007	102335
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	873	873
17CHS	526	1021	357	8543	49	280	496	879	40	79	17	19	151	550	1126	3491	151298	68	29	39	29	1988	2088	173163
18FAU	214	330	497	164	67	586	277	5251	3062	9156	26	30	68	92	15	53	63	43670	2993	1000	1309	31	2810	71764
19STA	290	472	149	245	91	527	693	2305	29	9714	6	8	27	27	2	9	23	1189	55914	12	16284	322	3490	91828
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5836	5836
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9110	9110
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	694	694
23EXTL	2213	9888	23185	17121	444	4172	2365	18332	2566	5240	8128	11192	16982	37400	533	531	1297	1430	2177	5404	6458	386	0	177444
TOTAL	271620	644196	1495611	1043861	35337	315712	187016	1500857	175258	359887	256569	161059	272481	741104	80684	12947	163941	50964	70918	17200	31638	3057	246928	8138845

1994 Observed HBO Motorized Person Trips

NOTE: Non-Wk Obs Trips Ftrd by 1.50 to Account for Under-Reporting

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	16940	18183	2968	2506	0	2928	4916	1680	0	390	0	0	933	1632	0	0	0	0	0	0	0	0	677	53753
2DCNCR	113766	385101	70356	48592	4090	19272	4546	17787	1224	0	474	0	780	1722	780	0	0	0	0	0	0	0	6354	674846
3MTG	33504	757341	273918	54070	926	7994	2608	11030	422	447	4200	0	0	7170	944	0	870	0	0	0	842	0	30360	1505037
4PG	26268	85262	65619	879488	813	3490	8610	9312	2802	4646	0	0	5246	22958	1719	848	28132	0	0	0	0	0	16011	1161222
5ARLCR	1467	1026	0	0	0	1989	1101	930	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	6536
6ARLNCR	19671	18236	4803	1449	11464	195932	12933	47358	2523	465	0	0	1086	513	0	0	930	0	0	0	0	0	4940	322302
7ALX	4742	5607	3986	1947	4562	11078	89050	35900	310	0	926	0	0	0	0	0	0	0	0	310	0	0	1143	159560
8FFX	39261	7983	15898	6084	5344	56828	536071	274862	21686	8056	0	0	914	0	0	0	0	0	2344	0	1920	914	28480	1524181
9LDN	208	208	1089	219	0	654	417	22413	142890	537	434	0	212	0	0	0	0	524	0	417	0	0	1688	171910
10PW	1944	2922	1982	957	0	3968	10095	44538	9606	336105	0	0	0	933	0	0	0	2240	4437	933	0	0	5896	426554
11FRD	849	0	11518	1011	0	0	0	328	1726	0	244560	1328	3366	328	684	0	0	0	0	0	0	0	8935	274634
12CAR	0	0	1662	9930	0	0	0	0	0	0	0	131842	2896	828	0	0	0	0	0	0	0	0	31069	178228
13HOW	0	0	10122	16448	0	0	0	474	0	0	0	1581	197998	11703	0	0	474	0	0	0	0	0	27052	265852
14AAR	0	0	2853	27326	0	0	0	2853	0	0	0	0	7508	615862	0	0	0	0	0	0	0	0	53255	709656
15CAL	1470	228	1227	4821	0	228	0	1402	420	0	0	0	0	3272	81778	3141	2152	0	0	0	426	0	1749	102315
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2272	2272
17CHS	1028	424	212	13690	411	1320	426	444	0	0	0	0	225	219	2182	3246	148114	0	0	0	0	738	1641	174321
18FAU	0	0	0	0	384	214	0	4254	2994	6735	0	0	0	0	0	0	0	45958	897	0	216	0	4350	66003
19STA	0	0	0	268	0	268	0	1293	0	13408	0	0	0	0	0	0	0	2301	66422	0	25308	1922	2671	113862
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7430	7430
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9285	9285
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1686	1686
23EXTL	3611	3492	11060	5361	756	4567	925	9864	2371	2678	9672	15485	21258	59063	777	610	157	3354	1139	9978	10288	1008	0	177474
TOTAL	264728	604406	1479274	1074168	28750	310729	189235	1486722	188974	373468	260265	150236	242421	726203	88864	7844	180830	54376	75239	11638	39000	4581	246967	8088919

1994 Difference (Estimated - Observed) HBO Motorized Person Trips

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	-2142	726	862	2520	974	1277	-3330	1693	81	-289	6	0	-788	-1398	4	2	17	5	14	2	2	0	381	619
2DCNCR	3059	4682	-1717	-19472	2208	-1598	9842	-7938	-308	837	-377	17	2037	-53	-682	12	210	16	79	34	53	9	10224	1174
3MTG	-2521	-11646	-1202	-7940	1610	1812	3148	5210	2296	164	351	766	3874	-206	-912	53	-816	14	43	650	-782	20	2920	-3095
4PG	-595	5542	-14641	-17794	2186	3508	1055	4284	-2456	-3632	81	41	10290	6258	-479	-510	-20554	3	128	34	60	81	10476	-16635
5ARLCR	506	2022	954	632	2536	1450	8	1349	46	62	5	0	13	32	0	0	2	2	3	0	3	0	278	9903
6ARLNCR	-1760	-6	4460	5257	-2656	6266	3156	-7358	-1014	1084	45	9	-927	27	28	7	-887	46	135	17	118	8	1512	7568
7ALX	1434	3170	-528	2579	-2214	1078	-9988	-5168	-34	1247	-918	3	86	209	22	5	38	16	109	-306	67	1	1786	-7306
8FFX	6141	6378	3534	4364	892	-14082	-9886	12571	198	3660	134	39	-466	705	60	48	159	641	-1722	174	-1509	-888	-2567	8579
9LDN	354	902	1660	87	185	836	111	-2355	-10967	1408	2134	50	-54	50	4	16	24	708	14	4125	16	10	1578	898
10PW	2796	2798	1456	1726	1180	3622	-568	2214	-2488	-19772	25	37	81	-739	26	60	39	304	4142	-512	6681	111	3657	6874
11FRD	-645	702	2266	-628	50	317	106	648	726	27	-12969	3336	398	-248	-673	23	26	9	13	4465	17	13	2107	88
12CAR	140	311	1479	-9574	34	122	90	364	91	95	7579	9482	5834	-688	13	18	97	34	24	95	17	4	-10979	4682
13HOW	763	3487	-240	-2172	72	278	198	-56	121	15	1653	1249	1568	1882	15	24	-460	3	6	244	15	13	-8552	125
14AAR	1705	11767	5838	778	368	867	949	-1438	55	88	28	19	12234	29972	1707	79	610	17	22	41	21	10	-7684	58052
15CAL	-949	1161	-761	2578	61	37	410	-798	-394	59	21	11	135	312	-6030	5037	196	26	13	22	-408	24	-742	20
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1399	-1399
17CHS	-502	596	146	-5148	-362	-1040	70	435	40	79	17	19	-74	331	-1056	245	3184	68	29	39	29	1250	447	-1158
18FAU	214	330	497	164	-317	372	277	997	68	2421	26	30	68	92	15	53	63	-2288	2096	1000	1093	31	-1540	5761
19STA	290	472	149	-24	91	258	693	1012	29	-3694	6	8	27	27	2	9	23	-1112	-10508	12	-9024	-1600	819	-22034
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1594	-1594
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-175	-175
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-992	-992
23EXTL	-1398	6396	12125	11760	-312	-395	1440	8468	195	2562	-1544	-4293	-4276	-21663	-244	-79	1140	-1924	1038	-4574	-3830	-622	0	-30
TOTAL	6892	39790	16338	-30307	6586	4983	-2219	14135	-13716	-13580	-3696	10823	30060	14901	-8180	5102	-16890	-3412	-4321	5562	-7362	-1524	-39	49926

1994 Ratio (Estimated / Observed) HBO Motorized Person Trips

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	0.87	1.04	1.29	2.01	0.00	1.44	0.32	2.01	0.00	0.26	0.00	0.00	0.16	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.56	1.01
2DCNCR	1.03	1.01	0.98	0.60	1.54	0.92	3.16	0.55	0.75	0.00	0.20	0.00	3.61	0.97	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.61	1.00
3MTG	0.92	0.85	1.00	0.85	2.74	1.23	2.21	1.47	6.45	1.37	1.08	0.00	0.00	0.97	0.03	0.00	0.06	0.00	0.00	0.00	0.07	0.00	1.10	1.00
4PG	0.98	1.07	0.78	0.98	3.69	2.00	1.12	1.46	0.12	0.22	0.00	0.00	2.96	1.27	0.72	0.40	0.27	0.00	0.00	0.00	0.00	0.00	1.65	0.99
5ARLCR	1.34	2.97	0.00	0.00	0.00	1.73	1.01	2.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.09	2.52
6ARLNCR	0.91	1.00	1.93	4.63	0.77	1.03	1.24	0.84	0.60	3.33	0.00	0.00	0.15	1.05	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	1.31	1.02
7ALX	1.30	1.57	0.87	2.32	0.51	1.10	0.89	0.86	0.89	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	2.56	0.95
8FFX	1.16	1.80	1.22	1.72	1.17	0.75	0.82	1.01	1.01	1.45	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.21	0.03	0.91	1.01
9LDN	2.70	5.32	2.52	1.40	0.00	2.28	1.27	0.89	0.92	3.62	5.92	0.00	0.75	0.00	0.00	0.00	0.00	0.00	2.35	0.00	10.89	0.00	0.00	1.93	1.01
10PW	2.44	1.96	1.73	2.80	0.00	1.91	0.94	1.05	0.74	0.94	0.00	0.00	0.00	0.21	0.00	0.00	0.00	1.14	1.93	0.45	0.00	0.00	1.62	1.02
11FRD	0.24	0.00	1.20	0.38	0.00	0.00	0.00	2.97	1.42	0.00	0.95	3.51	1.12	0.25	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.24	1.00
12CAR	0.00	0.00	1.89	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	3.01	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	1.03
13HOW	0.00	0.00	0.98	0.87	0.00	0.00	0.00	0.88	0.00	0.00	0.00	1.79	1.01	1.16	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.68	1.00
14AAR	0.00	0.00	3.05	1.03	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	2.63	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	1.08
15CAL	0.35	6.09	0.38	1.53	0.00	1.16	0.00	0.43	0.06	0.00	0.00	0.00	0.00	1.10	0.93	2.60	1.09	0.00	0.00	0.00	0.04	0.00	0.58	1.00
16STM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.38
17CHS	0.51	2.41	1.69	0.62	0.12	0.21	1.16	1.98	0.00	0.00	0.00	0.00	0.67	2.51	0.52	1.08	1.02	0.00	0.00	0.00	0.00	2.69	1.27	0.99
18FAU	0.00	0.00	0.00	0.00	0.17	2.73	0.00	1.23	1.02	1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	3.34	0.00	6.06	0.00	0.65	1.09
19STA	0.00	0.00	0.00	0.91	0.00	1.96	0.00	1.78	0.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.84	0.00	0.64	0.17	1.31	0.81
20CL&JEF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.79
21FBG&SP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.98
22KGEO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.41
23EXTL	0.61	2.83	2.10	3.19	0.59	0.91	2.56	1.86	1.08	1.96	0.84	0.72	0.80	0.63	0.69	0.87	8.26	0.43	1.91	0.54	0.63	0.38	0.00	1.00
TOTAL	1.03	1.07	1.01	0.97	1.23	1.02	0.99	1.01	0.93	0.96	0.99	1.07	1.12	1.02	0.91	1.65	0.91	0.94	1.48	0.81	0.67	1.00	1.00	1.01

1994 Estimated NHB Motorized Person Trips

Note: Some trips were removed for IJs with no observed data

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	109247	65916	23449	30120	5065	22739	14625	31405	1069	2833	158	5	1973	5830	212	7	371	54	147	3	80	3	2360	317671
2DCNCR	64178	180794	32055	32409	3873	11493	7710	16691	1977	3998	512	40	3175	6678	451	21	764	83	223	9	115	0	3932	371181
3MTG	26560	34403	894679	28836	2697	6809	4676	22572	5125	3820	7526	1149	6660	8733	189	13	230	158	123	315	60	2	12588	1067923
4PG	31266	32654	35578	566236	3696	6119	6716	15369	1191	3884	536	163	15401	14362	3117	299	6739	50	224	8	123	46	11706	755483
5ARLCR	7802	4159	2923	2394	2675	5516	3047	6875	242	615	32	1	132	430	20	0	31	12	34	0	19	1	245	37205
6ARLNCR	19434	11637	6230	4663	6383	117895	12003	26593	2148	4537	205	14	253	726	109	3	191	138	248	7	142	0	1555	215114
7ALX	12047	8994	5096	4842	3400	11545	90424	36999	998	5835	96	3	277	623	154	12	365	78	416	1	237	2	1292	183736
8FFX	32309	16161	18795	11432	7670	25120	35799	932194	21101	18873	753	32	817	1523	275	7	663	920	751	79	415	3	7974	1133666
9LDN	1586	1578	3605	688	229	1728	801	26447	65378	3874	1644	66	247	113	0	1	7	967	20	1634	8	0	1015	111636
10PW	6405	4920	3721	2378	890	5036	6216	19807	4829	198547	40	5	133	250	30	0	80	4379	4612	66	2740	37	2510	267631
11FRD	501	888	8980	621	71	369	158	1417	1532	73	155698	3804	2817	156	1	3	0	11	3	963	0	1	4042	182109
12CAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5192	5192
13HOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13190	13190
14AAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32009	32009
15CAL	560	710	312	3814	33	157	248	398	6	35	2	2	102	4120	41025	3484	1460	1	2	1	1	35	171	56679
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	157	157
17CHS	977	1238	385	8463	57	313	633	1059	14	108	4	1	121	1252	1222	1992	102346	2	18	2	23	702	535	121467
18FAU	129	112	176	31	20	179	97	1113	1092	5088	8	1	7	6	0	0	0	18912	557	134	305	3	647	28617
19STA	429	339	152	173	63	333	548	965	34	6155	2	0	5	14	1	6	14	632	15598	0	8940	255	613	35271
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2513	2513
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3371	3371
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	246	246
23EXTL	2314	3818	11852	10100	253	1586	1267	7949	1018	2509	4002	5137	14628	33195	158	153	519	626	627	2469	3480	241	0	107901
TOTAL	315744	368321	1047988	707200	37075	216937	184968	1147853	107754	260784	171218	10423	46748	78011	46964	6001	113780	27023	23603	5691	16688	1331	107863	5049968

1994 Observed NHB Motorized Person Trips

NOTE: Non-Wk Obs Trips Ftrd by 1.50 to Account for Under-Reporting

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	105312	65500	25930	30874	7324	20907	8996	38097	1042	3669	592	0	0	696	1200	0	2289	294	950	0	0	0	2977	316651
2DCNCR	65494	174284	44656	40834	2049	13640	7118	13551	1008	1251	734	0	402	1176	116	484	1604	118	0	0	0	0	2000	370518
3MTG	25926	44652	896373	50446	966	4540	3014	18924	2472	506	13155	0	1479	3566	387	0	764	0	0	456	422	208	6452	1074707
4PG	30878	40832	50456	574821	2248	4060	4280	13950	516	0	836	0	3040	12846	5928	0	12764	0	0	0	0	105	7153	764712
5ARLCR	7326	2048	966	2250	4706	8702	1720	8187	112	1550	0	0	0	0	0	0	212	0	0	0	0	0	265	38042
6ARLNCR	20907	13641	4539	4060	8702	103370	16038	40545	897	1858	502	0	0	441	621	0	531	0	0	0	0	0	1317	217970
7ALX	8997	7112	3014	4286	1724	16038	87015	50822	153	4425	504	0	0	0	0	0	362	236	126	0	0	0	1059	185870
8FFX	38102	13550	18920	13952	8186	40544	50818	893564	23526	19794	328	0	105	1988	0	0	1167	1472	1304	0	250	0	7685	1135252
9LDN	1040	1010	2472	518	112	897	153	23536	71488	2164	292	0	0	0	0	0	0	942	0	0	0	0	909	105534
10PW	3670	1251	504	0	1552	1858	4424	19790	2164	226884	0	0	0	159	0	0	0	2636	3472	0	2262	0	2048	272675
11FRD	592	734	13155	837	0	504	502	327	291	0	164356	165	1647	168	0	0	0	0	0	165	0	0	4950	188394
12CAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7514	7514
13HOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16022	16022
14AAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36219	36219
15CAL	1200	117	388	5925	0	621	0	0	0	0	0	0	320	1989	39426	1263	939	132	0	0	0	0	748	53068
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	296	296
17CHS	2286	1604	765	12771	213	532	360	1166	0	0	0	0	453	642	939	922	105366	0	0	0	0	310	438	128768
18FAU	294	117	0	0	0	0	236	1472	944	2637	0	0	0	0	132	0	0	22578	0	0	300	0	1621	30330
19STA	950	0	0	0	0	0	126	1304	0	3472	0	0	0	134	0	0	0	0	29304	0	9130	440	743	45602
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4150	4150
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2823	2823
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	531	531
23EXTL	2975	2001	6455	7148	265	1316	1060	7684	909	2047	4950	7520	16022	36217	745	296	441	1618	742	4151	2829	533	0	107924
TOTAL	315948	368450	1068593	748722	38047	217529	185858	1132916	105524	270258	186250	7685	23468	60020	49494	2966	126436	30025	35898	4772	15194	1596	107920	5103570

1994 Difference (Estimated - Observed) NHB Motorized Person Trips

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	3935	416	-2482	-754	-2260	1832	5630	-6692	26	-836	-434	5	1973	5134	-988	7	-1918	-240	-802	3	80	3	-617	1020
2DCNCR	-1316	6510	-12602	-8426	1824	-2146	592	3140	969	2747	-222	40	2773	5502	336	-464	-840	-36	223	9	115	0	1932	662
3MTG	634	-10249	-1694	-21610	1731	2268	1662	3648	2653	3314	-5629	1149	5181	5168	-198	13	-534	158	123	-141	-362	-206	6136	-6784
4PG	388	-8178	-14878	-8585	1448	2058	2436	1419	675	3884	-300	163	12360	1516	-2811	299	-6024	50	224	8	123	-59	4553	-9228
5ARLCR	476	2112	1957	144	-2030	-3186	1326	-1312	130	-934	32	1	132	430	20	0	-180	12	34	0	19	1	-20	-838
6ARLNCR	-1473	-2004	1691	602	-2318	14526	-4035	-13952	1251	2678	-298	14	253	285	-512	3	-340	138	248	7	142	0	238	-2856
7ALX	3050	1882	2082	556	1676	-4493	3409	-13822	845	1410	-408	3	277	623	154	12	4	-158	290	1	237	2	233	-2134
8FFX	-5792	2612	-124	-2520	-516	-15424	-15020	38630	-2425	-921	424	32	712	-464	275	7	-504	-552	-552	79	164	3	289	-1586
9LDN	546	568	1133	170	116	831	648	2910	-6110	1710	1352	66	247	113	0	1	7	25	20	1634	8	0	106	6102
10PW	2734	3669	3217	2378	-662	3178	1792	18	2664	-28337	40	5	133	91	30	0	80	1744	1140	66	478	37	462	-5044
11FRD	-92	154	-4175	-216	71	-135	-344	1090	1241	73	-8658	3639	1170	-12	1	3	0	11	3	798	0	1	-908	-6285
12CAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2322	-2322
13HOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2832	-2832
14AAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-4210	-4210
15CAL	-640	593	-76	-2111	33	-464	248	398	6	35	2	2	-218	2131	1599	2221	521	-131	2	1	1	35	-577	3611
16STM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-139	-139
17CHS	-1309	-366	-380	-4308	-156	-220	273	-106	14	108	4	1	-332	610	283	1070	-3020	2	18	2	23	392	97	-7300
18FAU	-165	-5	176	31	20	179	-138	-358	148	2451	8	1	7	6	-132	0	0	-3666	557	134	5	3	-974	-1712
19STA	-520	339	152	173	63	333	422	-338	34	2682	2	0	5	-120	1	6	14	632	-13706	0	-190	-184	-130	-10331
20CL&JEF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1637	-1637
21FBG&SP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	548	548
22KGEO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-285	-285
23EXTL	-661	1817	5397	2952	-12	270	207	265	109	462	-948	-2383	-1394	-3022	-587	-143	78	-992	-115	-1682	651	-292	0	-23
TOTAL	-204	-128	-20605	-41522	-972	-592	-890	14936	2230	-9474	-15032	2738	23280	17990	-2530	3035	-12656	-3002	-12294	919	1494	-266	-57	-53602

1994 Ratio (Estimated / Observed) NHB Motorized Person Trips

ORIGIN \ DESTINATION	DCCR	DCNCR	MTG	PG	ARLCR	ARLNCR	ALX	FFX	LDN	PW	FRD	CAR	HOW	AAR	CAL	STM	CHS	FAU	STA	CLK&JF	FBG&SP	KGEO	EXT	TOTAL
1DCCR	1.04	1.01	0.90	0.98	0.69	1.09	1.63	0.82	1.03	0.77	0.27	0.00	0.00	8.38	0.18	0.00	0.16	0.18	0.15	0.00	0.00	0.00	0.79	1.00
2DCNCR	0.98	1.04	0.72	0.79	1.89	0.84	1.08	1.23	1.96	3.20	0.70	0.00	7.90	5.68	3.90	0.04	0.48	0.70	0.00	0.00	0.00	0.00	1.97	1.00
3MTG	1.02	0.77	1.00	0.57	2.79	1.50	1.55	1.19	2.07	7.56	0.57	0.00	4.50	2.45	0.49	0.00	0.30	0.00	0.00	0.69	0.14	0.01	1.95	0.99
4PG	1.01	0.80	0.71	0.99	1.64	1.51	1.57	1.10	2.31	0.00	0.64	0.00	5.07	1.12	0.53	0.00	0.53	0.00	0.00	0.00	0.00	0.44	1.64	0.99
5ARLCR	1.06	2.03	3.03	1.06	0.57	0.63	1.77	0.84	2.15	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.92	0.98
6ARLNCR	0.93	0.85	1.37	1.15	0.73	1.14	0.75	0.66	2.39	2.44	0.41	0.00	0.00	1.65	0.18	0.00	0.36	0.00	0.00	0.00	0.00	0.00	1.18	0.99
7ALX	1.34	1.26	1.69	1.13	1.97	0.72	1.04	0.73	6.52	1.32	0.19	0.00	0.00	0.00	0.00	0.00	1.01	0.33	3.30	0.00	0.00	0.00	1.22	0.99
8FFX	0.85	1.19	0.99	0.82	0.94	0.62	0.70	1.04	0.90	0.95	2.29	0.00	7.78	0.77	0.00	0.00	0.57	0.63	0.58	0.00	1.66	0.00	1.04	1.00
9LDN	1.53	1.56	1.46	1.33	2.04	1.93	5.24	1.12	0.91	1.79	5.62	0.00	0.00	0.00	0.00	0.00	0.00	1.03	0.00	0.00	0.00	0.00	1.12	1.06
10PW	1.74	3.93	7.38	0.00	0.57	2.71	1.41	1.00	2.23	0.88	0.00	0.00	0.00	1.57	0.00	0.00	0.00	1.66	1.33	0.00	1.21	0.00	1.23	0.98
11FRD	0.85	1.21	0.68	0.74	0.00	0.73	0.31	4.33	5.26	0.00	0.95	23.05	1.71	0.93	0.00	0.00	0.00	0.00	0.00	5.84	0.00	0.00	0.82	0.97
12CAR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.69
13HOW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.82
14AAR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.88
15CAL	0.47	6.07	0.80	0.64	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.32	2.07	1.04	2.76	1.55	0.01	0.00	0.00	0.00	0.00	0.23	1.07
16STM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.53
17CHS	0.43	0.77	0.50	0.66	0.27	0.59	1.76	0.91	0.00	0.00	0.00	0.00	0.27	1.95	1.30	2.16	0.97	0.00	0.00	0.00	0.00	2.26	1.22	0.94
18FAU	0.44	0.96	0.00	0.00	0.00	0.00	0.41	0.76	1.16	1.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.00	0.00	1.02	0.00	0.40	0.94
19STA	0.45	0.00	0.00	0.00	0.00	0.00	4.35	0.74	0.00	1.77	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.53	0.00	0.98	0.58	0.83	0.77
20CL&JEF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.61
21FBG&SP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.19	1.19
22KGEO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.46
23EXTL	0.78	1.91	1.84	1.41	0.95	1.21	1.20	1.03	1.12	1.23	0.81	0.68	0.91	0.92	0.21	0.52	1.18	0.39	0.85	0.59	1.23	0.45	0.00	1.00
TOTAL	1.00	1.00	0.98	0.94	0.97	1.00	1.00	1.01	1.02	0.96	0.92	1.36	1.99	1.30	0.95	2.02	0.90	0.90	0.66	1.19	1.10	0.83	1.00	0.99

Appendix C
Mode Choice Model Performance Summaries

Estimated 1994 HBW transit person trips (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	14,963	4,565	1,020	0	0	620	780	1,626	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,574
2 DC n-core	77,127	20,927	5,824	1,728	3,055	1,967	293	1,525	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	112,446
3 Mont. Co.	53,410	6,465	11,007	0	2,994	7,142	0	1,594	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82,612
4 PG Co.	36,994	4,795	4,374	5,102	2,954	2,022	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56,241
5 Arl. core	2,790	368	0	0	400	336	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,894
6 Arl. n-core	30,109	3,400	1,359	0	2,043	3,025	0	352	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,288
7 Alex.	13,457	2,186	0	0	2,546	1,641	910	1,793	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,533
8 FFX Co.	42,267	2,872	0	0	12,920	15,993	1,200	9,974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85,226
9 Loudoun	2,600	420	367	12	353	420	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,172
10 PW Co.	8,434	1,135	896	0	967	1,686	317	1,437	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,872
11 Fred. MD	937	273	0	0	41	78	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,334
12 Carroll	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 Howard	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 Anne Ar.	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 Calvert	414	47	0	0	28	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	542
16 St. Mary's	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 Charles	1,435	42	0	0	160	69	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	1,713
18 Fauquier	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 Stafford	1,416	325	263	0	359	451	217	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,031
20 Clarke, Jeff	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 Spts, Fbrg	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 King Geor.	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 Externals	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	286,353	47,820	25,110	6,842	28,820	35,503	3,722	18,301	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	452,478

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.

Observed 1994 HBW transit person trips (screened by observed auto driver trips)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	14,974	4,565	1,027	0	0	620	1,249	2,331	0	0	0				0	0	0	0	0	0	0	0		24,766
2 DC n-core	77,130	20,923	5,829	1,728	3,055	1,971	283	1,526	0	0	0				0	0	0	0	0	0	0	0		112,445
3 Mont. Co.	53,417	6,461	11,016	0	2,993	7,140	0	1,594	0	0	0				0	0	0	0	0	0	0	0		82,621
4 PG Co.	36,996	4,791	4,374	5,117	2,950	2,024	0	0	0	0	0				0	0	0	0	0	0	0	0		56,252
5 Arl. core	2,824	367	0	0	652	337	0	0	0	0	0				0	0	0	0	0	0	0	0		4,180
6 Arl. n-core	30,107	3,403	1,358	0	2,041	3,027	0	310	0	0	0				0	0	0	0	0	0	0	0		40,246
7 Alex.	13,457	2,189	0	0	2,545	1,640	913	1,791	0	0	0				0	0	0	0	0	0	0	0		22,535
8 FFX Co.	42,263	2,874	0	0	12,907	15,997	1,197	9,990	0	0	0				0	0	0	0	0	0	0	0		85,228
9 Loudoun	3,616	418	366	10	355	419	0	0	0	0	0				0	0	0	0	0	0	0	0		5,184
10 PW Co.	8,816	1,135	896	0	966	1,686	330	1,428	0	0	0				0	0	0	0	0	0	0	0		15,257
11 Fred. MD	936	273	0	0	8	31	20	0	0	0	956				0	0	0	0	0	0	0	0		2,224
12 Carroll																								0
13 Howard																								0
14 Anne Ar.																								0
15 Calvert	234	10	0	0	3	5	0	0	0	0	0				0	0	0	0	0	0	0	0		252
16 St. Mary's																								0
17 Charles	1,437	69	0	0	162	32	0	0	0	0	0				0	0	673	0	0	0	0	0		2,373
18 Fauquier	187	25	19	0	21	0	0	0	0	0	0				0	0	0	0	0	0	0	0		252
19 Stafford	1,788	232	183	0	197	713	378	0	0	0	0				0	0	0	0	0	0	0	0		3,491
20 Clarke, Jeff																								0
21 Spts, Fbrg																								0
22 King Geor.																								0
23 Externals																								0
Total	288,182	47,735	25,068	6,855	28,855	35,642	4,370	18,970	0	0	956	0	0	0	0	0	673	0	0	0	0	0	0	457,306

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS + supplemental transit counts beyond HTS area

Estimated 1994 HBW percent transit (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	74.4%	50.8%	50.7%	0.0%	0.0%	28.7%	89.7%	72.8%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		59.7%
2 DC n-core	59.8%	30.1%	30.7%	15.5%	47.7%	20.7%	5.6%	11.3%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		42.5%
3 Mont. Co.	42.6%	12.0%	4.3%	0.0%	32.2%	52.5%	0.0%	5.8%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		16.1%
4 PG Co.	39.1%	8.8%	14.3%	2.4%	28.3%	11.5%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		12.1%
5 Arl. core	90.5%	40.8%	0.0%	0.0%	60.2%	38.1%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%		0.0%	0.0%	0.0%		0.0%			54.0%
6 Arl. n-core	62.4%	45.4%	19.4%	0.0%	22.2%	13.7%	0.0%	1.6%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		31.0%
7 Alex.	44.6%	50.4%	0.0%	0.0%	53.6%	15.2%	6.5%	9.8%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		25.3%
8 FFX Co.	37.4%	7.5%	0.0%	0.0%	57.6%	25.4%	3.3%	3.3%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		13.3%
9 Loudoun	81.5%	31.7%	8.1%	1.9%	28.8%	16.0%	0.0%	0.0%	0.0%	0.0%	0.0%						0.0%	0.0%	0.0%	0.0%	0.0%			5.5%
10 PW Co.	88.3%	28.4%	20.3%	0.0%	21.4%	15.6%	3.2%	2.4%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		8.5%
11 Fred. MD	38.0%	17.7%	0.0%	0.0%	6.2%	5.7%	1.7%	0.0%	0.0%	0.0%	0.0%				0.0%		0.0%	0.0%		0.0%	0.0%			1.3%
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	16.4%	3.2%	0.0%	0.0%	6.2%	6.2%	0.0%	0.0%	0.0%	0.0%					0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%		1.7%
16 St. Mary's																								
17 Charles	15.9%	1.7%	0.0%	0.0%	21.5%	4.8%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%		2.6%
18 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	92.4%	52.9%	50.7%	0.0%	51.9%	27.2%	12.9%	0.0%	0.0%	0.0%					0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		7.4%
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	48.4%	19.2%	6.7%	2.4%	39.5%	22.4%	4.0%	3.6%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		16.9%

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.
In the table above, Percent transit = (obs transit psn) / (est total psn)

Observed 1994 HBW percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	74.4%	50.8%	51.1%	0.0%	0.0%	28.7%	143.6%	104.4%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		62.8%
2 DC n-core	59.8%	30.1%	30.8%	15.5%	47.7%	20.7%	5.4%	11.3%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		42.5%
3 Mont. Co.	42.6%	12.0%	4.3%	0.0%	32.2%	52.5%	0.0%	5.8%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		16.1%
4 PG Co.	39.1%	8.8%	14.3%	2.4%	28.2%	11.5%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		12.1%
5 Arl. core	91.6%	40.6%	0.0%	0.0%	98.2%	38.2%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%		0.0%	0.0%	0.0%		0.0%			58.0%
6 Arl. n-core	62.4%	45.4%	19.4%	0.0%	22.1%	13.7%	0.0%	1.4%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		31.0%
7 Alex.	44.6%	50.4%	0.0%	0.0%	53.6%	15.2%	6.6%	9.8%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		25.3%
8 FFX Co.	37.4%	7.5%	0.0%	0.0%	57.5%	25.4%	3.3%	3.3%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		13.3%
9 Loudoun	113.3%	31.5%	8.1%	1.6%	29.0%	15.9%	0.0%	0.0%	0.0%	0.0%	0.0%						0.0%	0.0%	0.0%	0.0%	0.0%			6.9%
10 PW Co.	92.3%	28.4%	20.3%	0.0%	21.4%	15.6%	3.3%	2.4%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		8.7%
11 Fred. MD	38.0%	17.7%	0.0%	0.0%	1.2%	2.3%	6.6%	0.0%	0.0%	0.0%	1.5%				0.0%		0.0%	0.0%		0.0%	0.0%			2.1%
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	9.3%	0.7%	0.0%	0.0%	0.7%	0.6%	0.0%	0.0%	0.0%	0.0%					0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%		0.8%
16 St. Mary's																								
17 Charles	15.9%	2.7%	0.0%	0.0%	21.7%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	2.4%	0.0%	0.0%		0.0%	0.0%		3.6%
18 Fauquier	201.1%	42.4%	11.6%	0.0%	32.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.9%
19 Stafford	116.7%	37.8%	35.3%	0.0%	28.5%	42.9%	22.5%	0.0%	0.0%	0.0%					0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		8.6%
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	48.7%	19.2%	6.7%	2.4%	39.5%	22.5%	4.7%	3.7%	0.0%	0.0%	1.3%				0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%		17.1%

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS + BTS + Auto External Survey + transit counts beyond the HTS area
In the table above, Percent transit = (obs transit psn) / (est total psn)

Estimated 1994 HBW auto occupancy (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.30	1.12	1.49	1.12		1.12	1.13	1.12																1.20
2 DC n-core	1.29	1.14	1.26	1.18	1.35	1.30	1.13	1.04		1.13														1.20
3 Mont. Co.	1.20	1.07	1.12	1.03	1.12	1.12	1.49	1.12			1.12							1.29						1.12
4 PG Co.	1.38	1.12	1.05	1.08	1.15	1.10	1.12	1.03									1.33							1.12
5 Arl. core	1.11		1.12			1.46	1.13	1.12																1.20
6 Arl. n-core	1.11	1.03	1.12	1.12	1.14	1.07	1.14	1.05	1.13															1.09
7 Alex.	1.25	1.25	1.13	1.32	1.08	1.09	1.11	1.03	1.12		1.47													1.14
8 FFX Co.	1.38	1.09	1.08	1.06	1.40	1.07	1.10	1.06	1.11	1.12														1.11
9 Loudoun	1.38	1.12	1.12	1.13	1.08	1.16	1.12	1.04	1.11	1.07	1.12						1.17	1.51						1.09
10 PW Co.	1.58	1.13	1.12	1.13	1.18	1.89	1.21	1.12	1.12	1.14								1.12	1.10					1.16
11 Fred. MD	1.64	1.12	1.08	1.50	1.12	1.33		1.47	1.12		1.06													1.09
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.13	1.11	1.11	1.03		1.11	1.12	1.11							1.11		1.13							1.10
16 St. Mary's																								
17 Charles	1.24	1.28	1.12	1.04	1.29	1.30	1.12	1.12							1.11		1.04							1.09
18 Fauquier	1.69	1.64	1.12	1.38	1.52	1.12		1.08	1.24	1.12								1.06	1.11					1.10
19 Stafford	1.93	1.13	1.14			1.20	1.10	1.09		1.10								1.11	1.16					1.13
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.29	1.11	1.11	1.08	1.22	1.14	1.14	1.07	1.12	1.14	1.07				1.11		1.09	1.09	1.14					1.12

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.

Observed 1994 HBW auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.30	1.00	1.50	1.00		1.00	1.00	1.00																1.11
2 DC n-core	1.29	1.14	1.26	1.18	1.35	1.30	1.14	1.04		1.00														1.21
3 Mont. Co.	1.20	1.07	1.12	1.03	1.00	1.00	1.50	1.00			1.00							2.00						1.11
4 PG Co.	1.38	1.12	1.05	1.08	1.15	1.10	1.00	1.03									1.33							1.12
5 Arl. core	1.00		1.00			1.46	1.00	1.00																1.10
6 Arl. n-core	1.11	1.03	1.00	1.00	1.14	1.07	1.14	1.05	1.00															1.07
7 Alex.	1.25	1.24	1.13	1.32	1.08	1.09	1.11	1.01	1.00		1.00													1.13
8 FFX Co.	1.38	1.09	1.08	1.06	1.40	1.07	1.10	1.06	1.11	1.00														1.10
9 Loudoun	1.37	1.00	1.00	1.00	1.07	1.16	1.00	1.04	1.11	1.08	1.00						1.00	1.50						1.09
10 PW Co.	1.58	1.14	1.00	1.00	1.18	1.89	1.21	1.12	1.00	1.14								1.00	1.00					1.16
11 Fred. MD	1.64	1.00	1.08	1.50	1.00	1.32		1.47	1.00		1.06													1.09
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.13	1.00	1.00	1.02		1.00	1.00	1.00							1.14		1.00							1.08
16 St. Mary's																								
17 Charles	1.24	1.28	1.00	1.04	1.29	1.30	1.00	1.00							1.00		1.04							1.08
18 Fauquier	1.00	1.48	1.00	1.00	1.00	1.00		1.08	1.24	1.00								1.06	1.00					1.07
19 Stafford	2.00	1.00	1.00			1.21	1.00	1.09		1.12								1.00	1.19					1.16
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.30	1.11	1.11	1.07	1.23	1.12	1.13	1.06	1.10	1.12	1.06				1.14		1.10	1.11	1.16					1.12

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS

Difference (Est - Obs) 1994 HBW transit person trips

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	-11	0	-7	0	0	0	-469	-705	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1,192
2 DC n-core	-3	4	-5	0	0	-4	10	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3 Mont. Co.	-7	4	-9	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-9
4 PG Co.	-2	4	0	-15	4	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-11
5 Arl. core	-34	1	0	0	-252	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-286
6 Arl. n-core	2	-3	1	0	2	-2	0	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42
7 Alex.	0	-3	0	0	1	1	-3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2
8 FFX Co.	4	-2	0	0	13	-4	3	-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2
9 Loudoun	-1,016	2	1	2	-2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1,012
10 PW Co.	-382	0	0	0	1	0	-13	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-385
11 Fred. MD	1	0	0	0	33	47	-15	0	0	0	-956	0	0	0	0	0	0	0	0	0	0	0	0	-890
12 Carroll	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 Howard	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 Anne Ar.	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 Calvert	180	37	0	0	25	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	290
16 St. Mary's	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 Charles	-2	-27	0	0	-2	37	0	0	0	0	0	0	0	0	0	0	-666	0	0	0	0	0	0	-660
18 Fauquier	-187	-25	-19	0	-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-252
19 Stafford	-372	93	80	0	162	-262	-161	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-460
20 Clarke, Jeff	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 Spts, Fbrg	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 King Geor.	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 Externals	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	-1,829	85	42	-13	-35	-139	-648	-669	0	0	-956	0	0	0	0	0	-666	0	0	0	0	0	0	-4,828

Ratio (Est / Obs) 1994 HBW transit person trips

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	0.99			1.00	0.62	0.70																0.95
2 DC n-core	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.00																1.00
3 Mont. Co.	1.00	1.00	1.00		1.00	1.00		1.00																1.00
4 PG Co.	1.00	1.00	1.00	1.00	1.00	1.00																		1.00
5 Arl. core	0.99	1.00			0.61	1.00																		0.93
6 Arl. n-core	1.00	1.00	1.00		1.00	1.00		1.14																1.00
7 Alex.	1.00	1.00			1.00	1.00	1.00	1.00																1.00
8 FFX Co.	1.00	1.00			1.00	1.00	1.00	1.00																1.00
9 Loudoun	0.72	1.00	1.00	1.20	0.99	1.00																		0.80
10 PW Co.	0.96	1.00	1.00		1.00	1.00	0.96	1.01																0.97
11 Fred. MD	1.00	1.00			5.13	2.52	0.25				0.00													0.60
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.77	4.70			9.33	10.60																		2.15
16 St. Mary's																								
17 Charles	1.00	0.61			0.99	2.16											0.01							0.72
18 Fauquier	0.00	0.00	0.00		0.00																			0.00
19 Stafford	0.79	1.40	1.44		1.82	0.63	0.57																	0.87
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.99	1.00	1.00	1.00	1.00	1.00	0.85	0.96			0.00						0.01							0.99

Difference (Est - Obs) 1994 HBW percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	-0.1%	0.0%	-0.3%	0.0%	0.0%	0.0%	-53.9%	-31.6%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-3.0%
2 DC n-core	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
3 Mont. Co.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Co.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
5 Arl. core	-1.1%	0.1%	0.0%	0.0%	-38.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%		0.0%	0.0%	0.0%		0.0%			-4.0%
6 Arl. n-core	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
7 Alex.	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
8 FFX Co.	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	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 Loudoun	-31.8%	0.2%	0.0%	0.3%	-0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%						0.0%	0.0%	0.0%	0.0%	0.0%			-1.3%
10 PW Co.	-4.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.2%
11 Fred. MD	0.0%	0.0%	0.0%	0.0%	5.0%	3.5%	-5.0%	0.0%	0.0%	0.0%	-1.5%				0.0%		0.0%	0.0%		0.0%	0.0%			-0.9%
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	7.1%	2.5%	0.0%	0.0%	5.5%	5.6%	0.0%	0.0%	0.0%	0.0%					0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%		0.9%
16 St. Mary's																								
17 Charles	0.0%	-1.1%	0.0%	0.0%	-0.3%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	-2.3%	0.0%	0.0%		0.0%	0.0%		-1.0%
18 Fauquier	-201.1%	-42.4%	-11.6%	0.0%	-32.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.9%
19 Stafford	-24.3%	15.1%	15.4%	0.0%	23.4%	-15.8%	-9.6%	0.0%	0.0%	0.0%					0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-1.1%
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	-0.3%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.7%	-0.1%	0.0%	0.0%	-1.3%				0.0%	0.0%	-1.7%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.2%

Ratio (Est / Obs) 1994 HBW percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	0.99			1.00	0.62	0.70																0.95
2 DC n-core	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.00																1.00
3 Mont. Co.	1.00	1.00	1.00		1.00	1.00		1.00																1.00
4 PG Co.	1.00	1.00	1.00	1.00	1.00	1.00																		1.00
5 Arl. core	0.99	1.00			0.61	1.00																		0.93
6 Arl. n-core	1.00	1.00	1.00		1.00	1.00		1.14																1.00
7 Alex.	1.00	1.00			1.00	1.00	1.00	1.00																1.00
8 FFX Co.	1.00	1.00			1.00	1.00	1.00	1.00																1.00
9 Loudoun	0.72	1.00	1.00	1.20	0.99	1.00																		0.80
10 PW Co.	0.96	1.00	1.00		1.00	1.00	0.96	1.01																0.97
11 Fred. MD	1.00	1.00			5.13	2.52	0.25				0.00													0.60
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.77	4.70			9.33	10.60																		2.15
16 St. Mary's																								
17 Charles	1.00	0.61			0.99	2.16											0.01							0.72
18 Fauquier	0.00	0.00	0.00		0.00																			0.00
19 Stafford	0.79	1.40	1.44		1.82	0.63	0.57																	0.87
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.99	1.00	1.00	1.00	1.00	1.00	0.85	0.96			0.00						0.01							0.99

Difference (Est - Obs) 1994 HBW auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	0.00	0.12	-0.01	0.12		0.12	0.13	0.12																0.09
2 DC n-core	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.13														-0.01
3 Mont. Co.	0.00	0.00	0.00	0.00	0.12	0.12	0.00	0.12			0.12							-0.71						0.01
4 PG Co.	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00									0.00							0.00
5 Arl. core	0.11		0.12			0.00	0.13	0.12																0.10
6 Arl. n-core	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.13															0.02
7 Alex.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.12		0.47													0.01
8 FFX Co.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12														0.00
9 Loudoun	0.01	0.12	0.12	0.13	0.01	0.00	0.12	0.00	0.00	0.00	0.12						0.17	0.01						0.00
10 PW Co.	0.01	0.00	0.12	0.13	0.00	0.00	0.00	0.00	0.12	0.00								0.12	0.10					0.00
11 Fred. MD	0.00	0.12	0.00	0.00	0.12	0.00		0.00	0.12		0.00													0.00
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.00	0.11	0.11	0.01		0.11	0.12	0.11							-0.04		0.13							0.02
16 St. Mary's																								
17 Charles	0.00	0.00	0.12	0.00	0.00	0.00	0.12	0.12							0.11		0.00							0.00
18 Fauquier	0.69	0.16	0.12	0.38	0.52	0.12		0.00	0.00	0.12								0.00	0.11					0.03
19 Stafford	-0.07	0.13	0.14			-0.01	0.10	-0.01		-0.01								0.11	-0.03					-0.03
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	-0.01	0.00	0.00	0.01	-0.02	0.02	0.01	0.01	0.01	0.02	0.01				-0.03		-0.01	-0.02	-0.02					0.00

Ratio (Est / Obs) 1994 HBW auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.12	1.00	1.12		1.12	1.13	1.12																1.08
2 DC n-core	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.13														0.99
3 Mont. Co.	1.00	1.00	1.00	1.00	1.12	1.12	1.00	1.12			1.12							0.64						1.01
4 PG Co.	1.00	1.00	1.00	1.00	1.00	1.00	1.12	1.00									1.00							1.00
5 Arl. core	1.11		1.12			1.00	1.13	1.12																1.09
6 Arl. n-core	1.00	1.00	1.12	1.12	1.00	1.00	1.00	1.00	1.13															1.02
7 Alex.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.12		1.47													1.01
8 FFX Co.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.12														1.00
9 Loudoun	1.00	1.12	1.12	1.13	1.01	1.00	1.12	1.00	1.00	1.00	1.12						1.17	1.01						1.00
10 PW Co.	1.01	1.00	1.12	1.13	1.00	1.00	1.00	1.00	1.12	1.00								1.12	1.10					1.00
11 Fred. MD	1.00	1.12	1.00	1.00	1.12	1.00		1.00	1.12		1.00													1.00
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.00	1.11	1.11	1.01		1.11	1.12	1.11							0.97		1.13							1.01
16 St. Mary's																								
17 Charles	1.00	1.00	1.12	1.00	1.00	1.00	1.12	1.12							1.11		1.00							1.00
18 Fauquier	1.69	1.11	1.12	1.38	1.52	1.12		1.00	1.00	1.12								1.00	1.11					1.03
19 Stafford	0.97	1.13	1.14			0.99	1.10	0.99		0.99								1.11	0.97					0.98
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.99	1.00	1.00	1.01	0.99	1.02	1.00	1.01	1.01	1.02	1.01				0.97		0.99	0.98	0.99					1.00

Estimated 1994 HBS transit person trips (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	644	1,399	576	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,619
2 DC n-core	3,511	4,501	568	828	0	299	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,707
3 Mont. Co.	0	0	5,677	0	115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,792
4 PG Co.	651	0	704	1,777	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,132
5 Arl. core	328	0	0	0	166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	494
6 Arl. n-core	345	0	0	0	0	989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,334
7 Alex.	116	0	0	0	0	0	1,139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,255
8 FFX Co.	0	0	0	0	0	1,373	0	647	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,020
9 Loudoun	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 Co.	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 Fred. MD	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 Carroll	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 Howard	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 Anne Ar.	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 Calvert	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 St. Mary's	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 Charles	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 Fauquier	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 Stafford	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 Clarke, Jeff	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 Spts, Fbrg	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 King Geor.	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 Externals	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	5,595	5,900	7,525	2,605	281	2,661	1,139	647	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,353

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.

Observed 1994 HBS transit person trips (screened by observed auto driver trips)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	645	1,405	577	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		2,627
2 DC n-core	3,512	4,500	569	829	0	301	0	0	0	0	0				0	0	0	0	0	0	0	0		9,711
3 Mont. Co.	0	0	6,459	0	626	0	0	0	0	0	0				0	0	0	0	0	0	0	0		7,085
4 PG Co.	654	0	703	1,776	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		3,133
5 Arl. core	329	0	0	0	329	0	0	0	0	0	0				0	0	0	0	0	0	0	0		658
6 Arl. n-core	346	0	0	0	0	988	0	0	0	0	0				0	0	0	0	0	0	0	0		1,334
7 Alex.	116	0	0	0	0	0	1,140	0	0	0	0				0	0	0	0	0	0	0	0		1,256
8 FFX Co.	0	0	0	0	0	1,374	0	647	0	0	0				0	0	0	0	0	0	0	0		2,021
9 Loudoun	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
10 PW Co.	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
11 Fred. MD	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
12 Carroll																								0
13 Howard																								0
14 Anne Ar.																								0
15 Calvert	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
16 St. Mary's																								0
17 Charles	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
18 Fauquier	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
19 Stafford	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
20 Clarke, Jeff																								0
21 Spts, Fbrg																								0
22 King Geor.																								0
23 Externals																								0
Total	5,602	5,905	8,308	2,605	955	2,663	1,140	647	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27,825

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS + supplemental transit counts beyond HTS area

Estimated 1994 HBS percent transit (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	17.7%	32.8%	45.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		16.0%
2 DC n-core	24.5%	5.2%	2.0%	3.1%	0.0%	4.9%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		5.4%
3 Mont. Co.	0.0%	0.0%	1.2%	0.0%	54.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.2%
4 PG Co.	30.9%	0.0%	7.7%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.9%
5 Arl. core	65.9%	0.0%	0.0%	0.0%	19.7%	0.0%	0.0%	0.0%	0.0%	0.0%						0.0%	0.0%		0.0%	0.0%	0.0%			7.9%
6 Arl. n-core	19.3%	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.5%
7 Alex.	16.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.8%
8 FFX Co.	0.0%	0.0%	0.0%	0.0%	0.0%	13.8%	0.0%	0.1%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.4%
9 Loudoun	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Co.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Fred. MD	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 St. Mary's																								
17 Charles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	0.0%	0.0%	0.0%	0.0%		0.0%	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 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	21.9%	5.3%	1.5%	0.7%	5.0%	3.3%	1.5%	0.1%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.2%

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.
In the table above, Percent transit = (obs transit psn) / (est total psn)

Observed 1994 HBS percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	17.8%	33.0%	45.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		16.1%
2 DC n-core	24.5%	5.2%	2.0%	3.1%	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		5.4%
3 Mont. Co.	0.0%	0.0%	1.4%	0.0%	298.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.5%
4 PG Co.	31.0%	0.0%	7.7%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.9%
5 Arl. core	66.1%	0.0%	0.0%	0.0%	39.1%	0.0%	0.0%	0.0%	0.0%	0.0%						0.0%	0.0%		0.0%	0.0%	0.0%			10.5%
6 Arl. n-core	19.4%	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.5%
7 Alex.	16.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.8%
8 FFX Co.	0.0%	0.0%	0.0%	0.0%	0.0%	13.8%	0.0%	0.1%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.4%
9 Loudoun	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Co.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Fred. MD	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 St. Mary's																								
17 Charles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	0.0%	0.0%	0.0%	0.0%		0.0%	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 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	21.9%	5.3%	1.6%	0.7%	16.8%	3.3%	1.5%	0.1%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.3%

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS + BTS + Auto External Survey + transit counts beyond the HTS area
In the table above, Percent transit = (obs transit psn) / (est total psn)

Estimated 1994 HBS auto occupancy (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.27	1.38	2.23	1.38	1.35	1.38		1.38																1.38
2 DC n-core	1.33	1.20	1.15	1.31		2.20	1.93	1.38																1.26
3 Mont. Co.		1.38	1.21	1.33	1.38	1.39		1.38			1.38													1.22
4 PG Co.	1.38		1.43	1.20				1.24		2.19							1.42							1.22
5 Arl. core					1.11	1.38																		1.28
6 Arl. n-core		1.38	1.48		1.38	1.31	1.28	1.06	1.33															1.24
7 Alex.		1.38		1.38		1.38	1.17	1.32		1.38														1.23
8 FFX Co.	2.39		1.88		1.99	1.38	1.54	1.21	1.63	1.38														1.24
9 Loudoun			1.38					1.32	1.18	1.36	1.95				1.47									1.22
10 PW Co.								1.07	1.39	1.37								1.38						1.34
11 Fred. MD			1.46								1.25													1.26
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert		1.39		1.50											1.18		1.43	1.25						1.20
16 St. Mary's																								
17 Charles		1.65		1.21				1.39									1.30							1.30
18 Fauquier	1.60			1.38				1.38		1.57								1.32						1.34
19 Stafford	1.50					1.33		2.28		1.37									1.23					1.25
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.37	1.23	1.22	1.21	1.42	1.40	1.29	1.21	1.27	1.37	1.26				1.18		1.33	1.32	1.23					1.24

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.

Observed 1994 HBS auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.27	1.00	3.00	1.00	1.00	1.00		1.00																1.16
2 DC n-core	1.33	1.20	1.15	1.31		2.25	1.93	1.00																1.23
3 Mont. Co.		1.00	1.21	1.33	1.00	1.00		1.00			1.00													1.20
4 PG Co.	1.00		1.43	1.20				1.24		2.59							1.42							1.23
5 Arl. core					1.00	1.00																		1.00
6 Arl. n-core		1.00	1.48		1.00	1.31	1.28	1.04	1.00															1.22
7 Alex.		1.00		1.00		1.00	1.17	1.32		1.00														1.19
8 FFX Co.	2.82		1.88		1.98	1.00	1.54	1.21	1.63	1.00														1.23
9 Loudoun			1.00					1.32	1.18	1.00	1.95				1.00									1.21
10 PW Co.								1.06	1.00	1.37								1.00						1.34
11 Fred. MD			1.46								1.25													1.27
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert		1.00		1.61											1.21		1.00	1.00						1.21
16 St. Mary's																								
17 Charles		1.00		1.20				1.00									1.30							1.29
18 Fauquier	2.00			1.00				1.00		1.57								1.51						1.49
19 Stafford	1.00					1.00		3.00		1.00									1.37					1.35
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.46	1.18	1.22	1.21	1.20	1.30	1.27	1.20	1.25	1.35	1.26				1.21		1.32	1.46	1.37					1.23

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS

Difference (Est - Obs) 1994 HBS transit person trips

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	-1	-6	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-8
2 DC n-core	-1	1	-1	-1	0	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-4
3 Mont. Co.	0	0	-782	0	-511	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1,293
4 PG Co.	-3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
5 Arl. core	-1	0	0	0	-163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-164
6 Arl. n-core	-1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Alex.	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
8 FFX Co.	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
9 Loudoun	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 Co.	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 Fred. MD	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 Carroll	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 Howard	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 Anne Ar.	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 Calvert	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 St. Mary's	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 Charles	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 Fauquier	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 Stafford	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 Clarke, Jeff	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 Spts, Fbrg	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 King Geor.	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 Externals	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	-7	-5	-783	0	-674	-2	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1,472

Ratio (Est / Obs) 1994 HBS transit person trips

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	1.00																					1.00
2 DC n-core	1.00	1.00	1.00	1.00		0.99																		1.00
3 Mont. Co.			0.88		0.18																			0.82
4 PG Co.	1.00		1.00	1.00																				1.00
5 Arl. core	1.00				0.50																			0.75
6 Arl. n-core	1.00					1.00																		1.00
7 Alex.	1.00						1.00																	1.00
8 FFX Co.						1.00		1.00																1.00
9 Loudoun																								
10 PW Co.																								
11 Fred. MD																								
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert																								
16 St. Mary's																								
17 Charles																								
18 Fauquier																								
19 Stafford																								
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.00	1.00	0.91	1.00	0.29	1.00	1.00	1.00																0.95

Difference (Est - Obs) 1994 HBS percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	0.0%	-0.1%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	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 DC n-core	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
3 Mont. Co.	0.0%	0.0%	-0.2%	0.0%	-243.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.3%
4 PG Co.	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
5 Arl. core	-0.2%	0.0%	0.0%	0.0%	-19.4%	0.0%	0.0%	0.0%	0.0%	0.0%						0.0%	0.0%		0.0%	0.0%	0.0%			-2.6%
6 Arl. n-core	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
7 Alex.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
8 FFX Co.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Loudoun	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Co.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Fred. MD	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 St. Mary's																								
17 Charles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	0.0%	0.0%	0.0%	0.0%		0.0%	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 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.0%	0.0%	-0.2%	0.0%	-11.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.1%

Ratio (Est / Obs) 1994 HBS percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	1.00																					1.00
2 DC n-core	1.00	1.00	1.00	1.00		0.99																		1.00
3 Mont. Co.			0.88		0.18																			0.82
4 PG Co.	1.00		1.00	1.00																				1.00
5 Arl. core	1.00				0.50																			0.75
6 Arl. n-core	1.00					1.00																		1.00
7 Alex.	1.00						1.00																	1.00
8 FFX Co.						1.00		1.00																1.00
9 Loudoun																								
10 PW Co.																								
11 Fred. MD																								
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert																								
16 St. Mary's																								
17 Charles																								
18 Fauquier																								
19 Stafford																								
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.00	1.00	0.91	1.00	0.29	1.00	1.00	1.00																0.95

Difference (Est - Obs) 1994 HBS auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	0.00	0.38	-0.77	0.38	0.35	0.38		0.38																0.22
2 DC n-core	0.00	0.00	0.00	0.00		-0.06	0.00	0.38																0.03
3 Mont. Co.		0.38	0.00	0.00	0.38	0.39		0.38			0.38													0.01
4 PG Co.	0.38		0.00	0.00				0.00		-0.40							0.00							-0.01
5 Arl. core					0.11	0.38																		0.28
6 Arl. n-core		0.38	0.00		0.38	0.00	0.00	0.02	0.33															0.02
7 Alex.		0.38		0.38		0.38	0.00	0.00		0.38														0.05
8 FFX Co.	-0.43		0.00		0.01	0.38	0.00	0.00	0.00	0.38														0.01
9 Loudoun			0.38					0.00	0.00	0.36	0.00				0.47									0.01
10 PW Co.								0.01	0.39	0.00								0.38						-0.01
11 Fred. MD			0.00								0.00													-0.01
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert		0.39		-0.11											-0.03		0.43	0.25						-0.01
16 St. Mary's																								
17 Charles		0.65		0.00				0.39									0.00							0.01
18 Fauquier	-0.40			0.38				0.38		0.00								-0.20						-0.15
19 Stafford	0.50					0.33		-0.72		0.37									-0.14					-0.10
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	-0.09	0.05	0.00	0.00	0.23	0.10	0.02	0.01	0.03	0.02	0.00				-0.03		0.00	-0.14	-0.14					0.01

Ratio (Est / Obs) 1994 HBS auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.38	0.74	1.38	1.35	1.38		1.38																1.19
2 DC n-core	1.00	1.00	1.00	1.00		0.97	1.00	1.38																1.03
3 Mont. Co.		1.38	1.00	1.00	1.38	1.39		1.38			1.38													1.01
4 PG Co.	1.38		1.00	1.00				1.00		0.85							1.00							0.99
5 Arl. core					1.11	1.38																		1.28
6 Arl. n-core		1.38	1.00		1.38	1.00	1.00	1.02	1.33															1.02
7 Alex.		1.38		1.38		1.38	1.00	1.00		1.38														1.04
8 FFX Co.	0.85		1.00		1.01	1.38	1.00	1.00	1.00	1.38														1.01
9 Loudoun			1.38					1.00	1.00	1.36	1.00				1.47									1.01
10 PW Co.								1.01	1.39	1.00								1.38						1.00
11 Fred. MD			1.00								1.00													1.00
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert		1.39		0.93											0.98		1.43	1.25						0.99
16 St. Mary's																								
17 Charles		1.65		1.00				1.39									1.00							1.01
18 Fauquier	0.80			1.38				1.38		1.00								0.87						0.90
19 Stafford	1.50					1.33		0.76		1.37									0.90					0.93
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.94	1.04	1.00	1.00	1.19	1.08	1.02	1.01	1.02	1.02	1.00				0.98		1.00	0.91	0.90					1.01

Estimated 1994 HBO transit person trips (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	3,107	4,383	274	0	0	828	673	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,265
2 DC n-core	22,302	40,599	5,184	602	580	1,796	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71,063
3 Mont. Co.	9,095	4,242	2,166	0	0	634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,137
4 PG Co.	2,405	328	2,139	1,196	0	609	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,677
5 Arl. core	0	728	0	0	0	363	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,091
6 Arl. n-core	5,094	2,235	0	0	1,004	1,345	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,678
7 Alex.	994	892	225	0	1,340	0	899	427	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,777
8 FFX Co.	9,072	1,080	0	0	0	1,011	0	628	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,791
9 Loudoun	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 Co.	0	0	0	0	0	8	0	0	0	4,135	0	0	0	0	0	0	0	0	0	0	0	0	0	4,143
11 Fred. MD	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 Carroll	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 Howard	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 Anne Ar.	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 Calvert	168	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	168
16 St. Mary's	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 Charles	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 Fauquier	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 Stafford	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 Clarke, Jeff	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 Spts, Fbrg	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 King Geor.	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 Externals	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	52,237	54,487	9,988	1,798	2,924	6,594	1,572	1,055	0	4,135	0	0	0	0	0	0	0	0	0	0	0	0	0	134,790

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.

Observed 1994 HBO transit person trips (screened by observed auto driver trips)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	3,106	4,385	276	0	0	829	671	0	0	0	0				0	0	0	0	0	0	0	0		9,267
2 DC n-core	22,302	40,598	5,183	604	580	1,798	0	0	0	0	0				0	0	0	0	0	0	0	0		71,065
3 Mont. Co.	9,094	4,242	4,583	0	0	626	0	0	0	0	0				0	0	0	0	0	0	0	0		18,545
4 PG Co.	2,406	1,180	2,115	1,204	0	600	0	0	0	0	0				0	0	0	0	0	0	0	0		7,505
5 Arl. core	0	727	0	0	0	363	0	0	0	0	0				0	0	0	0	0	0	0	0		1,090
6 Arl. n-core	5,096	2,234	0	0	1,005	1,368	0	0	0	0	0				0	0	0	0	0	0	0	0		9,703
7 Alex.	994	892	226	0	1,340	0	918	436	0	0	0				0	0	0	0	0	0	0	0		4,806
8 FFX Co.	9,074	1,071	0	0	0	1,023	0	4,123	0	0	0				0	0	0	0	0	0	0	0		15,291
9 Loudoun	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
10 PW Co.	0	0	0	0	0	689	0	0	0	347	0				0	0	0	0	0	0	0	0		1,036
11 Fred. MD	0	0	0	0	0	0	0	0	0	0	465				0	0	0	0	0	0	0	0		465
12 Carroll																								0
13 Howard																								0
14 Anne Ar.																								0
15 Calvert	446	0	0	0	0	0	0	0	0	0	0				75	0	0	0	0	0	0	0		521
16 St. Mary's																								0
17 Charles	0	0	0	0	0	0	0	0	0	0	0				0	0	73	0	0	0	0	0		73
18 Fauquier	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
19 Stafford	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
20 Clarke, Jeff																								0
21 Spts, Fbrg																								0
22 King Geor.																								0
23 Externals																								0
Total	52,518	55,329	12,383	1,808	2,925	7,296	1,589	4,559	0	347	465	0	0	0	75	0	73	0	0	0	0	0	0	139,367

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS + supplemental transit counts beyond HTS area

Estimated 1994 HBO percent transit (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	21.0%	23.2%	7.1%	0.0%	0.0%	19.7%	42.3%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			17.5%
2 DC n-core	19.1%	10.4%	7.6%	2.1%	9.2%	10.2%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		10.9%
3 Mont. Co.	29.4%	6.6%	0.2%	0.0%	0.0%	6.5%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.1%
4 PG Co.	9.4%	0.4%	4.2%	0.1%	0.0%	8.7%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.6%
5 Arl. core	0.0%	23.9%	0.0%	0.0%	0.0%	10.5%	0.0%	0.0%	0.0%	0.0%	0.0%						0.0%	0.0%	0.0%		0.0%			6.8%
6 Arl. n-core	28.4%	12.3%	0.0%	0.0%	11.4%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		3.0%
7 Alex.	16.1%	10.2%	6.5%	0.0%	57.1%	0.0%	1.1%	1.4%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		3.2%
8 FFX Co.	20.0%	7.5%	0.0%	0.0%	0.0%	2.4%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.8%
9 Loudoun	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Co.	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	1.3%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.0%
11 Fred. MD	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	32.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.2%
16 St. Mary's																								
17 Charles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	19.6%	8.8%	0.7%	0.2%	8.5%	2.1%	0.9%	0.1%	0.0%	1.2%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		2.1%

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.
In the table above, Percent transit = (obs transit psn) / (est total psn)

Observed 1994 HBO percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	21.0%	23.2%	7.2%	0.0%	0.0%	19.7%	42.2%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			17.5%
2 DC n-core	19.1%	10.4%	7.6%	2.1%	9.2%	10.2%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		10.9%
3 Mont. Co.	29.3%	6.6%	0.4%	0.0%	0.0%	6.4%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.3%
4 PG Co.	9.4%	1.3%	4.1%	0.1%	0.0%	8.6%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.7%
5 Arl. core	0.0%	23.8%	0.0%	0.0%	0.0%	10.5%	0.0%	0.0%	0.0%	0.0%	0.0%						0.0%	0.0%	0.0%		0.0%			6.8%
6 Arl. n-core	28.5%	12.3%	0.0%	0.0%	11.4%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		3.0%
7 Alex.	16.1%	10.2%	6.5%	0.0%	57.1%	0.0%	1.2%	1.4%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		3.2%
8 FFX Co.	20.0%	7.5%	0.0%	0.0%	0.0%	2.4%	0.0%	0.3%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.0%
9 Loudoun	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Co.	0.0%	0.0%	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	0.1%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.2%
11 Fred. MD	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.2%
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	85.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.5%
16 St. Mary's																								
17 Charles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	19.7%	8.9%	0.9%	0.2%	8.5%	2.4%	0.9%	0.3%	0.0%	0.1%	0.2%				0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		2.1%

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS + BTS + Auto External Survey + transit counts beyond the HTS area
In the table above, Percent transit = (obs transit psn) / (est total psn)

Estimated 1994 HBO auto occupancy (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.59	1.21	1.95	1.51		1.36	1.24	2.06		1.42														1.44
2 DC n-core	1.33	1.48	1.33	1.39	1.36	1.33	1.52	1.22	1.37						1.42									1.42
3 Mont. Co.	1.17	1.25	1.48	1.33		1.38	1.55	1.09		1.37	1.38				1.60		1.59							1.46
4 PG Co.	1.33	1.40	1.43	1.46	1.38	1.38	1.92	1.10	1.57	2.18					1.38		2.02							1.45
5 Arl. core						1.46	1.38	2.00																1.92
6 Arl. n-core	1.14	1.25	1.41	1.38	1.10	1.47	1.34	1.32	1.38	1.38							1.59							1.40
7 Alex.	1.38	1.58	1.20	1.96	1.14	1.26	1.43	1.21	1.37		2.00													1.37
8 FFX Co.	1.30	1.41	1.32	1.38	1.38	1.52	1.34	1.45	1.26	1.65									1.61					1.44
9 Loudoun	1.39	1.38	1.24	1.39		2.48	1.38	1.41	1.51	1.71	1.93							2.47						1.50
10 PW Co.	1.38	1.51	1.33	1.38		1.38	2.13	1.42	1.50	1.54								1.28	1.13					1.51
11 Fred. MD	1.24		1.21	1.51				1.39	1.38		1.40				1.10									1.39
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.38	1.38	2.09	1.29		1.40		1.84	1.73						1.28		1.47							1.30
16 St. Mary's																								
17 Charles	1.67	2.06	1.38	1.28	1.40	1.39	1.38	1.38							1.41		1.35							1.35
18 Fauquier					1.52	1.39		1.13	1.16	1.35								1.22	2.26					1.26
19 Stafford				1.39		1.38		1.24		1.45								2.26	1.29					1.32
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.32	1.42	1.47	1.45	1.38	1.45	1.45	1.43	1.48	1.54	1.40				1.29		1.38	1.26	1.29					1.44

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.

Observed 1994 HBO auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.59	1.21	1.95	1.51		1.36	1.24	2.06		1.00														1.41
2 DC n-core	1.25	1.48	1.33	1.39	1.35	1.33	1.51	1.22	1.00						1.00									1.40
3 Mont. Co.	1.17	1.25	1.48	1.33		1.00	1.55	1.09		1.00	1.00				1.91		1.00							1.45
4 PG Co.	1.33	1.40	1.43	1.46	1.00	1.00	1.92	1.10	1.58	2.20					1.00		2.02							1.46
5 Arl. core						1.46	1.00	2.00																1.93
6 Arl. n-core	1.14	1.25	1.41	1.00	1.10	1.47	1.34	1.32	1.00	1.00							1.00							1.38
7 Alex.	1.00	1.58	1.20	1.96	1.14	1.26	1.43	1.21	1.00		1.00													1.34
8 FFX Co.	1.21	1.41	1.32	1.00	1.00	1.52	1.34	1.45	1.00	1.65									1.64					1.43
9 Loudoun	1.00	1.00	1.24	1.00		2.91	1.00	1.40	1.51	1.69	1.93							4.90						1.50
10 PW Co.	1.00	1.51	1.33	1.00		1.00	2.13	1.41	1.50	1.54								1.28	1.13					1.52
11 Fred. MD	1.24		1.21	1.51				1.00	1.00		1.43				1.00									1.41
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.00	1.00	2.07	1.29		1.00		1.82	2.00						1.36		1.47							1.37
16 St. Mary's																								
17 Charles	1.67	2.06	1.00	1.28	1.00	1.00	1.00	1.00							1.41		1.65							1.59
18 Fauquier					2.00	1.00		1.13	1.16	1.35								1.45	2.27					1.40
19 Stafford				1.00		1.00		1.24		1.45								2.24	1.79					1.72
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.26	1.42	1.47	1.44	1.16	1.43	1.43	1.43	1.41	1.54	1.42				1.35		1.68	1.48	1.73					1.44

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS

Difference (Est - Obs) 1994 HBO transit person trips

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1	-2	-2	0	0	-1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2
2 DC n-core	0	1	1	-2	0	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2
3 Mont. Co.	1	0	-2,417	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,408
4 PG Co.	-1	-852	24	-8	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-828
5 Arl. core	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6 Arl. n-core	-2	1	0	0	-1	-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-25
7 Alex.	0	0	-1	0	0	0	-19	-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-29
8 FFX Co.	-2	9	0	0	0	-12	0	-3,495	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3,500
9 Loudoun	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 Co.	0	0	0	0	0	-681	0	0	0	3,788	0	0	0	0	0	0	0	0	0	0	0	0	0	3,107
11 Fred. MD	0	0	0	0	0	0	0	0	0	0	-465	0	0	0	0	0	0	0	0	0	0	0	0	-465
12 Carroll	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 Howard	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 Anne Ar.	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 Calvert	-278	0	0	0	0	0	0	0	0	0	0	0	0	0	-75	0	0	0	0	0	0	0	0	-353
16 St. Mary's	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 Charles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-73	0	0	0	0	0	0	-73
18 Fauquier	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 Stafford	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 Clarke, Jeff	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 Spts, Fbrg	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 King Geor.	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 Externals	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	-281	-842	-2,395	-10	-1	-702	-17	-3,504	0	3,788	-465	0	0	0	-75	0	-73	0	0	0	0	0	0	-4,577

Ratio (Est / Obs) 1994 HBO transit person trips

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	0.99			1.00	1.00																	1.00
2 DC n-core	1.00	1.00	1.00	1.00	1.00	1.00																		1.00
3 Mont. Co.	1.00	1.00	0.47			1.01																		0.87
4 PG Co.	1.00	0.28	1.01	0.99		1.02																		0.89
5 Arl. core		1.00				1.00																		1.00
6 Arl. n-core	1.00	1.00			1.00	0.98																		1.00
7 Alex.	1.00	1.00	1.00		1.00		0.98	0.98																0.99
8 FFX Co.	1.00	1.01				0.99		0.15																0.77
9 Loudoun																								
10 PW Co.						0.01				11.92														4.00
11 Fred. MD											0.00													0.00
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.38														0.00									0.32
16 St. Mary's																								
17 Charles																	0.00							0.00
18 Fauquier																								
19 Stafford																								
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.99	0.98	0.81	0.99	1.00	0.90	0.99	0.23		11.92	0.00				0.00		0.00							0.97

Difference (Est - Obs) 1994 HBO percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.1%	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 DC n-core	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
3 Mont. Co.	0.0%	0.0%	-0.2%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.2%
4 PG Co.	0.0%	-0.9%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.1%
5 Arl. core	0.0%	0.0%	0.0%	0.0%	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 Arl. n-core	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
7 Alex.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
8 FFX Co.	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.3%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.2%
9 Loudoun	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Co.	0.0%	0.0%	0.0%	0.0%	0.0%	-9.0%	0.0%	0.0%	0.0%	1.2%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.7%
11 Fred. MD	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.2%
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	-53.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.4%
16 St. Mary's																								
17 Charles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	-0.1%	-0.1%	-0.2%	0.0%	0.0%	-0.2%	0.0%	-0.2%	0.0%	1.1%	-0.2%				-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.1%

Ratio (Est / Obs) 1994 HBO percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	0.99			1.00	1.00																	1.00
2 DC n-core	1.00	1.00	1.00	1.00	1.00	1.00																		1.00
3 Mont. Co.	1.00	1.00	0.47			1.01																		0.87
4 PG Co.	1.00	0.28	1.01	0.99		1.02																		0.89
5 Arl. core		1.00				1.00																		1.00
6 Arl. n-core	1.00	1.00			1.00	0.98																		1.00
7 Alex.	1.00	1.00	1.00		1.00		0.98	0.98																0.99
8 FFX Co.	1.00	1.01				0.99		0.15																0.77
9 Loudoun																								
10 PW Co.						0.01				11.92														4.00
11 Fred. MD											0.00													0.00
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.38														0.00									0.32
16 St. Mary's																								
17 Charles																	0.00							0.00
18 Fauquier																								
19 Stafford																								
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.99	0.98	0.81	0.99	1.00	0.90	0.99	0.23		11.92	0.00				0.00		0.00							0.97

Difference (Est - Obs) 1994 HBO auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	0.00	0.00	0.00	0.00		0.00	0.00	0.00		0.42														0.03
2 DC n-core	0.08	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.37						0.42									0.02
3 Mont. Co.	0.00	0.00	0.00	0.00		0.38	0.00	0.00		0.37	0.38				-0.31		0.59							0.01
4 PG Co.	0.00	0.00	0.00	0.00	0.38	0.38	0.00	0.00	-0.01	-0.02					0.38		0.00							-0.01
5 Arl. core						0.00	0.38	0.00																-0.01
6 Arl. n-core	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.38	0.38							0.59							0.01
7 Alex.	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37		1.00													0.03
8 FFX Co.	0.09	0.00	0.00	0.38	0.38	0.00	0.00	0.00	0.26	0.00									-0.03					0.01
9 Loudoun	0.39	0.38	0.00	0.39		-0.42	0.38	0.00	-0.01	0.01	0.00							-2.42						0.00
10 PW Co.	0.38	0.00	0.00	0.38		0.38	0.00	0.00	0.00	0.00								0.00	0.00					0.00
11 Fred. MD	0.00		0.00	0.00				0.39	0.38		-0.03				0.10									-0.02
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.38	0.38	0.02	0.00		0.40		0.02	-0.27						-0.08		0.00							-0.07
16 St. Mary's																								
17 Charles	0.00	0.00	0.38	0.00	0.40	0.39	0.38	0.38							0.00		-0.29							-0.24
18 Fauquier					-0.48	0.39		0.00	0.00	0.00								-0.23	0.00					-0.14
19 Stafford				0.39		0.38		0.00		0.00								0.02	-0.50					-0.40
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.06	0.01	0.00	0.01	0.22	0.02	0.02	0.00	0.08	0.00	-0.02				-0.06		-0.31	-0.22	-0.44					-0.01

Ratio (Est / Obs) 1994 HBO auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.42														1.02
2 DC n-core	1.06	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.37						1.42									1.02
3 Mont. Co.	1.00	1.00	1.00	1.00		1.38	1.00	1.00		1.37	1.38				0.84		1.59							1.01
4 PG Co.	1.00	1.00	1.00	1.00	1.38	1.38	1.00	1.00	0.99	0.99					1.38		1.00							0.99
5 Arl. core						1.00	1.38	1.00																0.99
6 Arl. n-core	1.00	1.00	1.00	1.38	1.00	1.00	1.00	1.00	1.38	1.38							1.59							1.01
7 Alex.	1.38	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.37		2.00													1.02
8 FFX Co.	1.07	1.00	1.00	1.38	1.38	1.00	1.00	1.00	1.26	1.00									0.98					1.01
9 Loudoun	1.39	1.38	1.00	1.39		0.85	1.38	1.00	1.00	1.01	1.00							0.51						1.00
10 PW Co.	1.38	1.00	1.00	1.38		1.38	1.00	1.00	1.00	1.00								1.00	1.00					1.00
11 Fred. MD	1.00		1.00	1.00				1.39	1.38		0.98				1.10									0.98
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.38	1.38	1.01	1.00		1.40		1.01	0.87						0.94		1.00							0.95
16 St. Mary's																								
17 Charles	1.00	1.00	1.38	1.00	1.40	1.39	1.38	1.38							1.00		0.82							0.85
18 Fauquier					0.76	1.39		1.00	1.00	1.00								0.84	1.00					0.90
19 Stafford				1.39		1.38		1.00		1.00								1.01	0.72					0.77
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.05	1.00	1.00	1.01	1.19	1.02	1.01	1.00	1.05	1.00	0.99				0.95		0.82	0.85	0.75					0.99

Estimated 1994 NHB transit person trips (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	21,793	9,195	6,157	4,630	2,721	4,385	864	4,891	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54,636
2 DC n-core	9,200	4,387	866	1,468	264	1,262	468	123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,038
3 Mont. Co.	6,152	787	4,829	659	233	332	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,992
4 PG Co.	4,627	1,470	665	163	0	200	0	564	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,689
5 Arl. core	2,720	272	230	0	0	354	493	242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,311
6 Arl. n-core	4,384	1,247	324	222	352	1,507	1,149	1,117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,302
7 Alex.	943	470	0	0	495	1,571	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,479
8 FFX Co.	4,897	91	0	546	264	1,110	0	129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,037
9 Loudoun	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44
10 PW Co.	611	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	616
11 Fred. MD	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
12 Carroll	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 Howard	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 Anne Ar.	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 Calvert	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	110
16 St. Mary's	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 Charles	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 Fauquier	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 Stafford	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 Clarke, Jeff	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 Spts, Fbrg	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 King Geor.	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 Externals	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	55,484	17,921	13,071	7,688	4,332	10,721	2,974	7,066	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	119,257

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.

Observed 1994 NHB transit person trips (screened by observed auto driver trips)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	21,795	9,202	6,152	4,628	2,720	4,385	862	4,895	54	617	86				110	0	0	0	65	0	0	0		55,571
2 DC n-core	9,200	4,386	881	1,472	272	1,247	479	233	0	201	0				0	0	0	0	0	0	0	0		18,371
3 Mont. Co.	6,154	882	3,050	674	232	326	0	0	0	0	0				0	0	0	0	0	0	0	0		11,318
4 PG Co.	4,627	1,473	674	1,297	0	222	0	562	0	0	0				0	0	0	0	0	0	0	0		8,855
5 Arl. core	2,720	271	232	0	0	354	493	243	0	124	0				0	0	54	0	0	0	0	0		4,491
6 Arl. n-core	4,383	1,246	326	222	354	425	95	1,117	0	0	0				0	0	0	0	0	0	0	0		8,168
7 Alex.	861	479	0	0	493	96	0	0	0	0	0				0	0	0	0	0	0	0	0		1,929
8 FFX Co.	4,897	233	0	562	243	1,117	0	459	0	0	0				0	0	0	0	0	0	0	0		7,511
9 Loudoun	54	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		54
10 PW Co.	615	201	0	0	124	0	0	0	0	0	0				0	0	0	0	0	0	0	0		940
11 Fred. MD	86	0	0	0	0	0	0	0	0	0	330				0	0	0	0	0	0	0	0		416
12 Carroll																								0
13 Howard																								0
14 Anne Ar.																								0
15 Calvert	110	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		110
16 St. Mary's																								0
17 Charles	0	0	0	0	54	0	0	0	0	0	0				0	0	109	0	0	0	0	0		163
18 Fauquier	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		0
19 Stafford	66	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0		66
20 Clarke, Jeff																								0
21 Spts, Fbrg																								0
22 King Geor.																								0
23 Externals																								0
Total	55,568	18,373	11,315	8,855	4,492	8,172	1,929	7,509	54	942	416	0	0	0	110	0	163	0	65	0	0	0	0	117,963

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS + supplemental transit counts beyond HTS area

Estimated 1994 NHB percent transit (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	19.9%	14.0%	26.3%	15.4%	53.7%	19.3%	5.9%	15.6%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		17.8%
2 DC n-core	14.3%	2.4%	2.7%	4.5%	6.8%	11.0%	6.1%	0.7%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			5.0%
3 Mont. Co.	23.2%	2.3%	0.5%	2.3%	8.6%	4.9%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.3%
4 PG Co.	14.8%	4.5%	1.9%	0.0%	0.0%	3.3%	0.0%	3.7%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.1%
5 Arl. core	34.9%	6.5%	7.9%	0.0%	0.0%	6.4%	16.2%	3.5%	0.0%	0.0%	0.0%				0.0%		0.0%	0.0%	0.0%		0.0%	0.0%		11.8%
6 Arl. n-core	22.6%	10.7%	5.2%	4.8%	5.5%	1.3%	9.6%	4.2%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			4.8%
7 Alex.	7.8%	5.2%	0.0%	0.0%	14.6%	13.6%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.9%
8 FFX Co.	15.2%	0.6%	0.0%	4.8%	3.4%	4.4%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.6%
9 Loudoun	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Co.	9.5%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.2%
11 Fred. MD	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	19.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.2%
16 St. Mary's																								
17 Charles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	17.7%	4.9%	1.3%	1.1%	11.8%	5.0%	1.6%	0.6%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		2.5%

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.
In the table above, Percent transit = (obs transit psn) / (est total psn)

Observed 1994 NHB percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	20.0%	14.0%	26.2%	15.4%	53.7%	19.3%	5.9%	15.6%	5.1%	21.8%	54.4%				51.9%	0.0%	0.0%	0.0%	44.2%	0.0%	0.0%	0.0%		18.1%
2 DC n-core	14.3%	2.4%	2.7%	4.5%	7.0%	10.8%	6.2%	1.4%	0.0%	5.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			5.1%
3 Mont. Co.	23.2%	2.6%	0.3%	2.3%	8.6%	4.8%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.1%
4 PG Co.	14.8%	4.5%	1.9%	0.2%	0.0%	3.6%	0.0%	3.7%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.2%
5 Arl. core	34.9%	6.5%	7.9%	0.0%	0.0%	6.4%	16.2%	3.5%	0.0%	20.2%	0.0%				0.0%		174.2%	0.0%	0.0%		0.0%	0.0%		12.3%
6 Arl. n-core	22.6%	10.7%	5.2%	4.8%	5.6%	0.4%	0.8%	4.2%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			3.8%
7 Alex.	7.1%	5.3%	0.0%	0.0%	14.5%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.1%
8 FFX Co.	15.2%	1.4%	0.0%	4.9%	3.2%	4.4%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.7%
9 Loudoun	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Co.	9.6%	4.1%	0.0%	0.0%	13.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.4%
11 Fred. MD	17.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%				0.0%	0.0%		0.0%	0.0%	0.0%		0.0%		0.2%
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	19.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.2%
16 St. Mary's																								
17 Charles	0.0%	0.0%	0.0%	0.0%	94.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%		0.1%
18 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	15.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%		0.2%
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	17.7%	5.0%	1.1%	1.3%	12.2%	3.8%	1.1%	0.7%	0.1%	0.4%	0.2%				0.2%	0.0%	0.1%	0.0%	0.3%	0.0%	0.0%	0.0%		2.5%

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS + BTS + Auto External Survey + transit counts beyond the HTS area
In the table above, Percent transit = (obs transit psn) / (est total psn)

Estimated 1994 NHB auto occupancy (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.44	1.34	1.26	1.20	1.20	1.18	1.37	1.21	1.40	1.44	1.20				1.12		1.49	1.38	2.63					1.32
2 DC n-core	1.34	1.34	1.17	1.18	1.24	1.08	1.21	1.09	1.28	1.25	1.23				1.17		1.43	1.36						1.28
3 Mont. Co.	1.26	1.17	1.29	1.16	1.25	1.07	1.25	1.11	1.42	1.12	1.26				1.24		1.24							1.28
4 PG Co.	1.20	1.18	1.16	1.24	1.25	1.07	1.11	1.17	1.26		1.24				1.44		1.11							1.23
5 Arl. core	1.20	1.25	1.25	1.25	1.22	1.28	1.25	1.49	1.26	1.63							1.41							1.29
6 Arl. n-core	1.18	1.08	1.07	1.07	1.28	1.21	1.11	1.25	1.07	1.16	1.25				1.22		1.69							1.19
7 Alex.	1.37	1.21	1.25	1.11	1.25	1.11	1.26	1.29	1.25	1.25	1.32						1.25	1.32	1.25					1.26
8 FFX Co.	1.21	1.10	1.11	1.17	1.50	1.25	1.29	1.22	1.07	1.23	1.25						1.09	1.35	1.08					1.22
9 Loudoun	1.41	1.27	1.42	1.25	1.23	1.07	1.25	1.07	1.18	1.61	1.25							1.25						1.18
10 PW Co.	1.44	1.25	1.12		1.63	1.16	1.25	1.23	1.61	1.38								1.24	1.10					1.35
11 Fred. MD	1.25	1.25	1.26	1.25		1.25	1.25	1.25	1.25		1.30													1.30
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.13	1.25	1.24	1.44		1.21									1.17		1.96							1.20
16 St. Mary's																								
17 Charles	1.48	1.36	1.25	1.11	1.43	1.64	1.26	1.10							1.96		1.44							1.41
18 Fauquier	2.08	1.23					1.41	1.35	1.26	1.24								1.25						1.26
19 Stafford	2.54						1.25	1.07		1.10									1.42					1.31
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.33	1.28	1.28	1.23	1.31	1.19	1.26	1.21	1.19	1.35	1.30				1.20		1.42	1.25	1.32					1.26

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.

Observed 1994 NHB auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.29	1.28	1.26	1.20	1.20	1.18	1.37	1.21	1.41	1.44	1.24				1.13		1.48	2.00	6.50					1.27
2 DC n-core	1.28	1.34	1.17	1.18	1.00	1.08	1.21	1.10	1.28	1.00	1.00				1.00		1.36	1.00						1.26
3 Mont. Co.	1.26	1.17	1.29	1.16	1.00	1.06	1.00	1.11	1.42	1.12	1.26				1.00		1.00							1.27
4 PG Co.	1.20	1.18	1.16	1.24	1.00	1.07	1.11	1.17	1.00		1.00				1.44		1.11							1.22
5 Arl. core	1.20	1.00	1.00	1.00	1.22	1.28	1.00	1.49	1.00	1.63							1.00							1.26
6 Arl. n-core	1.18	1.08	1.06	1.07	1.28	1.21	1.11	1.25	1.06	1.16	1.00				1.00		1.68							1.20
7 Alex.	1.37	1.21	1.00	1.11	1.00	1.11	1.26	1.29	1.00	1.00	1.00						1.00	1.00	1.00					1.24
8 FFX Co.	1.21	1.10	1.11	1.17	1.49	1.25	1.29	1.22	1.07	1.23	1.00						1.10	1.35	1.05					1.22
9 Loudoun	1.41	1.28	1.42	1.00	1.00	1.06	1.00	1.07	1.18	1.61	1.00							1.00						1.16
10 PW Co.	1.44	1.00	1.12		1.63	1.16	1.00	1.23	1.62	1.38								1.24	1.10					1.35
11 Fred. MD	1.24	1.00	1.26	1.00		1.00	1.00	1.00	1.00		1.30													1.29
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.13	1.00	1.00	1.44		1.00									1.21		1.95	1.00						1.23
16 St. Mary's																								
17 Charles	1.48	1.36	1.00	1.11	1.00	1.68	1.00	1.10							1.96		1.44							1.39
18 Fauquier	2.00	1.00					1.00	1.35	1.00	1.24					1.00			1.25						1.25
19 Stafford	6.50						1.00	1.05		1.10									1.46					1.41
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.27	1.26	1.27	1.22	1.26	1.20	1.24	1.22	1.17	1.35	1.29				1.23		1.39	1.25	1.41					1.25

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS

Difference (Est - Obs) 1994 NHB transit person trips

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	-2	-7	5	2	1	0	2	-4	-54	-617	-86	0	0	0	-110	0	0	0	-65	0	0	0	0	-935
2 DC n-core	0	1	-15	-4	-8	15	-11	-110	0	-201	0	0	0	0	0	0	0	0	0	0	0	0	0	-333
3 Mont. Co.	-2	-95	1,779	-15	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,674
4 PG Co.	0	-3	-9	-1,134	0	-22	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1,166
5 Arl. core	0	1	-2	0	0	0	0	-1	0	-124	0	0	0	0	0	0	-54	0	0	0	0	0	0	-180
6 Arl. n-core	1	1	-2	0	-2	1,082	1,054	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,134
7 Alex.	82	-9	0	0	2	1,475	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,550
8 FFX Co.	0	-142	0	-16	21	-7	0	-330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-474
9 Loudoun	-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-10
10 PW Co.	-4	-199	0	0	-121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-324
11 Fred. MD	-83	0	0	0	0	0	0	0	0	0	-330	0	0	0	0	0	0	0	0	0	0	0	0	-413
12 Carroll	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 Howard	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 Anne Ar.	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 Calvert	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 St. Mary's	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 Charles	0	0	0	0	-54	0	0	0	0	0	0	0	0	0	0	0	-109	0	0	0	0	0	0	-163
18 Fauquier	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 Stafford	-66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-66
20 Clarke, Jeff	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 Spts, Fbrg	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 King Geor.	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 Externals	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	-84	-452	1,756	-1,167	-160	2,549	1,045	-443	-54	-942	-416	0	0	0	-110	0	-163	0	-65	0	0	0	0	1,294

Ratio (Est / Obs) 1994 NHB transit person trips

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00				0.00				0.00					0.98
2 DC n-core	1.00	1.00	0.98	1.00	0.97	1.01	0.98	0.53		0.00														0.98
3 Mont. Co.	1.00	0.89	1.58	0.98	1.00	1.02																		1.15
4 PG Co.	1.00	1.00	0.99	0.13		0.90		1.00																0.87
5 Arl. core	1.00	1.00	0.99			1.00	1.00	1.00		0.00							0.00							0.96
6 Arl. n-core	1.00	1.00	0.99	1.00	0.99	3.55	12.09	1.00																1.26
7 Alex.	1.10	0.98			1.00	16.36																		1.80
8 FFX Co.	1.00	0.39		0.97	1.09	0.99		0.28																0.94
9 Loudoun	0.81																							0.81
10 PW Co.	0.99	0.01			0.02																			0.66
11 Fred. MD	0.03										0.00													0.01
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.00																							1.00
16 St. Mary's																								
17 Charles					0.00												0.00							0.00
18 Fauquier																								
19 Stafford	0.00																							0.00
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.00	0.98	1.16	0.87	0.96	1.31	1.54	0.94	0.00	0.00	0.00				0.00		0.00		0.00					1.01

Difference (Est - Obs) 1994 NHB percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-5.1%	-21.8%	-54.4%				-51.9%	0.0%	0.0%	0.0%	-44.2%	0.0%	0.0%	0.0%		-0.3%
2 DC n-core	0.0%	0.0%	0.0%	0.0%	-0.2%	0.1%	-0.1%	-0.7%	0.0%	-5.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			-0.1%
3 Mont. Co.	0.0%	-0.3%	0.2%	-0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.2%
4 PG Co.	0.0%	0.0%	0.0%	-0.2%	0.0%	-0.4%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.2%
5 Arl. core	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-20.2%	0.0%				0.0%		-174.2%	0.0%	0.0%		0.0%	0.0%		-0.5%
6 Arl. n-core	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	8.8%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			1.0%
7 Alex.	0.7%	-0.1%	0.0%	0.0%	0.1%	12.8%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.9%
8 FFX Co.	0.0%	-0.9%	0.0%	-0.1%	0.3%	0.0%	0.0%	0.0%	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 Loudoun	-0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Co.	-0.1%	-4.0%	0.0%	0.0%	-13.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.1%
11 Fred. MD	-16.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%				0.0%	0.0%		0.0%	0.0%	0.0%		0.0%		-0.2%
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 St. Mary's																								
17 Charles	0.0%	0.0%	0.0%	0.0%	-94.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.1%
18 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	-15.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%		-0.2%
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.0%	-0.1%	0.2%	-0.2%	-0.4%	1.2%	0.6%	0.0%	-0.1%	-0.4%	-0.2%				-0.2%	0.0%	-0.1%	0.0%	-0.3%	0.0%	0.0%	0.0%		0.0%

Ratio (Est / Obs) 1994 NHB percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00				0.00				0.00					0.98
2 DC n-core	1.00	1.00	0.98	1.00	0.97	1.01	0.98	0.53		0.00														0.98
3 Mont. Co.	1.00	0.89	1.58	0.98	1.00	1.02																		1.15
4 PG Co.	1.00	1.00	0.99	0.13		0.90		1.00																0.87
5 Arl. core	1.00	1.00	0.99			1.00	1.00	1.00		0.00							0.00							0.96
6 Arl. n-core	1.00	1.00	0.99	1.00	0.99	3.55	12.09	1.00																1.26
7 Alex.	1.10	0.98			1.00	16.36																		1.80
8 FFX Co.	1.00	0.39		0.97	1.09	0.99		0.28																0.94
9 Loudoun	0.81																							0.81
10 PW Co.	0.99	0.01			0.02																			0.66
11 Fred. MD	0.03										0.00													0.01
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.00																							1.00
16 St. Mary's																								
17 Charles					0.00												0.00							0.00
18 Fauquier																								
19 Stafford	0.00																							0.00
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.00	0.98	1.16	0.87	0.96	1.31	1.54	0.94	0.00	0.00	0.00				0.00		0.00		0.00					1.01

Difference (Est - Obs) 1994 NHB auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	0.15	0.06	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.05				0.00		0.01	-0.62	-3.88					0.06
2 DC n-core	0.06	0.00	0.00	0.00	0.24	0.00	0.01	0.00	0.01	0.25	0.23				0.17		0.06	0.36						0.02
3 Mont. Co.	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.00				0.24		0.24							0.00
4 PG Co.	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.26		0.24				0.00		0.00							0.00
5 Arl. core	0.00	0.25	0.25	0.25	0.00	0.00	0.25	0.00	0.26	0.00							0.41							0.03
6 Arl. n-core	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.25				0.22		0.01							0.00
7 Alex.	0.00	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.25	0.25	0.32						0.25	0.32	0.25					0.02
8 FFX Co.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25						-0.01	0.00	0.03					0.00
9 Loudoun	0.00	0.00	0.00	0.25	0.23	0.01	0.25	0.00	0.00	0.00	0.25							0.25						0.01
10 PW Co.	0.00	0.25	0.00		0.00	0.00	0.25	0.00	0.00	0.00								0.00	0.00					0.00
11 Fred. MD	0.00	0.25	0.00	0.25		0.25	0.25	0.25	0.25		0.00													0.01
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.01	0.25	0.24	0.00		0.21									-0.04		0.00							-0.03
16 St. Mary's																								
17 Charles	0.00	0.00	0.25	0.00	0.43	-0.04	0.26	0.00							0.00		0.00							0.02
18 Fauquier	0.08	0.23					0.41	0.00	0.26	0.00								0.00						0.01
19 Stafford	-3.96						0.25	0.02		0.00									-0.04					-0.11
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.06	0.02	0.00	0.00	0.05	0.00	0.02	0.00	0.02	-0.01	0.01				-0.03		0.03	0.01	-0.09					0.01

Ratio (Est / Obs) 1994 NHB auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.11	1.05	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.96				1.00		1.01	0.69	0.40					1.05
2 DC n-core	1.05	1.00	1.00	1.00	1.24	1.00	1.00	1.00	1.00	1.25	1.23				1.17		1.05	1.36						1.02
3 Mont. Co.	1.00	1.00	1.00	1.00	1.25	1.00	1.25	1.00	1.00	1.00	1.00				1.24		1.24							1.00
4 PG Co.	1.00	1.00	1.00	1.00	1.25	1.00	1.00	1.00	1.26		1.24				1.00		1.00							1.00
5 Arl. core	1.00	1.25	1.25	1.25	1.00	1.00	1.25	1.00	1.26	1.00							1.41							1.03
6 Arl. n-core	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.25				1.22		1.01							1.00
7 Alex.	1.00	1.00	1.25	1.00	1.25	1.00	1.00	1.00	1.25	1.25	1.32						1.25	1.32	1.25					1.02
8 FFX Co.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.25						0.99	1.00	1.03					1.00
9 Loudoun	1.00	1.00	1.00	1.25	1.23	1.01	1.25	1.00	1.00	1.00	1.25							1.25						1.01
10 PW Co.	1.00	1.25	1.00		1.00	1.00	1.25	1.00	1.00	1.00								1.00	1.00					1.00
11 Fred. MD	1.00	1.25	1.00	1.25		1.25	1.25	1.25	1.25		1.00													1.00
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.01	1.25	1.24	1.00		1.21									0.97		1.00							0.98
16 St. Mary's																								
17 Charles	1.00	1.00	1.25	1.00	1.43	0.97	1.26	1.00							1.00		1.00							1.01
18 Fauquier	1.04	1.23					1.41	1.00	1.26	1.00								1.00						1.01
19 Stafford	0.39						1.25	1.02		1.00									0.97					0.92
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.05	1.01	1.00	1.00	1.04	1.00	1.02	1.00	1.02	1.00	1.01				0.97		1.02	1.01	0.93					1.00

Estimated 1994 Tot transit person trips (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	40,507	19,542	8,027	4,630	2,721	5,833	2,317	6,517	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90,094
2 DC n-core	112,140	70,414	12,442	4,626	3,899	5,324	761	1,648	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	211,254
3 Mont. Co.	68,657	11,494	23,679	659	3,342	8,108	0	1,594	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117,533
4 PG Co.	44,677	6,593	7,882	8,238	2,954	2,831	0	564	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73,739
5 Arl. core	5,838	1,368	230	0	566	1,053	493	242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,790
6 Arl. n-core	39,932	6,882	1,683	222	3,399	6,866	1,149	1,469	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61,602
7 Alex.	15,510	3,548	225	0	4,381	3,212	2,948	2,220	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32,044
8 FFX Co.	56,236	4,043	0	546	13,184	19,487	1,200	11,378	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	106,074
9 Loudoun	2,644	420	367	12	353	420	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,216
10 PW Co.	9,045	1,137	896	0	970	1,694	317	1,437	0	4,135	0	0	0	0	0	0	0	0	0	0	0	0	0	19,631
11 Fred. MD	940	273	0	0	41	78	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,337
12 Carroll	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 Howard	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 Anne Ar.	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 Calvert	692	47	0	0	28	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	820
16 St. Mary's	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 Charles	1,435	42	0	0	160	69	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	1,713
18 Fauquier	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 Stafford	1,416	325	263	0	359	451	217	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,031
20 Clarke, Jeff	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 Spts, Fbrg	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 King Geor.	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 Externals	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	399,669	126,128	55,694	18,933	36,357	55,479	9,407	27,069	0	4,135	0	0	0	0	0	0	7	0	0	0	0	0	0	732,878

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.

Observed 1994 Tot transit person trips (screened by observed auto driver trips)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	40,520	19,557	8,032	4,628	2,720	5,834	2,782	7,226	54	617	86				110	0	0	0	65	0	0	0		92,231
2 DC n-core	112,144	70,407	12,462	4,633	3,907	5,317	762	1,759	0	201	0				0	0	0	0	0	0	0	0		211,592
3 Mont. Co.	68,665	11,585	25,108	674	3,851	8,092	0	1,594	0	0	0				0	0	0	0	0	0	0	0		119,569
4 PG Co.	44,683	7,444	7,866	9,394	2,950	2,846	0	562	0	0	0				0	0	0	0	0	0	0	0		75,745
5 Arl. core	5,873	1,365	232	0	981	1,054	493	243	0	124	0				0	0	54	0	0	0	0	0		10,419
6 Arl. n-core	39,932	6,883	1,684	222	3,400	5,808	95	1,427	0	0	0				0	0	0	0	0	0	0	0		59,451
7 Alex.	15,428	3,560	226	0	4,378	1,736	2,971	2,227	0	0	0				0	0	0	0	0	0	0	0		30,526
8 FFX Co.	56,234	4,178	0	562	13,150	19,511	1,197	15,219	0	0	0				0	0	0	0	0	0	0	0		110,051
9 Loudoun	3,670	418	366	10	355	419	0	0	0	0	0				0	0	0	0	0	0	0	0		5,238
10 PW Co.	9,431	1,336	896	0	1,090	2,375	330	1,428	0	347	0				0	0	0	0	0	0	0	0		17,233
11 Fred. MD	1,022	273	0	0	8	31	20	0	0	0	1,751				0	0	0	0	0	0	0	0		3,105
12 Carroll																								0
13 Howard																								0
14 Anne Ar.																								0
15 Calvert	790	10	0	0	3	5	0	0	0	0	0				75	0	0	0	0	0	0	0		883
16 St. Mary's																								0
17 Charles	1,437	69	0	0	216	32	0	0	0	0	0				0	0	855	0	0	0	0	0		2,609
18 Fauquier	187	25	19	0	21	0	0	0	0	0	0				0	0	0	0	0	0	0	0		252
19 Stafford	1,854	232	183	0	197	713	378	0	0	0	0				0	0	0	0	0	0	0	0		3,557
20 Clarke, Jeff																								0
21 Spts, Fbrg																								0
22 King Geor.																								0
23 Externals																								0
Total	401,870	127,342	57,074	20,123	37,227	53,773	9,028	31,685	54	1,289	1,837	0	0	0	185	0	909	0	65	0	0	0	0	742,461

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS + supplemental transit counts beyond HTS area

Estimated 1994 Tot percent transit (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	27.4%	19.9%	26.3%	12.0%	34.8%	18.9%	12.9%	16.7%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		21.6%
2 DC n-core	34.6%	9.7%	8.4%	4.7%	21.6%	11.9%	2.4%	3.2%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		14.5%
3 Mont. Co.	37.3%	7.2%	0.8%	0.6%	22.7%	25.5%	0.0%	2.2%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		3.4%
4 PG Co.	29.1%	3.6%	6.2%	0.4%	17.0%	8.9%	0.0%	0.9%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		2.8%
5 Arl. core	43.7%	15.6%	5.2%	0.0%	8.4%	9.3%	10.0%	2.1%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		14.8%
6 Arl. n-core	45.7%	17.3%	7.1%	1.4%	13.3%	1.7%	2.7%	1.3%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		8.2%
7 Alex.	31.6%	15.4%	1.9%	0.0%	40.3%	8.2%	1.3%	2.1%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		6.5%
8 FFX Co.	29.3%	5.6%	0.0%	1.6%	35.4%	13.8%	0.9%	0.4%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		2.8%
9 Loudoun	49.1%	10.2%	3.2%	0.7%	21.3%	7.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.0%
10 PW Co.	43.6%	7.7%	7.6%	0.0%	14.7%	7.2%	1.2%	1.0%	0.0%	0.6%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		2.0%
11 Fred. MD	29.3%	8.5%	0.0%	0.0%	5.2%	3.7%	0.8%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.2%
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	19.0%	1.3%	0.0%	0.0%	5.1%	4.1%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.4%
16 St. Mary's																								
17 Charles	13.6%	0.9%	0.0%	0.0%	18.6%	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.4%
18 Fauquier	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	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 Stafford	62.8%	22.7%	31.2%	0.0%	42.4%	17.9%	7.4%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.5%
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	33.4%	9.4%	1.7%	0.8%	24.2%	7.3%	1.8%	0.7%	0.0%	0.5%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		4.6%

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.
In the table above, Percent transit = (obs transit psn) / (est total psn)

Observed 1994 Tot percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	27.4%	19.9%	26.3%	12.0%	34.8%	18.9%	15.5%	18.5%	4.4%	20.3%	48.3%				48.0%	0.0%	0.0%	0.0%	38.5%	0.0%	0.0%	0.0%		22.2%
2 DC n-core	34.6%	9.7%	8.4%	4.7%	21.6%	11.9%	2.4%	3.4%	0.0%	3.8%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		14.5%
3 Mont. Co.	37.3%	7.2%	0.9%	0.6%	26.1%	25.4%	0.0%	2.2%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		3.4%
4 PG Co.	29.1%	4.1%	6.2%	0.5%	17.0%	8.9%	0.0%	0.9%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		2.9%
5 Arl. core	44.0%	15.6%	5.2%	0.0%	14.6%	9.3%	10.0%	2.1%	0.0%	17.2%	0.0%				0.0%	0.0%	131.7%	0.0%	0.0%	0.0%	0.0%	0.0%		15.8%
6 Arl. n-core	45.7%	17.3%	7.1%	1.4%	13.3%	1.5%	0.2%	1.3%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		7.9%
7 Alex.	31.4%	15.4%	1.9%	0.0%	40.3%	4.4%	1.3%	2.1%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		6.2%
8 FFX Co.	29.3%	5.8%	0.0%	1.7%	35.3%	13.9%	0.9%	0.5%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		2.9%
9 Loudoun	68.2%	10.2%	3.2%	0.6%	21.5%	6.9%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.3%
10 PW Co.	45.5%	9.1%	7.6%	0.0%	16.5%	10.1%	1.3%	1.0%	0.0%	0.1%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.7%
11 Fred. MD	31.8%	8.5%	0.0%	0.0%	1.0%	1.5%	3.2%	0.0%	0.0%	0.0%	0.3%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.5%
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	21.7%	0.3%	0.0%	0.0%	0.5%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.4%
16 St. Mary's																								
17 Charles	13.6%	1.4%	0.0%	0.0%	25.1%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%		0.6%
18 Fauquier	39.3%	4.4%	1.6%	0.0%	13.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.2%
19 Stafford	82.3%	16.2%	21.7%	0.0%	23.3%	28.2%	12.9%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		1.8%
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	33.6%	9.5%	1.7%	0.9%	24.8%	7.0%	1.7%	0.9%	0.0%	0.2%	0.3%				0.1%	0.0%	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%		4.6%

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS + BTS + Auto External Survey + transit counts beyond the HTS area
In the table above, Percent transit = (obs transit psn) / (est total psn)

Estimated 1994 Tot auto occupancy (screened by observed travel)

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.44	1.30	1.36	1.24	1.22	1.21	1.36	1.26	1.40	1.44	1.20				1.12		1.49	1.38	2.63					1.33
2 DC n-core	1.32	1.37	1.24	1.27	1.32	1.32	1.40	1.16	1.31	1.24	1.47				1.20		1.43	1.36						1.33
3 Mont. Co.	1.20	1.17	1.34	1.22	1.45	1.21	1.43	1.13	2.17	1.15	1.26				1.28		1.30	1.29						1.31
4 PG Co.	1.32	1.26	1.25	1.30	1.22	1.20	1.35	1.10	1.32	2.18	1.24				1.42		1.42							1.29
5 Arl. core	1.48	1.25	1.24	1.25	1.19	1.35	1.27	1.54	1.26	1.63							1.41							1.36
6 Arl. n-core	1.14	1.17	1.22	1.21	1.17	1.34	1.22	1.18	1.17	1.21	1.25				1.22		1.67							1.27
7 Alex.	1.31	1.35	1.20	1.39	1.17	1.18	1.29	1.22	1.23	1.37	1.37						1.25	1.32	1.25					1.27
8 FFX Co.	1.33	1.14	1.21	1.19	1.44	1.26	1.27	1.29	1.21	1.31	1.25						1.09	1.35	1.27					1.28
9 Loudoun	1.40	1.26	1.25	1.23	1.11	1.32	1.21	1.15	1.32	1.49	1.42				1.47		1.17	1.67						1.28
10 PW Co.	1.43	1.32	1.18	1.25	1.25	1.48	1.46	1.22	1.39	1.42								1.23	1.11					1.38
11 Fred. MD	1.49	1.17	1.17	1.42	1.12	1.31	1.25	1.39	1.22		1.30				1.10									1.29
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.15	1.24	1.34	1.26		1.18	1.12	1.34	1.73						1.22		1.43	1.50						1.23
16 St. Mary's																								
17 Charles	1.28	1.42	1.20	1.12	1.30	1.36	1.20	1.19							1.38		1.34							1.31
18 Fauquier	1.85	1.35	1.12	1.38	1.52	1.30	1.41	1.13	1.20	1.28								1.22	1.82					1.23
19 Stafford	2.37	1.13	1.14	1.39		1.25	1.14	1.12		1.23								1.63	1.29					1.27
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.31	1.30	1.32	1.29	1.29	1.30	1.30	1.27	1.30	1.40	1.30				1.23		1.35	1.24	1.27					1.30

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
This table shows estimated travel for only those interchanges where observed travel exists.

Observed 1994 Tot auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.33	1.23	1.39	1.20	1.13	1.19	1.31	1.20	1.41	1.36	1.24				1.13		1.48	2.00	6.50					1.27
2 DC n-core	1.27	1.37	1.24	1.28	1.27	1.29	1.31	1.12	1.11	1.00	1.65				1.00		1.36	1.00						1.31
3 Mont. Co.	1.20	1.16	1.33	1.21	1.14	1.01	1.35	1.05	1.66	1.06	1.14				1.51		1.00	2.00						1.31
4 PG Co.	1.33	1.25	1.24	1.30	1.08	1.18	1.49	1.11	1.45	2.33	1.00				1.31		1.51							1.29
5 Arl. core	1.62	1.00	1.00	1.00	1.17	1.30	1.00	1.51	1.00	1.63							1.00							1.29
6 Arl. n-core	1.14	1.13	1.16	1.03	1.15	1.34	1.21	1.19	1.01	1.13	1.00				1.00		1.17							1.25
7 Alex.	1.24	1.31	1.11	1.28	1.09	1.13	1.29	1.23	1.00	1.08	1.00						1.00	1.00	1.00					1.24
8 FFX Co.	1.31	1.13	1.18	1.09	1.36	1.25	1.27	1.29	1.11	1.18	1.00						1.10	1.35	1.37					1.27
9 Loudoun	1.35	1.13	1.20	1.00	1.07	1.26	1.00	1.15	1.31	1.32	1.53				1.00		1.00	1.45						1.27
10 PW Co.	1.46	1.22	1.12	1.00	1.26	1.38	1.46	1.22	1.32	1.42								1.14	1.09					1.38
11 Fred. MD	1.41	1.00	1.18	1.33	1.00	1.24	1.00	1.36	1.00		1.31				1.00									1.29
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.10	1.00	1.29	1.21		1.00	1.00	1.67	2.00						1.28		1.40	1.00						1.26
16 St. Mary's																								
17 Charles	1.32	1.33	1.00	1.13	1.23	1.22	1.00	1.02							1.42		1.45							1.39
18 Fauquier	1.22	1.34	1.00	1.00	1.57	1.00	1.00	1.11	1.15	1.26					1.00			1.34	1.77					1.30
19 Stafford	2.58	1.00	1.00	1.00		1.14	1.00	1.15		1.23								1.93	1.55					1.45
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.28	1.28	1.32	1.28	1.22	1.28	1.28	1.26	1.26	1.40	1.30				1.28		1.45	1.34	1.51					1.30

Notes: Geography: Expanded cordon modeled area (i-to-i trips only)
Source: 1994 HTS

Difference (Est - Obs) 1994 Tot transit person trips

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	-13	-15	-5	2	1	-1	-465	-709	-54	-617	-86	0	0	0	-110	0	0	0	-65	0	0	0	0	-2,137
2 DC n-core	-4	7	-20	-7	-8	7	-1	-111	0	-201	0	0	0	0	0	0	0	0	0	0	0	0	0	-338
3 Mont. Co.	-8	-91	-1,429	-15	-509	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,036
4 PG Co.	-6	-851	16	-1,156	4	-15	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,006
5 Arl. core	-35	3	-2	0	-415	-1	0	-1	0	-124	0	0	0	0	0	0	-54	0	0	0	0	0	0	-629
6 Arl. n-core	0	-1	-1	0	-1	1,058	1,054	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,151
7 Alex.	82	-12	-1	0	3	1,476	-23	-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,518
8 FFX Co.	2	-135	0	-16	34	-24	3	-3,841	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3,977
9 Loudoun	-1,026	2	1	2	-2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1,022
10 PW Co.	-386	-199	0	0	-120	-681	-13	9	0	3,788	0	0	0	0	0	0	0	0	0	0	0	0	0	2,398
11 Fred. MD	-82	0	0	0	33	47	-15	0	0	0	-1,751	0	0	0	0	0	0	0	0	0	0	0	0	-1,768
12 Carroll	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 Howard	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 Anne Ar.	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 Calvert	-98	37	0	0	25	48	0	0	0	0	0	0	0	0	-75	0	0	0	0	0	0	0	0	-63
16 St. Mary's	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 Charles	-2	-27	0	0	-56	37	0	0	0	0	0	0	0	0	0	0	-848	0	0	0	0	0	0	-896
18 Fauquier	-187	-25	-19	0	-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-252
19 Stafford	-438	93	80	0	162	-262	-161	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-526
20 Clarke, Jeff	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 Spts, Fbrg	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 King Geor.	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 Externals	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	-2,201	-1,214	-1,380	-1,190	-870	1,706	379	-4,616	-54	2,846	-1,837	0	0	0	-185	0	-902	0	-65	0	0	0	0	-9,583

Ratio (Est / Obs) 1994 Tot transit person trips

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	1.00	1.00	1.00	1.00	0.83	0.90	0.00	0.00	0.00				0.00				0.00					0.98
2 DC n-core	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94		0.00														1.00
3 Mont. Co.	1.00	0.99	0.94	0.98	0.87	1.00		1.00																0.98
4 PG Co.	1.00	0.89	1.00	0.88	1.00	0.99		1.00																0.97
5 Arl. core	0.99	1.00	0.99		0.58	1.00	1.00	1.00		0.00							0.00							0.94
6 Arl. n-core	1.00	1.00	1.00	1.00	1.00	1.18	12.09	1.03																1.04
7 Alex.	1.01	1.00	1.00		1.00	1.85	0.99	1.00																1.05
8 FFX Co.	1.00	0.97		0.97	1.00	1.00	1.00	0.75																0.96
9 Loudoun	0.72	1.00	1.00	1.20	0.99	1.00																		0.80
10 PW Co.	0.96	0.85	1.00		0.89	0.71	0.96	1.01		11.92														1.14
11 Fred. MD	0.92	1.00			5.13	2.52	0.25				0.00													0.43
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.88	4.70			9.33	10.60									0.00									0.93
16 St. Mary's																								
17 Charles	1.00	0.61			0.74	2.16											0.01							0.66
18 Fauquier	0.00	0.00	0.00		0.00																			0.00
19 Stafford	0.76	1.40	1.44		1.82	0.63	0.57																	0.85
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.99	0.99	0.98	0.94	0.98	1.03	1.04	0.85	0.00	3.21	0.00				0.00		0.01		0.00					0.99

Difference (Est - Obs) 1994 Tot percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-2.6%	-1.8%	-4.4%	-20.3%	-48.3%				-48.0%	0.0%	0.0%	0.0%	-38.5%	0.0%	0.0%	0.0%		-0.5%
2 DC n-core	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%	0.0%	-3.8%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
3 Mont. Co.	0.0%	-0.1%	0.0%	0.0%	-3.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.1%
4 PG Co.	0.0%	-0.5%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.1%
5 Arl. core	-0.3%	0.0%	0.0%	0.0%	-6.2%	0.0%	0.0%	0.0%	0.0%	-17.2%	0.0%				0.0%	0.0%	-131.7%	0.0%	0.0%	0.0%	0.0%	0.0%		-1.0%
6 Arl. n-core	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	2.5%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.3%
7 Alex.	0.2%	-0.1%	0.0%	0.0%	0.0%	3.7%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.3%
8 FFX Co.	0.0%	-0.2%	0.0%	0.0%	0.1%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.1%
9 Loudoun	-19.1%	0.0%	0.0%	0.1%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.3%
10 PW Co.	-1.9%	-1.4%	0.0%	0.0%	-1.8%	-2.9%	0.0%	0.0%	0.0%	0.5%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.2%
11 Fred. MD	-2.6%	0.0%	0.0%	0.0%	4.2%	2.3%	-2.4%	0.0%	0.0%	0.0%	-0.3%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.3%
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	-2.7%	1.0%	0.0%	0.0%	4.5%	3.7%	0.0%	0.0%	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 St. Mary's																								
17 Charles	0.0%	-0.6%	0.0%	0.0%	-6.5%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	-0.3%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.2%
18 Fauquier	-39.3%	-4.4%	-1.6%	0.0%	-13.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.2%
19 Stafford	-19.4%	6.5%	9.5%	0.0%	19.1%	-10.4%	-5.5%	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		-0.3%
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	-0.2%	-0.1%	0.0%	-0.1%	-0.6%	0.2%	0.1%	-0.1%	0.0%	0.3%	-0.3%				-0.1%	0.0%	-0.2%	0.0%	-0.1%	0.0%	0.0%	0.0%		-0.1%

Ratio (Est / Obs) 1994 Tot percent transit

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.00	1.00	1.00	1.00	1.00	1.00	0.83	0.90	0.00	0.00	0.00				0.00				0.00					0.98
2 DC n-core	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94		0.00														1.00
3 Mont. Co.	1.00	0.99	0.94	0.98	0.87	1.00		1.00																0.98
4 PG Co.	1.00	0.89	1.00	0.88	1.00	0.99		1.00																0.97
5 Arl. core	0.99	1.00	0.99		0.58	1.00	1.00	1.00		0.00							0.00							0.94
6 Arl. n-core	1.00	1.00	1.00	1.00	1.00	1.18	12.09	1.03																1.04
7 Alex.	1.01	1.00	1.00		1.00	1.85	0.99	1.00																1.05
8 FFX Co.	1.00	0.97		0.97	1.00	1.00	1.00	0.75																0.96
9 Loudoun	0.72	1.00	1.00	1.20	0.99	1.00																		0.80
10 PW Co.	0.96	0.85	1.00		0.89	0.71	0.96	1.01		11.92														1.14
11 Fred. MD	0.92	1.00			5.13	2.52	0.25				0.00													0.43
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.88	4.70			9.33	10.60									0.00									0.93
16 St. Mary's																								
17 Charles	1.00	0.61			0.74	2.16											0.01							0.66
18 Fauquier	0.00	0.00	0.00		0.00																			0.00
19 Stafford	0.76	1.40	1.44		1.82	0.63	0.57																	0.85
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.99	0.99	0.98	0.94	0.98	1.03	1.04	0.85	0.00	3.21	0.00				0.00		0.01		0.00					0.99

Difference (Est - Obs) 1994 Tot auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	0.11	0.07	-0.03	0.04	0.08	0.02	0.05	0.06	-0.01	0.08	-0.05				0.00		0.01	-0.62	-3.88					0.06
2 DC n-core	0.05	0.01	0.01	-0.01	0.06	0.03	0.08	0.03	0.20	0.24	-0.18				0.20		0.06	0.36						0.02
3 Mont. Co.	0.00	0.01	0.00	0.02	0.31	0.19	0.08	0.08	0.51	0.09	0.12				-0.23		0.30	-0.71						0.01
4 PG Co.	-0.01	0.02	0.01	0.00	0.13	0.02	-0.15	-0.01	-0.13	-0.15	0.24				0.11		-0.09							-0.01
5 Arl. core	-0.14	0.25	0.24	0.25	0.03	0.05	0.27	0.04	0.26	0.00							0.41							0.08
6 Arl. n-core	0.00	0.04	0.06	0.18	0.03	0.00	0.02	-0.01	0.16	0.08	0.25				0.22		0.50							0.01
7 Alex.	0.07	0.04	0.09	0.11	0.07	0.05	0.00	0.00	0.23	0.29	0.37						0.25	0.32	0.25					0.02
8 FFX Co.	0.01	0.01	0.03	0.10	0.08	0.00	0.00	0.00	0.09	0.13	0.25						-0.01	0.00	-0.10					0.01
9 Loudoun	0.04	0.13	0.05	0.23	0.04	0.06	0.21	0.00	0.00	0.17	-0.11				0.47		0.17	0.22						0.01
10 PW Co.	-0.03	0.10	0.06	0.25	-0.01	0.10	0.00	0.00	0.07	0.00								0.09	0.03					0.00
11 Fred. MD	0.08	0.17	-0.01	0.10	0.12	0.07	0.25	0.03	0.22		-0.01				0.10									-0.01
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	0.05	0.24	0.05	0.06		0.18	0.12	-0.33	-0.27						-0.06		0.03	0.50						-0.03
16 St. Mary's																								
17 Charles	-0.04	0.09	0.20	-0.01	0.08	0.14	0.20	0.17							-0.04		-0.11							-0.07
18 Fauquier	0.63	0.00	0.12	0.38	-0.05	0.30	0.41	0.02	0.06	0.02								-0.12	0.06					-0.06
19 Stafford	-0.20	0.13	0.14	0.39		0.11	0.14	-0.02		0.00								-0.30	-0.27					-0.18
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	0.03	0.02	0.00	0.00	0.07	0.02	0.02	0.00	0.04	0.01	0.00				-0.05		-0.11	-0.10	-0.24					0.00

Ratio (Est / Obs) 1994 Tot auto occupancy

	1 DC core	2 DC ncore	3 Mont Co	4 PG Co.	5 Arl. core	6 Arl ncore	7 Alex.	8 FFX Co	9 Loud.	10 PW Co	11 Fred MD	12 Carroll	13 Howard	14 Anne Ar	15 Calv.	16 St Mar.	17 Charles	18 Fauqu.	19 Staff.	20 Clke, Jeff	21 Spts,Fbrg	22 King G.	23 Ext	Total
1 DC core	1.08	1.06	0.98	1.03	1.07	1.02	1.04	1.05	0.99	1.06	0.96				1.00		1.01	0.69	0.40					1.05
2 DC n-core	1.04	1.00	1.00	0.99	1.04	1.03	1.06	1.03	1.18	1.24	0.89				1.20		1.05	1.36						1.01
3 Mont. Co.	1.00	1.01	1.00	1.01	1.27	1.19	1.06	1.07	1.31	1.08	1.11				0.85		1.30	0.64						1.01
4 PG Co.	1.00	1.01	1.01	1.00	1.12	1.01	0.90	0.99	0.91	0.94	1.24				1.09		0.94							1.00
5 Arl. core	0.91	1.25	1.24	1.25	1.02	1.04	1.27	1.02	1.26	1.00							1.41							1.06
6 Arl. n-core	1.00	1.04	1.05	1.17	1.02	1.00	1.01	0.99	1.16	1.08	1.25				1.22		1.42							1.01
7 Alex.	1.05	1.03	1.08	1.08	1.07	1.04	1.00	1.00	1.23	1.27	1.37						1.25	1.32	1.25					1.02
8 FFX Co.	1.01	1.01	1.03	1.09	1.06	1.00	1.00	1.00	1.09	1.11	1.25						0.99	1.00	0.93					1.01
9 Loudoun	1.03	1.12	1.04	1.23	1.04	1.05	1.21	1.00	1.00	1.13	0.93				1.47		1.17	1.15						1.01
10 PW Co.	0.98	1.08	1.05	1.25	0.99	1.07	1.00	1.00	1.05	1.00								1.08	1.02					1.00
11 Fred. MD	1.06	1.17	0.99	1.07	1.12	1.06	1.25	1.02	1.22		0.99				1.10									1.00
12 Carroll																								
13 Howard																								
14 Anne Ar.																								
15 Calvert	1.05	1.24	1.04	1.05		1.18	1.12	0.80	0.87						0.96		1.02	1.50						0.97
16 St. Mary's																								
17 Charles	0.97	1.07	1.20	0.99	1.06	1.11	1.20	1.16							0.97		0.92							0.95
18 Fauquier	1.52	1.00	1.12	1.38	0.97	1.30	1.41	1.01	1.05	1.01								0.91	1.03					0.95
19 Stafford	0.92	1.13	1.14	1.39		1.09	1.14	0.98		1.00								0.84	0.83					0.87
20 Clarke, Jeff																								
21 Spts, Fbrg																								
22 King Geor.																								
23 Externals																								
Total	1.02	1.01	1.00	1.00	1.06	1.02	1.01	1.00	1.03	1.00	1.00				0.96		0.93	0.93	0.84					1.00

Appendix D
Mode Choice Model Calibration File Formats and Statistics

File formats

Variable statistics (minimum, maximum, mean)

Ref: cal_fmt_v2_1c.xls, calsumhbw4.lst, calsumhbs4.lst, calsumhbo4.lst, calsumnhb4.lst

File Format Description
HBW "Main" Mode Choice Model Calibration File Format / Version 2 Model Set

File Names: hbwm4.dat
Date: 11/27/02
Record Count: 7,209
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
1	1	8	hhid	8	Household ID
2	10	11	persnum	2	Person Number Within a HH
3	13	14	tripnum	2	Trip Number of Person
4	16	16	vehicnt	1	Number of vehicles owned 0-2 (2 refers to 2 or more vehicles)
5	18	18	mainmd	1	main mode choice 1)Transit, 2)Drive Alone, 3)Group Drive
6	20	23	ffactor	4	survey weight (or expansion factor)
7	25	28	ptaz	4	Production TAZ
8	30	33	ataz	4	Attraction TAZ
9	35	36	pshtim_a	2	AM Production-end short-walk area time (min)
10	38	39	plgtim_a	2	AM Production-end long-walk area time (min)
11	41	42	ashtim_a	2	AM Attraction-end short-walk area time (min)
12	44	45	algtim_a	2	AM Attraction-end long-walk area time (min)
13	47	50	wkctm_w	4	walking connecting time - walk network (min)
14	52	55	drvtm_w	4	drv access time - walk network (min)
15	57	60	iwttm_w	4	initial wait time - walk network (min)
16	62	65	xwttm_w	4	transfer time - walk network (min)
17	67	70	nmetm_w	4	nonmetro in-veh,time - walk network (min)
18	72	75	mettm_w	4	metrorail in-veh, time - walk network (min)
19	77	80	wkctm_d	4	walk connecting time - drv network (min)
20	82	85	drvtm_d	4	drive access time - drv network (min)
21	87	90	iwttm_d	4	initial wait time - drv network (min)
22	92	95	xwttm_d	4	transfer wait time - drv network (min)
23	97	100	nmetm_d	4	nonmetro in-veh, time - drv network (min)
24	102	105	mettm_d	4	metrorail in-veh, time - drv network (min)
25	107	110	fare_wk	4	transit fare - walk network (1980 cents)
26	112	115	fare_dr	4	transit fare - driv network (1980 cents)
27	117	120	daopcst	4	drv alone hwy operating cost (1980 cents)
28	122	125	gropcst	4	drv group hwy operating cost (1980 cents)
29	127	130	dapkcst	4	drv alone parking cost (1980 cents)
30	132	135	grpkcst	4	drv group parking cost (1980 cents)
31	137	140	daexctm	4	drv alone excess time (min)
32	142	145	grexctm	4	drv group excess time (min)
33	147	150	dahwyrun	4	drv alone hwy run time (min)
34	152	155	grhwyrun	4	drv group hwy run time (min)
35	157	160	ve0dum	4	0 veh own, hh dummy (0,1)
36	162	165	ve1dum	4	1 veh own, hh dummy (0,1)
37	167	170	ve2dum	4	2+veh own, hh dummy (0,1)
38	172	175	wmt25dum	4	Metro time >25% of all tr IVT? 1=yes, 0=No (walk acc path)
39	177	181	plu_mix	5	Production-end Land Use mix index
40	183	187	alu_mix	5	Attraction-end Land Use mix index
41	189	192	pshpct_a	4	AM production-end zonal 'short walk' area percent (0-100)
42	194	197	plgpct_a	4	AM production-end zonal 'long walk' area percent (0-100)
43	199	202	ptopct_a	4	AM production-end zonal 'Total walk' area percent (0-100)
44	204	207	ashpct_a	4	AM Attraction-end zonal 'short walk' area percent (0-100)
45	209	212	algpct_a	4	AM attraction-end zonal 'long walk' area percent (0-100)
46	214	217	atopct_a	4	AM attraction-end zonal 'Total walk' area percent (0-100)

File Format Description
HBW "Main" Mode Choice Model Calibration File Format / Version 2 Model Set

File Names: hbwm4.dat
Date: 11/27/02
Record Count: 7,209
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
47	219	219	pwmrkt_a	1	Production zonal walk market type (1-6)
48	221	221	awmrkt_a	1	Attraction zonal walk market type (1-6)
49	223	223	gishacda	1	GIS -based household location type (1-4)
50	225	227	wlktotrn	3	Transit Available (wlk acc) - 1/yes -1/ no
51	229	231	auttotrn	3	Transit Available (Drv acc) - 1/yes -1/ no
52	233	236	datoll	4	drive alone toll (1980 cents)
53	238	241	grtoll	4	group drive toll (1980 cents)
54	243	246	ftt	4	final total transit travel time for obs. used in estimation
55	248	251	fwalktm	4	final total walking time used in estimation
56	253	256	ffare	4	final transit fare used in estimation
57	258	261	fwaittm	4	final total waiting time (initial and xfer) used in estimation
58	263	266	fivtmet	4	final total metrorail IVT used in estimation
59	268	271	fivtnmet	4	final non-metrorail IVT used in estimation
60	273	276	fmetdum	4	final flag for 25%> IVT time in metrorail used in estimation
61	278	281	fdrvadum	4	final drive access to transit dummy (0/No-1/yes)
62	283	286	acctotrn	4	Transit available - for both walk&auto paths
63	288	289	slflag	2	interchange sh/lg market code 1-10 (see below)

Notes:
pwmrkt_o / awmrkt_o are zonal P/A transit access codes
based on the proximity to Off-Pk hr service, as follows:

1 S "short" walk only
2 S&L partial "short" and "long" walk only
3 L "long" walk only
4 L&N partial "long" and "no walk" only
5 S&L&N partial "short"and"long"and"no walk"only
6 N "no walk" only

gishacda codes:
GIS-based household location indicators
with respect to AM peak transit service as follows:
1 HH located in "short" walk access area
2 HH located in "long" walk access area to transit
3 HH located in "no-walk" walk area to transit
4 HH location unknown

slflag I/J coding flg:

1 sh wk/sh wk transit i/j market
2 sh wk/lg wk transit i/j market
3 sh wk/no wk transit i/j market
4 lg wk/sh wk transit i/j market
5 lg wk/lg wk transit i/j market
6 lg wk/no wk transit i/j market
7 no wk/sh wk transit i/j market
8 no wk/lg wk transit i/j market
9 no wk/no wk transit i/j market
10 Unknown i/j walk market

File Format Description
HBS "Main" Mode Choice Model Calibration File Format / Version 2 Model Set

File Names: hbsm4.dat
Date: 11/27/02
Record Count: 3,407
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
1	1	8	hhid	8	Household ID
2	10	11	persnum	2	Person Number Within a HH
3	13	14	tripnum	2	Trip Number of Person
4	16	16	vehicnt	1	Number of vehicles owned 0-2 (2 refers to 2 or more vehicles)
5	18	18	mainmd	1	main mode choice 1)Transit, 2)Drive Alone, 3)Group Drive
6	20	23	ffactor	4	survey weight (or expansion factor)
7	25	28	ptaz	4	Production TAZ
8	30	33	ataz	4	Attraction TAZ
9	35	36	pshtim_o	2	Off-Pk Production-end short-walk area time (min)
10	38	39	plgtim_o	2	Off-Pk Production-end long-walk area time (min)
11	41	42	ashtim_o	2	Off-Pk Attraction-end short-walk area time (min)
12	44	45	algtim_o	2	Off-Pk Attraction-end long-walk area time (min)
13	47	50	wkctm_w	4	walking connecting time - walk network (min)
14	52	55	drvtm_w	4	drv access time - walk network (min)
15	57	60	iwttm_w	4	initial wait time - walk network (min)
16	62	65	xwttm_w	4	transfer time - walk network (min)
17	67	70	nmetm_w	4	nonmetro in-veh,time - walk network (min)
18	72	75	mettm_w	4	metrorail in-veh, time - walk network (min)
19	77	80	wkctm_d	4	walk connecting time - drv network (min)
20	82	85	drvtm_d	4	drive access time - drv network (min)
21	87	90	iwttm_d	4	initial wait time - drv network (min)
22	92	95	xwttm_d	4	transfer wait time - drv network (min)
23	97	100	nmetm_d	4	nonmetro in-veh, time - drv network (min)
24	102	105	mettm_d	4	metrorail in-veh, time - drv network (min)
25	107	110	fare_wk	4	transit fare - walk network (1980 cents)
26	112	115	fare_dr	4	transit fare - driv network (1980 cents)
27	117	120	daopcst	4	drv alone hwy operating cost (1980 cents)
28	122	125	gropcst	4	drv group hwy operating cost (1980 cents)
29	127	130	dapkcst	4	drv alone parking cost (1980 cents)
30	132	135	grpkcst	4	drv group parking cost (1980 cents)
31	137	140	daexctm	4	drv alone excess time (min)
32	142	145	grexctm	4	drv group excess time (min)
33	147	150	dahwyrun	4	drv alone hwy run time (min)
34	152	155	grhwyrun	4	drv group hwy run time (min)
35	157	160	ve0dum	4	0 veh own, hh dummy (0,1)
36	162	165	ve1dum	4	1 veh own, hh dummy (0,1)
37	167	170	ve2dum	4	2+veh own, hh dummy (0,1)
38	172	175	wmt25dum	4	Metro time >25% of all tr IVT? 1=yes, 0=No (walk acc path)
39	177	181	plu_mix	5	Production-end Land Use mix index
40	183	187	alu_mix	5	Attraction-end Land Use mix index
41	189	192	pshpct_o	4	Off-Pk production-end zonal 'short walk' area percent (0-100)
42	194	197	plgpct_o	4	Off-Pk production-end zonal 'long walk' area percent (0-100)
43	199	202	ptopct_o	4	Off-Pk production-end zonal 'Total walk' area percent (0-100)
44	204	207	ashpct_o	4	Off-Pk Attraction-end zonal 'short walk' area percent (0-100)
45	209	212	algpct_o	4	Off-Pk attraction-end zonal 'long walk' area percent (0-100)
46	214	217	atopct_o	4	Off-Pk attraction-end zonal 'Total walk' area percent (0-100)

File Format Description
HBS "Main" Mode Choice Model Calibration File Format / Version 2 Model Set

File Names: hbsm4.dat
Date: 11/27/02
Record Count: 3,407
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
47	219	219	pwmrkt_o	1	Production zonal walk market type (1-6)
48	221	221	awmrkt_o	1	Attraction zonal walk market type (1-6)
49	223	223	gishacdo	1	GIS -based household location type (1-4)
50	225	227	wlktotrn	3	Transit Available (wlk acc) - 1/yes -1/ no
51	229	231	auttotrn	3	Transit Available (Drv acc) - 1/yes -1/ no
52	233	236	datoll	4	drive alone toll (1980 cents)
53	238	241	grtoll	4	group drive toll (1980 cents)
54	243	246	ftt	4	final total transit travel time for obs. used in estimation
55	248	251	fwalktm	4	final total walking time used in estimation
56	253	256	ffare	4	final transit fare used in estimation
57	258	261	fwaittm	4	final total waiting time (initial and xfer) used in estimation
58	263	266	fivtmet	4	final total metrorail IVT used in estimation
59	268	271	fivtnmet	4	final non-metrorail IVT used in estimation
60	273	276	fmetdum	4	final flag for 25%> IVT time in metrorail used in estimation
61	278	281	fdrvadum	4	final drive access to transit dummy (0/No-1/yes)
62	283	286	acctotrn	4	Transit available - for both walk&auto paths
63	288	289	slflag	2	interchange sh/lg market code 1-10 (see below)

Notes:
pwmrkt_o / awmrkt_o are zonal P/A transit access codes based on the proximity to Off-Pk hr service, as follows:

1 S "short" walk only
2 S&L partial "short" and "long" walk only
3 L "long" walk only
4 L&N partial "long" and "no walk" only
5 S&L&N partial "short"and"long"and"no walk"only
6 N "no walk" only

gishacdo codes are GIS-based household location indicators with respect to Off-peak transit service as follows:

1 HH located in "short" walk access area
2 HH located in "long" walk access area to transit
3 HH located in "no-walk" walk area to transit
4 HH location unknown

slflag I/J coding flg:

1 sh wk/sh wk transit i/j market
2 sh wk/lg wk transit i/j market
3 sh wk/no wk transit i/j market
4 lg wk/sh wk transit i/j market
5 lg wk/lg wk transit i/j market
6 lg wk/no wk transit i/j market
7 no wk/sh wk transit i/j market
8 no wk/lg wk transit i/j market
9 no wk/no wk transit i/j market
10 Unknown i/j walk market

File Format Description
HBO "Main" Mode Choice Model Calibration File Format / Version 2 Model Set

File Names: hbom4.dat
Date: 11/27/02
Record Count: 10,494
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
1	1	8	hhid	8	Household ID
2	10	11	persnum	2	Person Number Within a HH
3	13	14	tripnum	2	Trip Number of Person
4	16	16	vehicnt	1	Number of vehicles owned 0-2 (2 refers to 2 or more vehicles)
5	18	18	mainmd	1	main mode choice 1)Transit, 2)Drive Alone, 3)Group Drive
6	20	23	ffactor	4	survey weight (or expansion factor)
7	25	28	ptaz	4	Production TAZ
8	30	33	ataz	4	Attraction TAZ
9	35	36	pshtim_o	2	Off-Pk Production-end short-walk area time (min)
10	38	39	plgtim_o	2	Off-Pk Production-end long-walk area time (min)
11	41	42	ashtim_o	2	Off-Pk Attraction-end short-walk area time (min)
12	44	45	algtim_o	2	Off-Pk Attraction-end long-walk area time (min)
13	47	50	wkctm_w	4	walking connecting time - walk network (min)
14	52	55	drvtm_w	4	drv access time - walk network (min)
15	57	60	iwttm_w	4	initial wait time - walk network (min)
16	62	65	xwttm_w	4	transfer time - walk network (min)
17	67	70	nmetm_w	4	nonmetro in-veh,time - walk network (min)
18	72	75	mettm_w	4	metrorail in-veh, time - walk network (min)
19	77	80	wkctm_d	4	walk connecting time - drv network (min)
20	82	85	drvtm_d	4	drive access time - drv network (min)
21	87	90	iwttm_d	4	initial wait time - drv network (min)
22	92	95	xwttm_d	4	transfer wait time - drv network (min)
23	97	100	nmetm_d	4	nonmetro in-veh, time - drv network (min)
24	102	105	mettm_d	4	metrorail in-veh, time - drv network (min)
25	107	110	fare_wk	4	transit fare - walk network (1980 cents)
26	112	115	fare_dr	4	transit fare - driv network (1980 cents)
27	117	120	daopcst	4	drv alone hwy operating cost (1980 cents)
28	122	125	gropcst	4	drv group hwy operating cost (1980 cents)
29	127	130	dapkcst	4	drv alone parking cost (1980 cents)
30	132	135	grpkcst	4	drv group parking cost (1980 cents)
31	137	140	daexctm	4	drv alone excess time (min)
32	142	145	grexctm	4	drv group excess time (min)
33	147	150	dahwyrun	4	drv alone hwy run time (min)
34	152	155	grhwyrun	4	drv group hwy run time (min)
35	157	160	ve0dum	4	0 veh own, hh dummy (0,1)
36	162	165	ve1dum	4	1 veh own, hh dummy (0,1)
37	167	170	ve2dum	4	2+veh own, hh dummy (0,1)
38	172	175	wmt25dum	4	Metro time >25% of all tr IVT? 1=yes, 0=No (walk acc path)
39	177	181	plu_mix	5	Production-end Land Use mix index
40	183	187	alu_mix	5	Attraction-end Land Use mix index
41	189	192	pshpct_o	4	Off-Pk production-end zonal 'short walk' area percent (0-100)
42	194	197	plgpct_o	4	Off-Pk production-end zonal 'long walk' area percent (0-100)
43	199	202	ptopct_o	4	Off-Pk production-end zonal 'Total walk' area percent (0-100)
44	204	207	ashpct_o	4	Off-Pk Attraction-end zonal 'short walk' area percent (0-100)
45	209	212	algpct_o	4	Off-Pk attraction-end zonal 'long walk' area percent (0-100)
46	214	217	atopct_o	4	Off-Pk attraction-end zonal 'Total walk' area percent (0-100)

File Format Description
HBO "Main" Mode Choice Model Calibration File Format / Version 2 Model Set

File Names: hbom4.dat
Date: 11/27/02
Record Count: 10,494
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
47	219	219	pwmrkt_o	1	Production zonal walk market type (1-6)
48	221	221	awmrkt_o	1	Attraction zonal walk market type (1-6)
49	223	223	gishacdo	1	GIS -based household location type (1-4)
50	225	227	wlktotrn	3	Transit Available (wlk acc) - 1/yes -1/ no
51	229	231	auttotrn	3	Transit Available (Drv acc) - 1/yes -1/ no
52	233	236	datoll	4	drive alone toll (1980 cents)
53	238	241	grtoll	4	group drive toll (1980 cents)
54	243	246	ftt	4	final total transit travel time for obs. used in estimation
55	248	251	fwalktm	4	final total walking time used in estimation
56	253	256	ffare	4	final transit fare used in estimation
57	258	261	fwaittm	4	final total waiting time (initial and xfer) used in estimation
58	263	266	fivtmet	4	final total metrorail IVT used in estimation
59	268	271	fivtnmet	4	final non-metrorail IVT used in estimation
60	273	276	fmetdum	4	final flag for 25%> IVT time in metrorail used in estimation
61	278	281	fdrvadum	4	final drive access to transit dummy (0/No-1/yes)
62	283	286	acctotrn	4	Transit available - for both walk&auto paths
63	288	289	slflag	2	interchange sh/lg market code 1-10 (see below)

Notes:
pwmrkt_o / awmrkt_o are zonal P/A transit access codes based on the proximity to Off-Pk hr service, as follows:

1 S "short" walk only
2 S&L partial "short" and "long" walk only
3 L "long" walk only
4 L&N partial "long" and "no walk" only
5 S&L&N partial "short"and"long"and"no walk"only
6 N "no walk" only

gishacdo codes are GIS-based household location indicators with respect to Off-peak transit service as follows:

1 HH located in "short" walk access area
2 HH located in "long" walk access area to transit
3 HH located in "no-walk" walk area to transit
4 HH location unknown

slflag I/J coding flg:

1 sh wk/sh wk transit i/j market
2 sh wk/lg wk transit i/j market
3 sh wk/no wk transit i/j market
4 lg wk/sh wk transit i/j market
5 lg wk/lg wk transit i/j market
6 lg wk/no wk transit i/j market
7 no wk/sh wk transit i/j market
8 no wk/lg wk transit i/j market
9 no wk/no wk transit i/j market
10 Unknown i/j walk market

File Format Description
NHB "Main" Mode Choice Model Calibration File Format / Version 2 Model Set

File Names: nhbm4.dat
Date: 11/27/02
Record Count: 7,904
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
1	1	8	hhid	8	Household ID
2	10	11	persnum	2	Person Number Within a HH
3	13	14	tripnum	2	Trip Number of Person
4	16	16	vehicnt	1	Number of vehicles owned 0-2 (2 refers to 2 or more vehicles)
5	18	18	mainmd	1	main mode choice 1)Transit, 2)Drive Alone, 3)Group Drive
6	20	23	ffactor	4	survey weight (or expansion factor)
7	25	28	ptaz	4	Production TAZ
8	30	33	ataz	4	Attraction TAZ
9	35	36	pshtim_o	2	Off-Pk Production-end short-walk area time (min)
10	38	39	plgtim_o	2	Off-Pk Production-end long-walk area time (min)
11	41	42	ashtim_o	2	Off-Pk Attraction-end short-walk area time (min)
12	44	45	algtim_o	2	Off-Pk Attraction-end long-walk area time (min)
13	47	50	wkctm_w	4	walking connecting time - walk network (min)
14	52	55	drvtm_w	4	drv access time - walk network (min)
15	57	60	iwttm_w	4	initial wait time - walk network (min)
16	62	65	xwttm_w	4	transfer time - walk network (min)
17	67	70	nmetm_w	4	nonmetro in-veh,time - walk network (min)
18	72	75	mettm_w	4	metrorail in-veh, time - walk network (min)
19	77	80	wlkctm_d	4	walk connecting time - drv network (min)
20	82	85	drvtm_d	4	drive access time - drv network (min)
21	87	90	iwttm_d	4	initial wait time - drv network (min)
22	92	95	xwttm_d	4	transfer wait time - drv network (min)
23	97	100	nmetm_d	4	nonmetro in-veh, time - drv network (min)
24	102	105	mettm_d	4	metrorail in-veh, time - drv network (min)
25	107	110	fare_wk	4	transit fare - walk network (1980 cents)
26	112	115	fare_dr	4	transit fare - driv network (1980 cents)
27	117	120	daopcst	4	drv alone hwy operating cost (1980 cents)
28	122	125	gropcst	4	drv group hwy operating cost (1980 cents)
29	127	130	dapkcst	4	drv alone parking cost (1980 cents)
30	132	135	grpkcst	4	drv group parking cost (1980 cents)
31	137	140	daexctm	4	drv alone excess time (min)
32	142	145	grexctm	4	drv group excess time (min)
33	147	150	dahwyrun	4	drv alone hwy run time (min)
34	152	155	grhwyrun	4	drv group hwy run time (min)
35	157	160	ve0dum	4	0 veh own, hh dummy (0,1)
36	162	165	ve1dum	4	1 veh own, hh dummy (0,1)
37	167	170	ve2dum	4	2+veh own, hh dummy (0,1)
38	172	175	wmt25dum	4	Metro time >25% of all tr IVT? 1=yes, 0=No (walk acc path)
39	177	181	plu_mix	5	Production-end Land Use mix index
40	183	187	alu_mix	5	Attraction-end Land Use mix index
41	189	192	pshpct_o	4	Off-Pk production-end zonal 'short walk' area percent (0-100)
42	194	197	plgpct_o	4	Off-Pk production-end zonal 'long walk' area percent (0-100)
43	199	202	ptopct_o	4	Off-Pk production-end zonal 'Total walk' area percent (0-100)
44	204	207	ashpct_o	4	Off-Pk Attraction-end zonal 'short walk' area percent (0-100)
45	209	212	algpct_o	4	Off-Pk attraction-end zonal 'long walk' area percent (0-100)
46	214	217	atopct_o	4	Off-Pk attraction-end zonal 'Total walk' area percent (0-100)

File Format Description
NHB "Main" Mode Choice Model Calibration File Format / Version 2 Model Set

File Names: nhbm4.dat
Date: 11/27/02
Record Count: 7,904
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
47	219	219	pwmrkt_o	1	Production zonal walk market type (1-6)
48	221	221	awmrkt_o	1	Attraction zonal walk market type (1-6)
49	223	223	gishacdo	1	GIS -based household location type (1-4)
50	225	227	wlktotrn	3	Transit Available (wlk acc) - 1/yes -1/ no
51	229	231	auttotrn	3	Transit Available (Drv acc) - 1/yes -1/ no
52	233	236	datoll	4	drive alone toll (1980 cents)
53	238	241	grtoll	4	group drive toll (1980 cents)
54	243	246	ftt	4	final total transit travel time for obs. used in estimation
55	248	251	fwalktm	4	final total walking time used in estimation
56	253	256	ffare	4	final transit fare used in estimation
57	258	261	fwaittm	4	final total waiting time (initial and xfer) used in estimation
58	263	266	fivtmet	4	final total metrorail IVT used in estimation
59	268	271	fivtnmet	4	final non-metrorail IVT used in estimation
60	273	276	fmetdum	4	final flag for 25%> IVT time in metrorail used in estimation
61	278	281	fdrvadum	4	final drive access to transit dummy (0/No-1/yes)
62	283	286	acctotrn	4	Transit available - for both walk&auto paths
63	288	289	slflag	2	interchange sh/lg market code 1-10 (see below)

Notes:
pwmrkt_o / awmrkt_o are zonal P/A transit access codes based on the proximity to Off-Pk hr service, as follows:

1 S "short" walk only
2 S&L partial "short" and "long" walk only
3 L "long" walk only
4 L&N partial "long" and "no walk" only
5 S&L&N partial "short"and"long"and"no walk"only
6 N "no walk" only

gishacdo codes are GIS-based household location indicators with respect to Off-peak transit service as follows:

1 HH located in "short" walk access area
2 HH located in "long" walk access area to transit
3 HH located in "no-walk" walk area to transit
4 HH location unknown

slflag I/J coding flg:

1 sh wk/sh wk transit i/j market
2 sh wk/lg wk transit i/j market
3 sh wk/no wk transit i/j market
4 lg wk/sh wk transit i/j market
5 lg wk/lg wk transit i/j market
6 lg wk/no wk transit i/j market
7 no wk/sh wk transit i/j market
8 no wk/lg wk transit i/j market
9 no wk/no wk transit i/j market
10 Unknown i/j walk market

File Format Description

HBW Car Occupancy Mode Choice Model Calibration File Format / Version 2 Model Set

File Name: hbwc4.dat
Date: 11/27/02
Record Count: 1,317
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
1	1	8	hhid	8	Household ID
2	10	11	persnum	2	Person Number Within a HH
3	13	14	tripnum	2	Trip Number (HBW) of a hh member
4	16	16	vehicnt	1	Number of vehicles owned (0,1,2+)
5	18	18	coccmd	1	car occ, choice 1= 2occ; 2= 3occ; 3= 4+occ
6	20	21	occgrp	2	Auto Occupancy (2,3,4)
7	23	26	ptaz	4	Productions TAZ
8	28	31	ataz	4	Attractions TAZ
9	33	34	pjur	2	Production jurisdiction
10	36	37	ajur	2	Attraction jurisdiction
11	39	41	pnewdist	3	Production district
12	43	45	anewdist	3	Attraction district
13	47	50	ffactor	4	Survey Weight
14	51	55	oc3v0dum	5	3 occ -0 veh owned hh dummy (0,1)
15	56	60	oc3v1dum	5	3 occ -1 veh owned hh dummy (0,1)
16	61	65	oc3v2dum	5	3 occ -2+veh owned hh dummy (0,1)
17	66	70	oc4v0dum	5	4+occ -0 veh owned hh dummy (0,1)
18	71	75	oc4v1dum	5	4+occ -1 veh owned hh dummy (0,1)
19	76	80	oc4v2dum	5	4+occ -2+veh owned hh dummy (0,1)
20	81	85	oc2exctm	5	2 occ hwy excess time (min)
21	86	90	oc3exctm	5	3 occ hwy excess time (min)
22	91	95	oc4exctm	5	4+occ hwy excess time (min)
23	96	100	oc2opcst	5	2 occ auto operating cost ('80 cents)
24	101	105	oc3opcst	5	3 occ auto operating cost ('80 cents)
25	106	110	oc4opcst	5	4+ occ auto operating cost ('80 cents)
26	111	115	oc2dst	5	2 occ hwy distance (1/10s miles)
27	116	120	oc3dst	5	3 occ hwy distance (1/10s miles)
28	121	125	oc4dst	5	4+occ hwy distance (1/10s miles)
29	126	130	oc2pkcst	5	2 occ parking cost ('80 cents)
30	131	135	oc3pkcst	5	3 occ parking cost ('80 cents)
31	136	140	oc4pkcst	5	4+occ parking cost ('80 cents)
32	141	145	oc2hwyrn	5	2 occ hwy run time (min)
33	146	150	oc3hwyrn	5	3 occ hwy run time (min)
34	151	155	oc4hwyrn	5	4+occ hwy run time (min)
35	151	155	tmsav_24	5	time saved by HOV3+ relative to HOV2 (min)
36	151	155	oc2toll	5	2 occ toll ('80 cents)
37	151	155	oc3toll	5	3 occ toll ('80 cents)
38	151	155	oc4toll	5	4+occ toll('80 cents)

Note: Observations based on non-intrazonal motorized HBW trip records from the 1994 HTS.
All data formats are integer; each field is separated by at least one space.

File Format Description
HBS Car Occupancy Mode Choice Model Calibration File Format / Version 2 Model Set

File Name: hbsc4.dat
Date: 11/27/02
Record Count: 1,503
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
1	1	8	hhid	8	Household ID
2	10	11	persnum	2	Person Number Within a HH
3	13	14	tripnum	2	Trip Number (HBW) of a hh member
4	16	16	vehicnt	1	Number of vehicles owned (0,1,2+)
5	18	18	coccmd	1	car occ, choice 1= 2occ; 2= 3occ; 3= 4+occ
6	20	21	occgrp	2	Auto Occupancy (2,3,4)
7	23	26	ptaz	4	Productions TAZ
8	28	31	ataz	4	Attractions TAZ
9	33	34	pjur	2	Production jurisdiction
10	36	37	ajur	2	Attraction jurisdiction
11	39	41	pnewdist	3	Production district
12	43	45	anewdist	3	Attraction district
13	47	50	ffactor	4	Survey Weight
14	51	55	oc3v0dum	5	3 occ -0 veh owned hh dummy (0,1)
15	56	60	oc3v1dum	5	3 occ -1 veh owned hh dummy (0,1)
16	61	65	oc3v2dum	5	3 occ -2+veh owned hh dummy (0,1)
17	66	70	oc4v0dum	5	4+occ -0 veh owned hh dummy (0,1)
18	71	75	oc4v1dum	5	4+occ -1 veh owned hh dummy (0,1)
19	76	80	oc4v2dum	5	4+occ -2+veh owned hh dummy (0,1)
20	81	85	oc2exctm	5	2 occ hwy excess time (min)
21	86	90	oc3exctm	5	3 occ hwy excess time (min)
22	91	95	oc4exctm	5	4+occ hwy excess time (min)
23	96	100	oc2opcst	5	2 occ auto operating cost ('80 cents)
24	101	105	oc3opcst	5	3 occ auto operating cost ('80 cents)
25	106	110	oc4opcst	5	4+ occ auto operating cost ('80 cents)
26	111	115	oc2dst	5	2 occ hwy distance (1/10s miles)
27	116	120	oc3dst	5	3 occ hwy distance (1/10s miles)
28	121	125	oc4dst	5	4+occ hwy distance (1/10s miles)
29	126	130	oc2pkcst	5	2 occ parking cost ('80 cents)
30	131	135	oc3pkcst	5	3 occ parking cost ('80 cents)
31	136	140	oc4pkcst	5	4+occ parking cost ('80 cents)
32	141	145	oc2hwyrn	5	2 occ hwy run time (min)
33	146	150	oc3hwyrn	5	3 occ hwy run time (min)
34	151	155	oc4hwyrn	5	4+occ hwy run time (min)
35	156	160	tmsav_24	5	time saved by HOV3+ relative to HOV2 (min)
36	161	165	oc2toll	5	2 occ toll ('80 cents)
37	166	170	oc3toll	5	3 occ toll ('80 cents)
38	171	175	oc4toll	5	4+occ toll('80 cents)

Note: Observations based on non-intrazonal motorized HBW trip records from the 1994 HTS.
All data formats are integer; each field is separated by at least one space.

File Format Description
HBO Car Occupancy Mode Choice Model Calibration File Format / Version 2 Model Set

File Name: hboc4.dat
Date: 11/27/02
Record Count: 5,848
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
1	1	8	hhid	8	Household ID
2	10	11	persnum	2	Person Number Within a HH
3	13	14	tripnum	2	Trip Number (HBW) of a hh member
4	16	16	vehicnt	1	Number of vehicles owned (0,1,2+)
5	18	18	coccmd	1	car occ, choice 1= 2occ; 2= 3occ; 3= 4+occ
6	20	21	occgrp	2	Auto Occupancy (2,3,4)
7	23	26	ptaz	4	Productions TAZ
8	28	31	ataz	4	Attractions TAZ
9	33	34	pjur	2	Production jurisdiction
10	36	37	ajur	2	Attraction jurisdiction
11	39	41	pnewdist	3	Production district
12	43	45	anewdist	3	Attraction district
13	47	50	ffactor	4	Survey Weight
14	51	55	oc3v0dum	5	3 occ -0 veh owned hh dummy (0,1)
15	56	60	oc3v1dum	5	3 occ -1 veh owned hh dummy (0,1)
16	61	65	oc3v2dum	5	3 occ -2+veh owned hh dummy (0,1)
17	66	70	oc4v0dum	5	4+occ -0 veh owned hh dummy (0,1)
18	71	75	oc4v1dum	5	4+occ -1 veh owned hh dummy (0,1)
19	76	80	oc4v2dum	5	4+occ -2+veh owned hh dummy (0,1)
20	81	85	oc2exctm	5	2 occ hwy excess time (min)
21	86	90	oc3exctm	5	3 occ hwy excess time (min)
22	91	95	oc4exctm	5	4+occ hwy excess time (min)
23	96	100	oc2opcst	5	2 occ auto operating cost ('80 cents)
24	101	105	oc3opcst	5	3 occ auto operating cost ('80 cents)
25	106	110	oc4opcst	5	4+ occ auto operating cost ('80 cents)
26	111	115	oc2dst	5	2 occ hwy distance (1/10s miles)
27	116	120	oc3dst	5	3 occ hwy distance (1/10s miles)
28	121	125	oc4dst	5	4+occ hwy distance (1/10s miles)
29	126	130	oc2pkcst	5	2 occ parking cost ('80 cents)
30	131	135	oc3pkcst	5	3 occ parking cost ('80 cents)
31	136	140	oc4pkcst	5	4+occ parking cost ('80 cents)
32	141	145	oc2hwyrn	5	2 occ hwy run time (min)
33	146	150	oc3hwyrn	5	3 occ hwy run time (min)
34	151	155	oc4hwyrn	5	4+occ hwy run time (min)
35	156	160	tmsav_24	5	time saved by HOV3+ relative to HOV2 (min)
36	161	165	oc2toll	5	2 occ toll ('80 cents)
37	166	170	oc3toll	5	3 occ toll ('80 cents)
38	171	175	oc4toll	5	4+occ toll('80 cents)

Note: Observations based on non-intrazonal motorized HBW trip records from the 1994 HTS.
All data formats are integer; each field is separated by at least one space.

File Format Description
NHB Car Occupancy Mode Choice Model Calibration File Format / Version 2 Model Set

File Name: nhbc4.dat
Date: 11/27/02
Record Count: 3,225
Programmer: RJM

Field #	Begin Col.	End Col.	Variable	Field Length	Description
1	1	8	hhid	8	Household ID
2	10	11	persnum	2	Person Number Within a HH
3	13	14	tripnum	2	Trip Number (HBW) of a hh member
4	16	16	vehicnt	1	Number of vehicles owned (0,1,2+)
5	18	18	coccmd	1	car occ, choice 1= 2occ; 2= 3occ; 3= 4+occ
6	20	21	occgrp	2	Auto Occupancy (2,3,4)
7	23	26	ptaz	4	Productions TAZ
8	28	31	ataz	4	Attractions TAZ
9	33	34	pjur	2	Production jurisdiction
10	36	37	ajur	2	Attraction jurisdiction
11	39	41	pnewdist	3	Production district
12	43	45	anewdist	3	Attraction district
13	47	50	ffactor	4	Survey Weight
14	51	55	oc3v0dum	5	3 occ -0 veh owned hh dummy (0,1)
15	56	60	oc3v1dum	5	3 occ -1 veh owned hh dummy (0,1)
16	61	65	oc3v2dum	5	3 occ -2+veh owned hh dummy (0,1)
17	66	70	oc4v0dum	5	4+occ -0 veh owned hh dummy (0,1)
18	71	75	oc4v1dum	5	4+occ -1 veh owned hh dummy (0,1)
19	76	80	oc4v2dum	5	4+occ -2+veh owned hh dummy (0,1)
20	81	85	oc2exctm	5	2 occ hwy excess time (min)
21	86	90	oc3exctm	5	3 occ hwy excess time (min)
22	91	95	oc4exctm	5	4+occ hwy excess time (min)
23	96	100	oc2opcst	5	2 occ auto operating cost ('80 cents)
24	101	105	oc3opcst	5	3 occ auto operating cost ('80 cents)
25	106	110	oc4opcst	5	4+ occ auto operating cost ('80 cents)
26	111	115	oc2dst	5	2 occ hwy distance (1/10s miles)
27	116	120	oc3dst	5	3 occ hwy distance (1/10s miles)
28	121	125	oc4dst	5	4+occ hwy distance (1/10s miles)
29	126	130	oc2pkcst	5	2 occ parking cost ('80 cents)
30	131	135	oc3pkcst	5	3 occ parking cost ('80 cents)
31	136	140	oc4pkcst	5	4+occ parking cost ('80 cents)
32	141	145	oc2hwyrn	5	2 occ hwy run time (min)
33	146	150	oc3hwyrn	5	3 occ hwy run time (min)
34	151	155	oc4hwyrn	5	4+occ hwy run time (min)
35	156	160	tmsav_24	5	time saved by HOV3+ relative to HOV2 (min)
36	161	165	oc2toll	5	2 occ toll ('80 cents)
37	166	170	oc3toll	5	3 occ toll ('80 cents)
38	171	175	oc4toll	5	4+occ toll('80 cents)

Note: Observations based on non-intrazonal motorized HBW trip records from the 1994 HTS.
All data formats are integer; each field is separated by at least one space.

hbw
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Calibration file for main model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
VEHICNT	7209	0	0.000	2.000	1.679	12105.000
MAINMD	7209	0	1.000	3.000	2.024	14590.000
FFACTOR	7209	0	36.000	1827.000	361.372	2605128.000
PTAZ	7209	0	1.000	2125.000	1125.478	8113568.000
ATAZ	7209	0	1.000	2124.000	872.750	6291655.000
PSHTIM_A	7209	0	0.000	7.000	3.092	22288.000
PLGTIM_A	7209	0	0.000	20.000	10.007	72144.000
ASHTIM_A	7209	0	0.000	7.000	3.399	24501.000
ALGTIM_A	7209	0	0.000	20.000	8.776	63263.000
WKCTM_W	7209	0	0.000	27.000	0.422	3044.000
DRVTM_W	7209	0	0.000	0.000	0.000	0.000
IWTTM_W	7209	0	0.000	30.000	4.748	34226.000
XWTTM_W	7209	0	0.000	45.000	3.058	22048.000
NMETM_W	7209	0	0.000	134.000	13.201	95164.000
METTM_W	7209	0	0.000	63.000	6.172	44495.000
WKCTM_D	7209	0	0.000	8.000	1.862	13425.000
DRVTM_D	7209	0	0.000	38.000	7.685	55401.000
IWTTM_D	7209	0	0.000	30.000	4.354	31387.000
XWTTM_D	7209	0	0.000	34.000	3.418	24642.000
NMETM_D	7209	0	0.000	110.000	13.601	98051.000
METTM_D	7209	0	0.000	63.000	8.236	59373.000
FARE_WK	7209	0	27.000	355.000	123.071	887216.000
FARE_DR	7209	0	27.000	464.000	132.257	953438.000
DAOPCST	7209	0	2.000	366.000	74.740	538801.000
GROPCST	7209	0	1.000	162.000	32.920	237320.000
DAPKCST	7209	0	0.000	152.000	28.237	203559.000
GRPKCST	7209	0	0.000	76.000	11.926	85976.000
DAEXCTM	7209	0	1.000	8.000	3.805	27432.000
GREXCTM	7209	0	1.000	8.000	3.805	27432.000
DAHWYRUN	7209	0	1.000	111.000	29.006	209102.000
GRHWYRUN	7209	0	2.000	106.000	27.394	197485.000
VE0DUM	7209	0	0.000	1.000	0.045	325.000
VE1DUM	7209	0	0.000	1.000	0.231	1663.000
VE2DUM	7209	0	0.000	1.000	0.724	5221.000
WMT25DUM	7209	0	0.000	1.000	0.330	2377.000
PLU_MIX	7209	0	0.000	31299.000	1966.314	14175161.000
ALU_MIX	7209	0	0.000	34752.000	3072.214	22147588.000
PSHPCT_A	7209	0	0.000	100.000	32.650	235377.000
PLGPCT_A	7209	0	0.000	100.000	40.037	288627.000
PTOPCT_A	7209	0	0.000	100.000	72.687	524004.000
ASHPCT_A	7209	0	0.000	100.000	52.153	375968.000
ALGPCT_A	7209	0	0.000	100.000	34.835	251123.000
ATOPCT_A	7209	0	0.000	100.000	86.987	627091.000
PWMRKT_A	7209	0	1.000	6.000	3.283	23669.000
AWMRKT_A	7209	0	1.000	6.000	2.529	18232.000
GISHACDA	7209	0	1.000	4.000	2.264	16318.000
WLKTOTRN	7209	0	-1.000	1.000	0.282	2035.000
AUTTOTRN	7209	0	-1.000	1.000	0.522	3763.000
DATOLL	7209	0	0.000	46.000	1.616	11650.000
GRTOLL	7209	0	0.000	23.000	0.725	5229.000
FTT	7209	0	0.000	164.000	35.743	257673.000
FWALKTM	7209	0	0.000	31.000	6.158	44395.000
FFARE	7209	0	0.000	464.000	91.918	662637.000
FWAITTM	7209	0	0.000	60.000	7.215	52012.000

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Calibration file for main model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
FIVTMET	7209	0	0.000	63.000	6.018	43384.000
FIVTNMET	7209	0	0.000	115.000	13.044	94036.000
FMETDUM	7209	0	0.000	1.000	0.328	2365.000
FDRVADUM	7209	0	0.000	1.000	0.394	2840.000
ACCTOTRN	7209	0	-1.000	1.000	0.291	2099.000
SLFLAG	7209	0	1.000	10.000	4.892	35269.000

hbw
10:24 Wednesday, November 27, 2002 3
Calibration file for carpool occ model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
VEHICNT	1317	0	0.000	2.000	1.677	2208.000
COCCMD	1317	0	1.000	3.000	1.438	1894.000
OCCGRP	1317	0	2.000	4.000	2.438	3211.000
PTAZ	1317	0	47.000	2125.000	1151.814	1516939.000
ATAZ	1317	0	1.000	2123.000	805.597	1060971.000
PJUR	1317	0	0.000	21.000	5.494	7235.000
AJUR	1317	0	0.000	21.000	3.140	4135.000
PNEWDIST	1317	0	8.000	418.000	201.318	265136.000
ANEWDIST	1317	0	1.000	416.000	142.982	188307.000
FFACTOR	1317	0	41.000	1218.000	369.822	487056.000
OC3V0DUM	1317	0	0.000	1.000	0.036	47.000
OC3V1DUM	1317	0	0.000	1.000	0.252	332.000
OC3V2DUM	1317	0	0.000	1.000	0.712	938.000
OC4V0DUM	1317	0	0.000	1.000	0.036	47.000
OC4V1DUM	1317	0	0.000	1.000	0.252	332.000
OC4V2DUM	1317	0	0.000	1.000	0.712	938.000
OC2EXCTM	1317	0	1.000	8.000	4.173	5496.000
OC3EXCTM	1317	0	1.000	8.000	4.173	5496.000
OC4EXCTM	1317	0	1.000	8.000	4.173	5496.000
OC2OPCST	1317	0	1.000	162.000	41.778	55022.000
OC3OPCST	1317	0	1.000	108.000	27.859	36690.000
OC4OPCST	1317	0	1.000	74.000	18.987	25006.000
OC2DST	1317	0	5.000	612.000	157.696	207686.000
OC3DST	1317	0	5.000	612.000	157.648	207622.000
OC4DST	1317	0	5.000	612.000	157.648	207622.000
OC2PKCST	1317	0	0.000	76.000	16.519	21756.000
OC3PKCST	1317	0	0.000	51.000	11.026	14521.000
OC4PKCST	1317	0	0.000	35.000	7.532	9920.000
OC2HWYRN	1317	0	3.000	104.000	32.492	42792.000
OC3HWYRN	1317	0	4.000	105.000	30.541	40222.000
OC4HWYRN	1317	0	5.000	106.000	31.541	41539.000
TMSAV_24	1317	0	-2.000	39.000	0.951	1253.000
OC2TOLL	1317	0	0.000	23.000	0.862	1135.000
OC3TOLL	1317	0	0.000	15.000	0.569	749.000
OC4TOLL	1317	0	0.000	10.000	0.374	492.000

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Calibration file for main model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
VEHICNT	3407	0	0.000	2.000	1.706	5812.000
MAINMD	3407	0	1.000	3.000	2.418	8237.000
FFACTOR	3407	0	36.000	988.000	369.409	1258576.000
PTAZ	3407	0	2.000	2125.000	1107.750	3774105.000
ATAZ	3407	0	8.000	2124.000	1118.918	3812153.000
PSHTIM_A	3407	0	0.000	7.000	2.606	8877.000
PLGTIM_A	3407	0	0.000	20.000	8.510	28992.000
ASHTIM_A	3407	0	0.000	7.000	2.780	9471.000
ALGTIM_A	3407	0	0.000	20.000	8.158	27796.000
WKCTM_W	3407	0	0.000	4.000	0.165	562.000
DRVTM_W	3407	0	0.000	0.000	0.000	0.000
IWTTM_W	3407	0	0.000	30.000	7.320	24940.000
XWTTM_W	3407	0	0.000	45.000	2.035	6934.000
NMETM_W	3407	0	0.000	73.000	5.714	19469.000
METTM_W	3407	0	0.000	57.000	1.424	4852.000
WKCTM_D	3407	0	0.000	4.000	1.458	4966.000
DRVTM_D	3407	0	0.000	19.000	5.081	17310.000
IWTTM_D	3407	0	0.000	30.000	7.020	23917.000
XWTTM_D	3407	0	0.000	55.000	3.794	12926.000
NMETM_D	3407	0	0.000	109.000	8.134	27712.000
METTM_D	3407	0	0.000	57.000	2.463	8390.000
FARE_WK	3407	0	27.000	332.000	86.072	293247.000
FARE_DR	3407	0	27.000	332.000	95.846	326549.000
DAOPCST	3407	0	2.000	467.000	32.670	111305.000
GROPCST	3407	0	1.000	193.000	13.784	46963.000
DAPKCST	3407	0	0.000	50.000	0.273	930.000
GRPKCST	3407	0	0.000	25.000	0.114	390.000
DAEXCTM	3407	0	1.000	8.000	2.034	6929.000
GREXCTM	3407	0	1.000	8.000	2.034	6929.000
DAHWYRUN	3407	0	1.000	106.000	10.387	35390.000
GRHWYRUN	3407	0	2.000	107.000	11.387	38797.000
VE0DUM	3407	0	0.000	1.000	0.025	84.000
VE1DUM	3407	0	0.000	1.000	0.245	834.000
VE2DUM	3407	0	0.000	1.000	0.731	2489.000
WMT25DUM	3407	0	0.000	1.000	0.113	386.000
PLU_MIX	3407	0	0.000	34752.000	1560.386	5316234.000
ALU_MIX	3407	0	0.000	34752.000	2295.879	7822061.000
PSHPCT_A	3407	0	0.000	100.000	34.832	118674.000
PLGPCT_A	3407	0	0.000	100.000	39.787	135555.000
PTOPCT_A	3407	0	0.000	100.000	74.620	254229.000
ASHPCT_A	3407	0	0.000	100.000	42.267	144005.000
ALGPCT_A	3407	0	0.000	100.000	40.375	137557.000
ATOPCT_A	3407	0	0.000	100.000	82.642	281562.000
PWMRKT_A	3407	0	1.000	6.000	3.140	10698.000
AWMRKT_A	3407	0	1.000	6.000	2.851	9715.000
GISHACDA	3407	0	1.000	4.000	2.243	7641.000
WLKTOTRN	3407	0	-1.000	1.000	0.111	379.000
AUTTOTRN	3407	0	-1.000	1.000	0.279	951.000
DATOLL	3407	0	0.000	46.000	0.220	751.000
GRTOLL	3407	0	0.000	21.000	0.099	336.000
FTT	3407	0	0.000	155.000	23.773	80994.000
FWALKTM	3407	0	0.000	31.000	5.829	19858.000
FFARE	3407	0	0.000	332.000	63.801	217369.000
FWAITTM	3407	0	0.000	60.000	9.137	31130.000

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Calibration file for main model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
FIVTMET	3407	0	0.000	57.000	1.217	4146.000
FIVTNMET	3407	0	0.000	109.000	5.886	20053.000
FMETDUM	3407	0	0.000	1.000	0.115	393.000
FDRVADUM	3407	0	0.000	1.000	0.390	1328.000
ACCTOTRN	3407	0	-1.000	1.000	0.120	409.000
SLFLAG	3407	0	1.000	10.000	5.355	18246.000

hbs
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Calibration file for carpool occ model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
VEHICNT	1503	0	0.000	2.000	1.721	2587.000
COCCMD	1503	0	1.000	3.000	1.440	2165.000
OCCGRP	1503	0	2.000	4.000	2.440	3668.000
PTAZ	1503	0	37.000	2125.000	1151.024	1729989.000
ATAZ	1503	0	10.000	2124.000	1160.347	1744001.000
PJUR	1503	0	0.000	21.000	5.266	7915.000
AJUR	1503	0	0.000	21.000	5.228	7858.000
PNEWDIST	1503	0	7.000	418.000	201.275	302516.000
ANEWDIST	1503	0	2.000	417.000	203.261	305502.000
FFACTOR	1503	0	64.000	988.000	364.774	548256.000
OC3V0DUM	1503	0	0.000	1.000	0.023	34.000
OC3V1DUM	1503	0	0.000	1.000	0.234	351.000
OC3V2DUM	1503	0	0.000	1.000	0.744	1118.000
OC4V0DUM	1503	0	0.000	1.000	0.023	34.000
OC4V1DUM	1503	0	0.000	1.000	0.234	351.000
OC4V2DUM	1503	0	0.000	1.000	0.744	1118.000
OC2EXCTM	1503	0	1.000	8.000	1.967	2956.000
OC3EXCTM	1503	0	1.000	8.000	1.967	2956.000
OC4EXCTM	1503	0	1.000	8.000	1.967	2956.000
OC2OPCST	1503	0	1.000	114.000	17.785	26731.000
OC3OPCST	1503	0	1.000	76.000	11.844	17802.000
OC4OPCST	1503	0	0.000	52.000	8.051	12100.000
OC2DST	1503	0	3.000	432.000	67.100	100851.000
OC3DST	1503	0	3.000	432.000	67.100	100851.000
OC4DST	1503	0	3.000	432.000	67.100	100851.000
OC2PKCST	1503	0	0.000	25.000	0.093	140.000
OC3PKCST	1503	0	0.000	17.000	0.063	94.000
OC4PKCST	1503	0	0.000	11.000	0.042	63.000
OC2HWYRN	1503	0	2.000	54.000	12.075	18148.000
OC3HWYRN	1503	0	3.000	55.000	13.075	19651.000
OC4HWYRN	1503	0	4.000	56.000	14.075	21154.000
TMSAV_24	1503	0	-2.000	-2.000	-2.000	-3006.000
OC2TOLL	1503	0	0.000	21.000	0.147	221.000
OC3TOLL	1503	0	0.000	14.000	0.096	144.000
OC4TOLL	1503	0	0.000	9.000	0.062	93.000

hbo
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Calibration file for main model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
VEHICNT	10494	0	0.000	2.000	1.744	18302.000
MAINMD	10494	0	1.000	3.000	2.517	26417.000
FFACTOR	10494	0	36.000	1218.000	353.966	3714520.000
PTAZ	10494	0	2.000	2125.000	1071.305	11242275.000
ATAZ	10494	0	1.000	2125.000	1037.380	10886264.000
PSHTIM_A	10494	0	0.000	7.000	2.497	26201.000
PLGTIM_A	10494	0	0.000	20.000	8.233	86392.000
ASHTIM_A	10494	0	0.000	7.000	2.711	28446.000
ALGTIM_A	10494	0	0.000	20.000	8.211	86162.000
WKCTM_W	10494	0	0.000	14.000	0.202	2119.000
DRVTM_W	10494	0	0.000	0.000	0.000	0.000
IWTTM_W	10494	0	0.000	30.000	6.626	69536.000
XWTTM_W	10494	0	0.000	44.000	2.404	25226.000
NMETM_W	10494	0	0.000	86.000	6.431	67485.000
METTM_W	10494	0	0.000	63.000	2.577	27041.000
WKCTM_D	10494	0	0.000	6.000	1.411	14809.000
DRVTM_D	10494	0	0.000	19.000	5.024	52724.000
IWTTM_D	10494	0	0.000	30.000	6.173	64778.000
XWTTM_D	10494	0	0.000	55.000	3.348	35136.000
NMETM_D	10494	0	0.000	113.000	7.398	77631.000
METTM_D	10494	0	0.000	63.000	3.566	37422.000
FARE_WK	10494	0	27.000	332.000	94.072	987193.000
FARE_DR	10494	0	27.000	332.000	102.079	1071220.000
DAOPCST	10494	0	2.000	582.000	42.566	446686.000
GROPCST	10494	0	0.000	241.000	17.688	185622.000
DAPKCST	10494	0	0.000	100.000	2.007	21058.000
GRPKCST	10494	0	0.000	50.000	0.848	8902.000
DAEXCTM	10494	0	1.000	8.000	2.052	21533.000
GREXCTM	10494	0	1.000	8.000	2.052	21533.000
DAHWYRUN	10494	0	1.000	124.000	12.915	135535.000
GRHWYRUN	10494	0	2.000	125.000	13.915	146029.000
VE0DUM	10494	0	0.000	1.000	0.023	241.000
VE1DUM	10494	0	0.000	1.000	0.210	2204.000
VE2DUM	10494	0	0.000	1.000	0.767	8049.000
WMT25DUM	10494	0	0.000	1.000	0.176	1842.000
PLU_MIX	10494	0	0.000	34752.000	1663.994	17461948.000
ALU_MIX	10494	0	0.000	34752.000	2173.581	22809559.000
PSHPCT_A	10494	0	0.000	100.000	33.056	346887.000
PLGPCT_A	10494	0	0.000	100.000	40.714	427251.000
PTOPCT_A	10494	0	0.000	100.000	73.770	774138.000
ASHPCT_A	10494	0	0.000	100.000	38.166	400512.000
ALGPCT_A	10494	0	0.000	100.000	40.636	426437.000
ATOPCT_A	10494	0	0.000	100.000	78.802	826949.000
PWMRKT_A	10494	0	1.000	6.000	3.218	33770.000
AWMRKT_A	10494	0	1.000	6.000	3.009	31572.000
GISHACDA	10494	0	1.000	4.000	2.266	23777.000
WLKTOTRN	10494	0	-1.000	1.000	0.089	932.000
AUTTOTRN	10494	0	-1.000	1.000	0.240	2522.000
DATOLL	10494	0	0.000	46.000	0.548	5751.000
GRTOLL	10494	0	0.000	23.000	0.229	2406.000
FTT	10494	0	0.000	158.000	24.709	259292.000
FWALKTM	10494	0	0.000	35.000	5.675	59551.000
FFARE	10494	0	0.000	332.000	68.965	723716.000
FWAITTM	10494	0	0.000	69.000	8.672	91000.000

hbo
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Calibration file for main model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
FIVTMET	10494	0	0.000	59.000	2.396	25143.000
FIVTNMET	10494	0	0.000	97.000	6.148	64519.000
FMETDUM	10494	0	0.000	1.000	0.181	1897.000
FDRVADUM	10494	0	0.000	1.000	0.428	4487.000
ACCTOTRN	10494	0	-1.000	1.000	0.093	976.000
SLFLAG	10494	0	1.000	10.000	5.475	57456.000

hbo
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Calibration file for carpool occ model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
VEHICNT	5848	0	0.000	2.000	1.790	10466.000
COCCMD	5848	0	1.000	3.000	1.596	9333.000
OCCGRP	5848	0	2.000	4.000	2.596	15181.000
PTAZ	5848	0	2.000	2125.000	1112.068	6503374.000
ATAZ	5848	0	2.000	2125.000	1082.771	6332045.000
PJUR	5848	0	0.000	21.000	5.046	29508.000
AJUR	5848	0	0.000	21.000	4.778	27939.000
PNEWDIST	5848	0	1.000	418.000	193.567	1131979.000
ANEWDIST	5848	0	1.000	418.000	189.000	1105270.000
FFACTOR	5848	0	36.000	1218.000	353.529	2067438.000
OC3V0DUM	5848	0	0.000	1.000	0.015	87.000
OC3V1DUM	5848	0	0.000	1.000	0.181	1056.000
OC3V2DUM	5848	0	0.000	1.000	0.805	4705.000
OC4V0DUM	5848	0	0.000	1.000	0.015	87.000
OC4V1DUM	5848	0	0.000	1.000	0.181	1056.000
OC4V2DUM	5848	0	0.000	1.000	0.805	4705.000
OC2EXCTM	5848	0	1.000	8.000	1.816	10619.000
OC3EXCTM	5848	0	1.000	8.000	1.816	10619.000
OC4EXCTM	5848	0	1.000	8.000	1.816	10619.000
OC2OPCST	5848	0	1.000	187.000	20.184	118034.000
OC3OPCST	5848	0	1.000	125.000	13.434	78563.000
OC4OPCST	5848	0	0.000	85.000	9.177	53665.000
OC2DST	5848	0	3.000	706.000	76.173	445462.000
OC3DST	5848	0	3.000	706.000	76.173	445462.000
OC4DST	5848	0	3.000	706.000	76.173	445462.000
OC2PKCST	5848	0	0.000	50.000	0.569	3327.000
OC3PKCST	5848	0	0.000	33.000	0.376	2198.000
OC4PKCST	5848	0	0.000	23.000	0.258	1511.000
OC2HWYRN	5848	0	2.000	84.000	13.315	77864.000
OC3HWYRN	5848	0	3.000	85.000	14.315	83712.000
OC4HWYRN	5848	0	4.000	86.000	15.315	89560.000
TMSAV_24	5848	0	-2.000	-2.000	-2.000	-11696.000
OC2TOLL	5848	0	0.000	23.000	0.224	1311.000
OC3TOLL	5848	0	0.000	15.000	0.149	870.000
OC4TOLL	5848	0	0.000	10.000	0.096	561.000

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Calibration file for main model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
VEHICNT	7904	0	0.000	2.000	1.738	13741.000
MAINMD	7904	0	1.000	3.000	2.353	18601.000
FFACTOR	7904	0	36.000	1218.000	362.434	2864675.000
PTAZ	7904	0	1.000	2140.000	1014.873	8021557.000
ATAZ	7904	0	1.000	2125.000	1036.024	8188730.000
PSHTIM_A	7904	0	0.000	7.000	2.904	22954.000
PLGTIM_A	7904	0	0.000	20.000	8.470	66949.000
ASHTIM_A	7904	0	0.000	7.000	2.891	22847.000
ALGTIM_A	7904	0	0.000	20.000	8.419	66547.000
WKCTM_W	7904	0	0.000	13.000	0.235	1859.000
DRVTM_W	7904	0	0.000	0.000	0.000	0.000
IWTTM_W	7904	0	0.000	50.000	7.125	56313.000
XWTTM_W	7904	0	0.000	50.000	3.054	24141.000
NMETM_W	7904	0	0.000	100.000	7.703	60881.000
METTM_W	7904	0	0.000	60.000	3.100	24506.000
WKCTM_D	7904	0	0.000	7.000	1.531	12104.000
DRVTM_D	7904	0	0.000	26.000	5.337	42182.000
IWTTM_D	7904	0	0.000	30.000	6.687	52857.000
XWTTM_D	7904	0	0.000	55.000	4.255	33628.000
NMETM_D	7904	0	0.000	112.000	8.556	67629.000
METTM_D	7904	0	0.000	60.000	4.890	38647.000
FARE_WK	7904	0	27.000	332.000	91.721	724966.000
FARE_DR	7904	0	27.000	359.000	99.830	789053.000
DAOPCST	7904	0	2.000	463.000	46.464	367250.000
GROPCST	7904	0	0.000	195.000	19.439	153642.000
DAPKCST	7904	0	0.000	100.000	3.211	25381.000
GRPKCST	7904	0	0.000	50.000	1.357	10726.000
DAEXCTM	7904	0	1.000	8.000	2.343	18520.000
GREXCTM	7904	0	1.000	8.000	2.343	18520.000
DAHWYRUN	7904	0	1.000	105.000	13.975	110461.000
GRHWYRUN	7904	0	2.000	106.000	14.975	118365.000
VE0DUM	7904	0	0.000	1.000	0.019	147.000
VE1DUM	7904	0	0.000	1.000	0.224	1773.000
VE2DUM	7904	0	0.000	1.000	0.757	5984.000
WMT25DUM	7904	0	0.000	1.000	0.216	1705.000
PLU_MIX	7904	0	0.000	34752.000	2456.891	19419267.000
ALU_MIX	7904	0	0.000	34752.000	2413.616	19077221.000
PSHPCT_A	7904	0	0.000	100.000	42.667	337240.000
PLGPCT_A	7904	0	0.000	100.000	40.223	317921.000
PTOPCT_A	7904	0	0.000	100.000	82.890	655161.000
ASHPCT_A	7904	0	0.000	100.000	42.204	333577.000
ALGPCT_A	7904	0	0.000	100.000	40.263	318241.000
ATOPCT_A	7904	0	0.000	100.000	82.467	651818.000
PWMRKT_A	7904	0	1.000	6.000	2.836	22413.000
AWMRKT_A	7904	0	1.000	6.000	2.840	22449.000
GISHACDA	7904	0	1.000	4.000	2.298	18161.000
WLKTOTRN	7904	0	-1.000	1.000	0.171	1354.000
AUTTOTRN	7904	0	-1.000	1.000	0.330	2606.000
DATOLL	7904	0	0.000	54.000	0.843	6667.000
GRTOLL	7904	0	0.000	23.000	0.353	2787.000
FTT	7904	0	0.000	153.000	29.706	234799.000
FWALKTM	7904	0	0.000	31.000	6.790	53666.000
FFARE	7904	0	0.000	332.000	83.167	657354.000
FWAITTM	7904	0	0.000	69.000	10.874	85951.000

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Calibration file for main model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
FIVTMET	7904	0	0.000	60.000	3.214	25403.000
FIVTNMET	7904	0	0.000	100.000	8.406	66440.000
FMETDUM	7904	0	0.000	1.000	0.221	1750.000
FDRVADUM	7904	0	0.000	1.000	0.225	1776.000
ACCTOTRN	7904	0	-1.000	1.000	0.230	1818.000
SLFLAG	7904	0	1.000	9.000	2.823	22314.000

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Calibration file for carpool occ model

Variable	N	Nmiss	Minimum	Maximum	Mean	Sum
VEHICNT	3225	0	0.000	2.000	1.770	5709.000
COCCMD	3225	0	1.000	3.000	1.525	4918.000
OCCGRP	3225	0	2.000	4.000	2.525	8143.000
PTAZ	3225	0	2.000	2140.000	1051.549	3391244.000
ATAZ	3225	0	2.000	2125.000	1061.565	3423546.000
PJUR	3225	0	0.000	23.000	4.616	14886.000
AJUR	3225	0	0.000	21.000	4.634	14945.000
PNEWDIST	3225	0	1.000	435.000	183.333	591249.000
ANEWDIST	3225	0	1.000	418.000	184.845	596124.000
FFACTOR	3225	0	41.000	1218.000	360.605	1162952.000
OC3V0DUM	3225	0	0.000	1.000	0.011	34.000
OC3V1DUM	3225	0	0.000	1.000	0.209	673.000
OC3V2DUM	3225	0	0.000	1.000	0.781	2518.000
OC4V0DUM	3225	0	0.000	1.000	0.011	34.000
OC4V1DUM	3225	0	0.000	1.000	0.209	673.000
OC4V2DUM	3225	0	0.000	1.000	0.781	2518.000
OC2EXCTM	3225	0	1.000	8.000	2.070	6677.000
OC3EXCTM	3225	0	1.000	8.000	2.070	6677.000
OC4EXCTM	3225	0	1.000	8.000	2.070	6677.000
OC2OPCST	3225	0	1.000	189.000	22.449	72399.000
OC3OPCST	3225	0	1.000	126.000	14.959	48244.000
OC4OPCST	3225	0	0.000	86.000	10.197	32884.000
OC2DST	3225	0	3.000	715.000	84.723	273233.000
OC3DST	3225	0	3.000	715.000	84.723	273233.000
OC4DST	3225	0	3.000	715.000	84.723	273233.000
OC2PKCST	3225	0	0.000	50.000	0.978	3154.000
OC3PKCST	3225	0	0.000	33.000	0.648	2090.000
OC4PKCST	3225	0	0.000	23.000	0.444	1431.000
OC2HWYRN	3225	0	2.000	87.000	14.575	47003.000
OC3HWYRN	3225	0	3.000	88.000	15.575	50228.000
OC4HWYRN	3225	0	4.000	89.000	16.575	53453.000
TMSAV_24	3225	0	-2.000	-2.000	-2.000	-6450.000
OC2TOLL	3225	0	0.000	27.000	0.385	1243.000
OC3TOLL	3225	0	0.000	18.000	0.256	827.000
OC4TOLL	3225	0	0.000	12.000	0.165	531.000

Appendix E
Mode Choice Model Aggregate Adjustment Factors

Final TPAF and COAF values **Sim Yr: 1994**

HBW TPAF mctf_hbw.asc

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	dc cr	dcncr	mtg	pg	arlcr	arlnc	alx	ffx	ldn	pw	frd	how	aa	chs	carrl	ca/sm	s. va	fauq	w. va	ext
1	1.4040	1.0961	1.0248	1.0000	1.0000	0.4703	7.0000	7.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	1.1586	1.0217	0.9939	0.8619	1.2648	0.4883	0.2500	0.7480	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	1.1179	0.6916	0.4039	1.0000	1.5787	2.7915	1.0000	2.1418	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	1.4031	0.7839	1.4231	0.6471	1.5682	0.6010	1.0000	1.0000	1.0000	1.0000	1.0000	7.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5	1.7511	1.2262	1.0000	1.0000	7.0000	0.7957	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6	1.3190	2.3341	1.1795	1.0000	0.7241	0.5435	1.0000	0.2500	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7	1.0854	3.0568	1.0000	1.0000	2.1966	0.5500	0.4447	1.3549	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
8	1.0724	0.5971	1.0000	1.0000	2.7542	1.1033	0.4062	0.8614	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
9	7.0000	3.2556	1.8841	1.0000	1.4039	1.0031	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10	7.0000	3.2111	3.6305	1.0000	1.4621	1.2289	0.4847	1.7906	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
11	2.7032	3.5464	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	7.0000	1.6057	0.6499	1.0000	1.7389	1.4009	1.0000	1.0000	1.0000	1.0000	1.0000	1.4976	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
13	2.9147	1.0204	0.5178	1.0000	0.6231	0.4168	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	7.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
14	1.4455	1.0000	1.0000	1.0000	4.5245	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
16	1.1090	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
17	7.0000	7.0000	7.0000	1.0000	3.5056	2.3139	1.8229	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
18	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
19	7.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
20	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.2500		Max	7.0000		Ave	1.2581		Std dev	1.0977		Count	400						

HBW COAF mccf_hbw.asc

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	dc cr	dcncr	mtg	pg	arlcr	arlnc	alx	ffx	ldn	pw	frd	how	aa	chs	carrl	ca/sm	s. va	fauq	w. va	ext
1	1.9217	1.0130	2.6803	0.8074	1.0000	0.5647	0.6545	0.7337	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	1.7078	1.2488	1.6972	1.1470	2.2535	1.3895	0.7657	0.2500	1.0000	0.4615	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	1.0655	0.5700	1.0736	0.2878	0.8377	0.8286	2.5187	0.8836	1.0000	1.0000	0.8436	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	1.9099	0.9847	0.3581	0.8175	1.0676	0.6074	0.9269	0.2500	1.0000	1.0000	1.0000	1.0000	1.0000	2.3041	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5	0.7675	1.0000	0.8506	1.0000	1.0000	2.6752	0.9245	0.9253	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6	0.7217	0.3242	0.8523	0.8919	1.0338	0.6249	1.2398	0.4220	0.7120	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7	1.2580	1.7953	0.7123	1.9508	0.6818	0.5824	1.0627	0.2500	0.5731	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
8	1.2526	0.5265	0.5108	0.3791	1.7822	0.4215	0.8593	0.6191	1.0232	1.0697	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
9	0.7034	0.4758	0.6057	0.4879	0.2647	0.5775	0.5069	0.3435	1.3208	0.5405	0.9201	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	2.6173	1.0000	1.0000
10	0.8805	0.3964	0.4117	0.4118	0.4541	1.5248	0.9735	0.8583	0.9259	1.7435	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8345	0.9690	1.0000	1.0000
11	1.3909	0.5265	0.5276	1.6452	0.4774	1.0029	1.0000	1.7203	0.7574	1.0000	0.9353	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.2469	1.6793	0.4504	1.5431	1.0000	1.0000	1.0000	0.7374	1.0000	1.0000	1.0000	0.5374	0.2500	1.0000	0.9878	1.0000	1.0000	1.0000	1.0000	1.0000
13	1.1596	1.5697	1.9307	0.7007	1.0000	1.0000	1.0000	0.5988	1.0000	1.0000	1.0000	0.5421	1.2563	0.6477	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
14	0.9169	1.5447	0.5195	0.2957	1.2720	1.1806	0.7436	0.6463	1.0000	1.0000	1.0000	1.0000	1.0000	0.7008	1.0000	0.8411	1.0000	1.0000	1.0000	1.0000
15	1.0000	1.0000	0.6685	0.6927	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8476	0.4437	1.0000	2.4452	1.0000	1.0000	1.0000	1.0000	1.0000
16	0.4788	0.6260	0.4978	0.2500	1.0000	0.4757	0.5962	0.5384	1.0000	1.0000	1.0000	1.0000	1.0000	0.8822	1.0000	1.6701	1.0000	1.0000	1.0000	1.0000
17	0.9436	0.2921	0.3085	1.0000	1.0000	0.4143	0.3748	0.4057	1.0000	0.8918	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	2.5493	0.7676	1.0000	1.0000
18	1.0000	1.0000	0.5386	1.0000	1.0000	0.3454	1.0000	0.4950	1.4547	0.9459	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8295	1.1352	1.0000	1.0000
19	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
20	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.2500		Max	2.6803		Ave	0.9719		Std dev	0.3473		Count	400						

Final TPAF and COAF values **Sim Yr: 1994**

HBS TPAF mctf_hbs.asc

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	dc cr	dcncr	mtg	pg	arlcr	arlnc	alx	ffx	ldn	pw	frd	how	aa	chs	carrl	ca/sm	s. va	fauq	w. va	ext
1	1.7603	3.4089	4.8084	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	1.6067	0.6785	0.2513	0.4466	1.0000	0.4472	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	1.0000	1.0000	0.8379	1.0000	12.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	4.4419	1.0000	2.2184	0.7757	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5	7.4164	1.0000	1.0000	1.0000	12.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6	1.8014	1.0000	1.0000	1.0000	1.0000	0.6428	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7	2.5674	1.0000	1.0000	1.0000	1.0000	1.0000	1.1287	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
8	1.0000	1.0000	1.0000	1.0000	1.0000	3.4493	1.0000	0.4702	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
16	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
18	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
19	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
20	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.2513		Max	12.0000		Ave	1.1054		Std dev	0.9003		Count	400						

HBS COAF mccf_hbs.asc

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	dc cr	dcncr	mtg	pg	arlcr	arlnc	alx	ffx	ldn	pw	frd	how	aa	chs	carrl	ca/sm	s. va	fauq	w. va	ext
1	1.9801	1.7354	7.4554	1.3320	1.6487	1.6120	1.0000	1.3006	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	1.1894	0.9434	0.5487	0.9004	1.0000	2.6877	2.0645	1.0406	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	1.0000	1.2533	0.9215	1.0007	1.3299	1.0882	1.0000	1.0318	1.0000	1.0000	0.8954	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	1.1268	1.0000	1.1866	0.8812	1.0000	1.0000	1.0000	0.6890	1.0000	2.9583	1.0000	1.0000	1.0000	1.0622	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5	1.0000	1.0000	1.0000	1.0000	12.0000	1.7474	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6	1.0000	1.2652	1.3131	1.0000	1.3307	1.5793	0.9999	0.2500	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7	1.0000	1.1736	1.0000	1.0917	1.0000	1.2717	1.0078	1.0560	1.0000	0.9864	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
8	3.3281	1.0000	1.6969	1.0000	1.9404	1.1192	1.4437	0.9096	1.5156	1.0305	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
9	1.0000	1.0000	0.7492	1.0000	1.0000	1.0000	1.0000	0.8962	0.8465	0.9294	1.6479	1.0000	1.0000	1.0000	1.0000	0.5302	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.2500	0.9190	1.5071	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9652	1.0000	1.0000
11	1.0000	1.0000	1.0380	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.2542	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	0.9970	1.0933	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	2.1246	2.0503	1.0000	0.7699	1.0000	1.0000	1.0000	1.0000	1.0000
13	1.0000	1.0000	0.8436	0.8618	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0446	1.3473	1.4569	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
14	1.0000	1.0000	1.0000	0.5295	1.0000	1.0000	1.0000	0.6497	1.0000	1.0000	1.0000	1.0000	1.0000	1.7706	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
15	1.0000	1.0000	0.7722	1.5924	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.6477	1.0000	1.5740	1.0000	1.0000	1.0000	1.0000	1.0000
16	1.0000	0.7007	1.0000	1.0935	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9095	1.0000	1.2803	1.0000	1.0000	1.0000	1.0000
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	2.7032	1.0000	0.9407	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	2.0256	1.0000	1.0000	1.0000
18	1.0000	1.0000	1.0000	0.6419	1.0000	1.0000	1.0000	0.7855	1.0000	1.2231	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	8.3996	1.0000	1.0000
19	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
20	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.2500		Max	12.0000		Ave	1.1132		Std dev	0.7794		Count	400						

Final TPAF and COAF values **Sim Yr: 1994**

HBO TPAF mctf_hbo.asc

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	dc cr	dcncr	mtg	pg	arlcr	arlnc	alx	ffx	ldn	pw	frd	how	aa	chs	carrl	ca/sm	s. va	fauq	w. va	ext
1	0.8867	1.0258	0.2674	1.0000	1.0000	0.6180	2.4696	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	0.7205	1.3610	0.6442	0.3235	0.5145	0.6153	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	1.4792	0.8370	0.2571	1.0000	1.0000	0.7881	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	0.6983	0.2629	0.9887	0.3407	1.0000	1.0545	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5	1.0000	1.5910	1.0000	1.0000	1.0000	0.7401	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6	1.1299	1.1003	1.0000	1.0000	1.1897	0.2839	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7	0.8967	1.2302	0.8460	1.0000	7.2040	1.0000	0.6734	0.6262	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
8	1.6943	1.3461	1.0000	1.0000	1.0000	0.5450	1.0000	0.2605	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	5.1966	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.0000	2.7613	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
13	1.0000	1.0000	1.0000	3.0890	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
16	12.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
18	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
19	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
20	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.2571		Max	12.0000		Ave	1.0514		Std dev	0.6931		Count	400						

HBO COAF mccf_hbo.asc

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	dc cr	dcncr	mtg	pg	arlcr	arlnc	alx	ffx	ldn	pw	frd	how	aa	chs	carrl	ca/sm	s. va	fauq	w. va	ext
1	2.0062	0.6492	1.8778	1.1898	1.0000	0.9704	0.7521	1.9444	1.0000	0.9401	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	0.8000	1.3098	0.7735	0.8157	0.8394	0.7846	1.0633	0.5423	0.8009	1.0000	1.0000	1.0000	1.0000	1.0000	0.7471	1.0000	1.0000	1.0000	1.0000	1.0000
3	0.4624	0.6104	1.2819	0.7270	1.0000	0.8462	1.0660	0.2534	1.0000	0.7823	0.7993	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	0.7589	0.8494	0.8966	1.2197	0.8494	0.8336	1.4286	0.2546	1.1214	1.5486	1.0000	1.0000	1.0000	1.4248	1.0000	0.8163	1.0000	1.0000	1.0000	1.0000
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.1946	1.0329	1.9216	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6	0.4078	0.6356	0.9188	0.8558	0.3079	1.3815	0.8064	0.7421	0.8378	0.8362	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7	0.9024	1.1788	0.5377	1.5274	0.3937	0.6635	1.4017	0.5454	0.8241	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
8	0.7000	0.8684	0.7181	0.8001	0.8433	1.0325	0.7517	1.1681	0.6000	1.1339	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0984	1.0000	1.0000	1.0000
9	0.8257	0.7883	0.5582	0.8411	1.0000	2.5452	0.8064	0.8240	1.7623	1.1709	1.3540	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	5.3836	1.0000	1.0000
10	0.8227	0.9968	0.7322	0.7891	1.0000	0.8208	1.5562	0.8414	0.9508	1.6214	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.3173	0.6189	1.0000	1.0000
11	0.5384	1.0000	0.4902	0.9359	1.0000	1.0000	1.0000	0.7898	0.7832	1.0000	2.0860	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.0444	1.2450	1.0000	1.0000	1.0000	0.8062	1.0000	1.0000	1.0000	7.2328	0.6091	1.0000	0.7446	1.0000	1.0000	1.0000	1.0000	1.0000
13	1.0000	1.0000	0.9441	0.9410	1.0000	1.0000	1.0000	1.4799	1.0000	1.0000	1.0000	0.4375	1.7183	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
14	1.1887	1.4958	0.7891	0.6222	1.0000	0.8329	0.7907	0.7937	1.0000	1.0000	1.0000	1.0000	1.0000	8.6164	1.0000	0.8134	1.0000	1.0000	1.0000	1.0000
15	1.0000	1.0000	0.7813	0.9228	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.4333	0.7915	1.0000	12.0000	1.0000	1.0000	1.0000	1.0000	1.0000
16	0.8113	0.7950	1.5050	0.6376	1.0000	0.8466	1.0000	1.2878	1.3959	1.0000	1.0000	1.0000	1.0000	0.8985	1.0000	1.6039	1.0000	1.0000	1.0000	1.0000
17	1.0000	1.0000	1.0000	0.7727	1.0000	0.8080	1.0000	0.5534	1.0000	0.8765	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	12.0000	1.5760	1.0000	1.0000
18	1.0000	1.0000	1.0000	1.0000	1.0000	0.8125	1.0000	0.3201	0.3815	0.7257	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.5751	12.0000	1.0000	1.0000
19	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
20	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.2534		Max	12.0000		Ave	1.1100		Std dev	1.1144		Count	400						

Final TPAF and COAF values **Sim Yr: 1994**

NHB TPAF mctf_nhb.asc

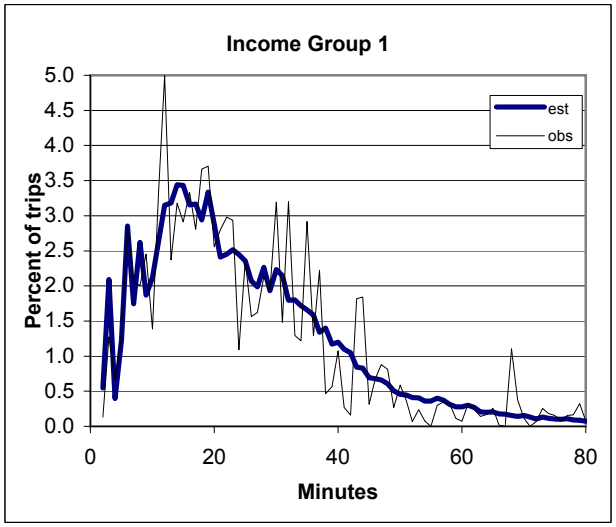
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	dc cr	dcncr	mtg	pg	arlcr	arlnc	alx	ffx	ldn	pw	frd	how	aa	chs	carrl	ca/sm	s. va	fauq	w. va	ext
1	0.6334	0.8832	0.9808	1.3909	1.7413	0.6552	0.3434	1.6976	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	0.3911	0.4685	0.2539	0.8552	0.3324	0.5383	0.5674	0.2988	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	0.5759	0.2650	0.2500	0.6848	0.3790	0.3535	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	0.5924	0.6880	0.4413	0.2500	1.0000	0.3430	1.0000	1.5155	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5	0.6848	0.4037	0.4434	1.0000	1.0000	0.3990	1.0236	0.6784	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6	0.5007	0.6976	0.4146	0.6720	0.3931	0.2500	1.0000	1.1083	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7	0.2500	0.5416	1.0000	1.0000	0.7561	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
8	0.7374	0.2500	1.0000	1.9604	0.3673	0.6417	1.0000	0.2500	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10	5.8414	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.2482	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
16	7.5389	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
18	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
19	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
20	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.2500		Max	7.5389		Ave	0.9836		Std dev	0.4502		Count	400						

NHB COAF mccf_nhb.asc

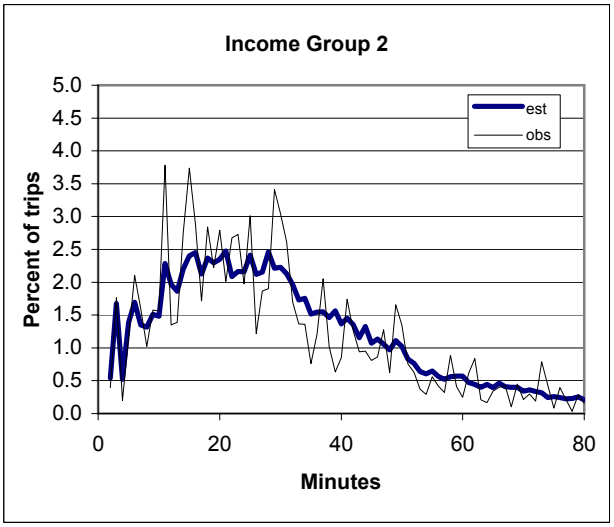
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	dc cr	dcncr	mtg	pg	arlcr	arlnc	alx	ffx	ldn	pw	frd	how	aa	chs	carrl	ca/sm	s. va	fauq	w. va	ext
1	1.5000	1.0000	0.8167	0.6473	0.6725	0.6161	1.0718	0.6723	1.0771	1.1751	0.7384	1.0000	1.0000	1.2352	1.0000	0.4537	10.8608	1.0000	1.0000	1.0000
2	1.0000	1.1283	0.5672	0.5742	0.7845	0.2838	0.6740	0.3350	0.8160	0.7586	0.7017	1.0000	1.0000	1.0689	1.0000	0.6680	1.0000	1.0000	1.0000	1.0000
3	0.8213	0.5668	1.0453	0.5353	0.7886	0.2500	0.7801	0.3603	1.1131	0.4074	0.7771	1.0000	1.0000	0.8502	1.0000	0.7472	1.0000	1.0000	1.0000	1.0000
4	0.6488	0.5749	0.5340	0.8444	0.7829	0.2500	0.3928	0.5346	0.7719	1.0000	0.7788	1.0000	1.0000	0.3643	1.0000	1.1315	1.0000	1.0000	1.0000	1.0000
5	0.6734	0.7983	0.7960	0.7732	2.4356	0.8963	0.7932	1.2891	0.8171	1.4814	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6	0.6174	0.2831	0.2500	0.2500	0.9071	0.9173	0.4038	0.7782	0.2500	0.5393	0.7926	1.0000	1.0000	1.5053	1.0000	0.7086	1.0000	1.0000	1.0000	1.0000
7	1.0731	0.6697	0.7813	0.3883	0.7970	0.3987	1.0518	0.8724	0.7310	0.7602	1.0000	1.0000	1.0000	0.7002	1.0000	1.0000	0.7473	1.0000	1.0000	1.0000
8	0.6726	0.3377	0.3617	0.5313	1.3043	0.7817	0.8729	0.7813	0.2500	0.6950	0.6910	1.0000	1.0000	0.2818	1.0000	1.0000	0.2500	0.9021	1.0000	1.0000
9	1.1298	0.8057	1.1126	0.7386	0.7654	0.2500	0.7800	0.2503	0.8984	1.4082	0.7412	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.7246	1.0000	1.0000
10	1.1650	0.7607	0.4172	1.0000	1.4827	0.5439	0.7595	0.6933	1.4136	1.4326	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.3381	0.7140	1.0000	1.0000
11	0.7333	0.7707	0.7725	0.7553	1.0000	0.7346	0.7858	0.7509	0.7373	1.0000	1.6310	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
14	1.2497	0.9953	0.7477	0.3632	1.0000	1.5320	0.7767	0.3353	1.0000	1.0000	1.0000	1.0000	1.0000	2.1464	1.0000	1.8037	1.0000	1.0000	1.0000	1.0000
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
16	0.4410	0.7342	0.7403	1.1239	1.0000	0.7060	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.7974	1.0000	1.1071	1.0000	1.0000	1.0000	1.0000
17	8.7250	1.0000	1.0000	1.0000	1.0000	1.0000	0.7288	0.2500	1.0000	0.3362	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.1221	1.0000	1.0000	1.0000
18	1.9515	0.7547	1.0000	1.0000	1.0000	1.0000	1.0000	0.9666	0.7423	0.7134	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	2.0518	1.0000	1.0000
19	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
20	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.2500		Max	10.8608		Ave	0.9728		Std dev	0.6913		Count	400						

Appendix F
Trip Length Frequency (TLFs) Summaries

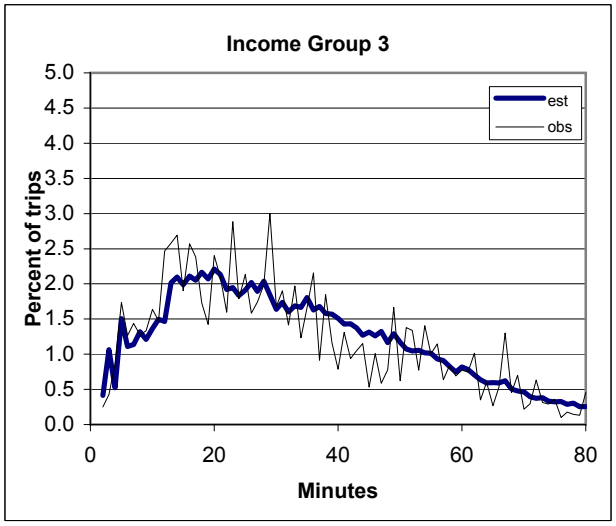
Estimated and Observed Trip Length Frequency Distributions, by Income Strata
Internal Trips, HBW
Impedance Measure: Composite Time (Highway and Transit) in Minutes



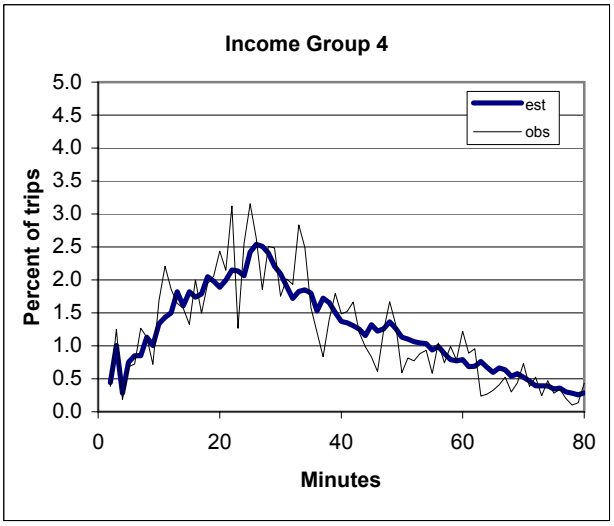
Mean trip length (minutes)
Est 24.63
Obs 25.04



Mean trip length (minutes)
Est 30.91
Obs 29.98



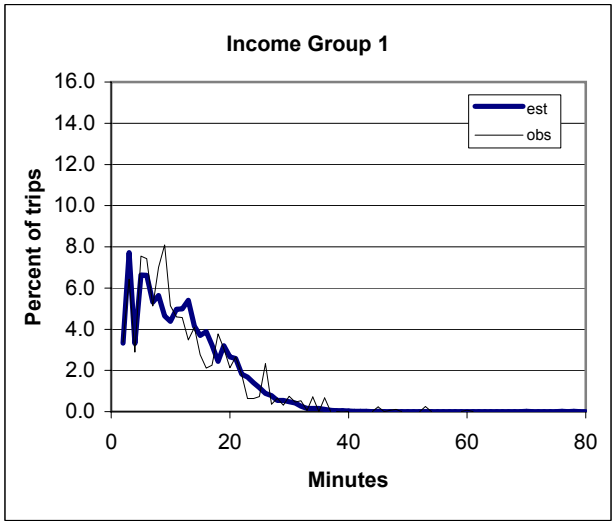
Mean trip length (minutes)
Est 34.42
Obs 33.72



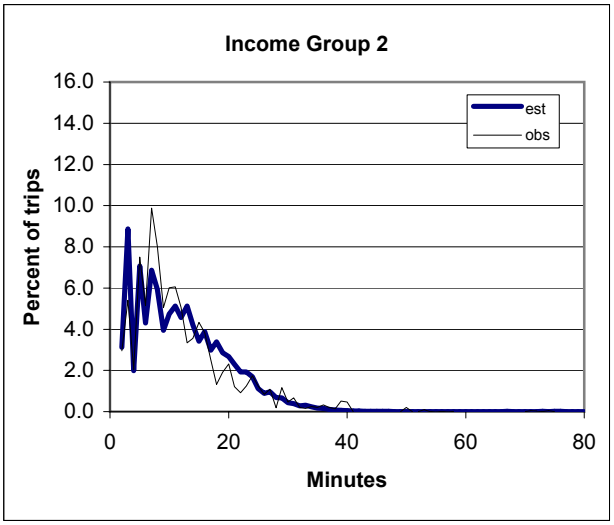
Mean trip length (minutes)
Est 35.31
Obs 34.28

Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Time includes terminal time.
- Intrazonal impedance = one-half the lowest interzonal time or distance.
- Includes only trips within the 1994 Household Travel Survey area.
- Calibration subdirectory, cmptlfci.rpt.
- Last time interval is "80 or more" minutes.

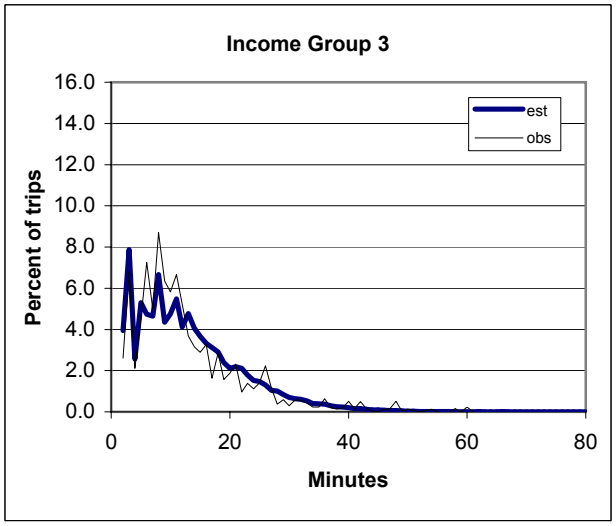
Estimated and Observed Trip Length Frequency Distributions, by Income Strata
Internal Trips, HBS
Impedance Measure: Composite Time (Highway and Transit) in Minutes



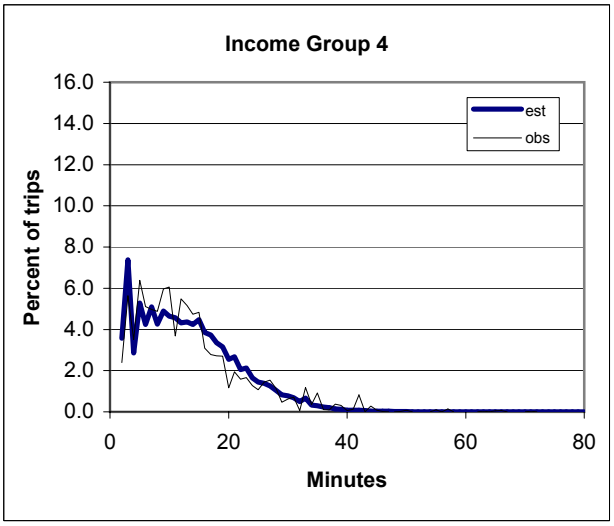
Mean trip length (minutes)
Est 11.82
Obs 11.68



Mean trip length (minutes)
Est 12.03
Obs 11.78



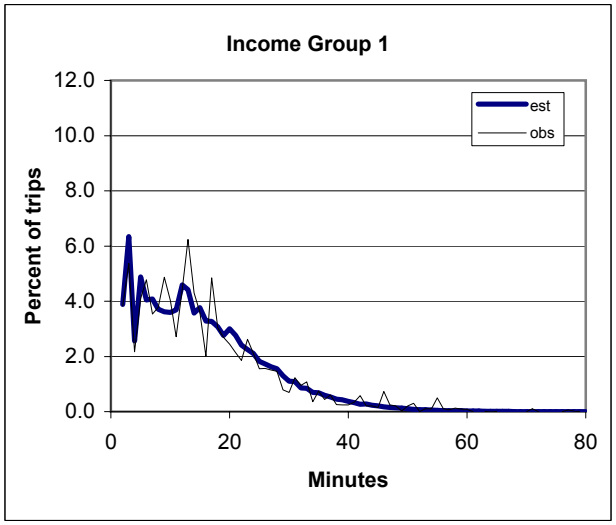
Mean trip length (minutes)
Est 12.99
Obs 12.80



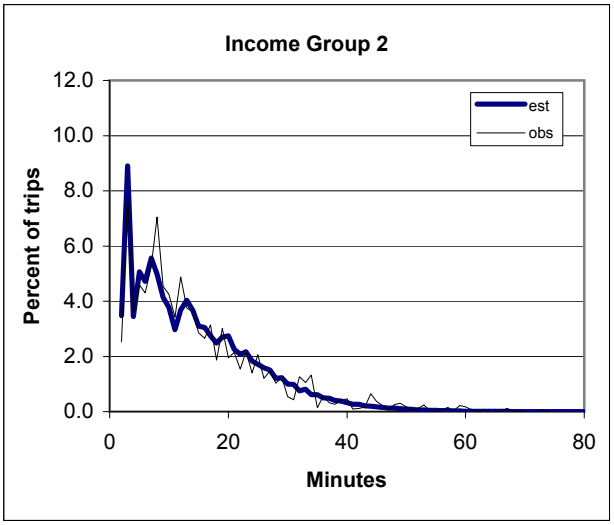
Mean trip length (minutes)
Est 13.07
Obs 13.14

Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Time includes terminal time.
- Intrazonal impedance = one-half the lowest interzonal time or distance.
- Includes only trips within the 1994 Household Travel Survey area.
- Calibration subdirectory, cmptlfci.rpt.
- Last time interval is "80 or more" minutes.

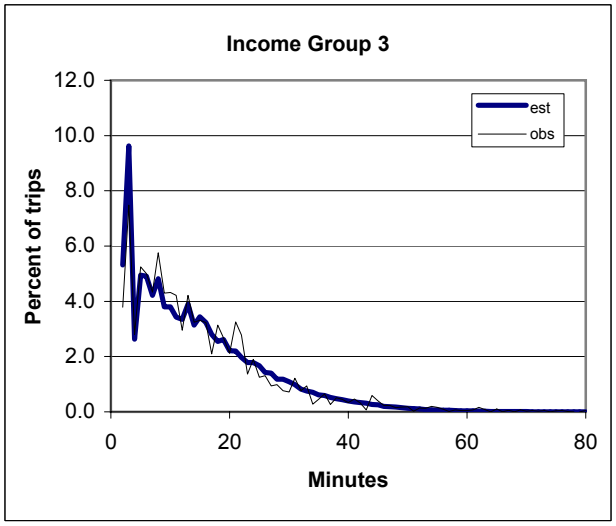
Estimated and Observed Trip Length Frequency Distributions, by Income Strata
Internal Trips, HBO
Impedance Measure: Composite Time (Highway and Transit) in Minutes



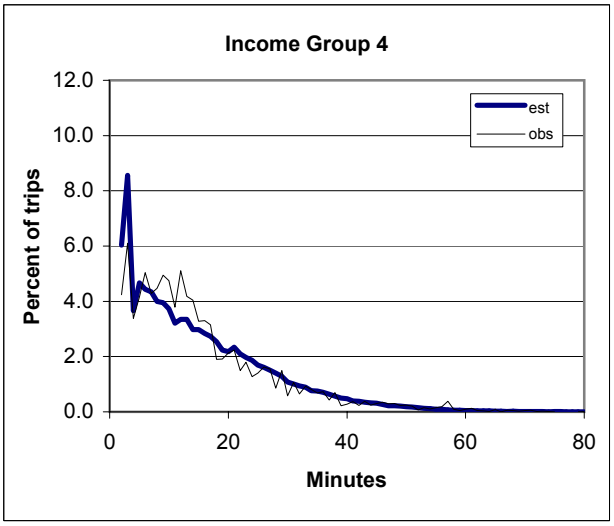
Mean trip length (minutes)
Est 15.15
Obs 15.74



Mean trip length (minutes)
Est 14.04
Obs 14.63



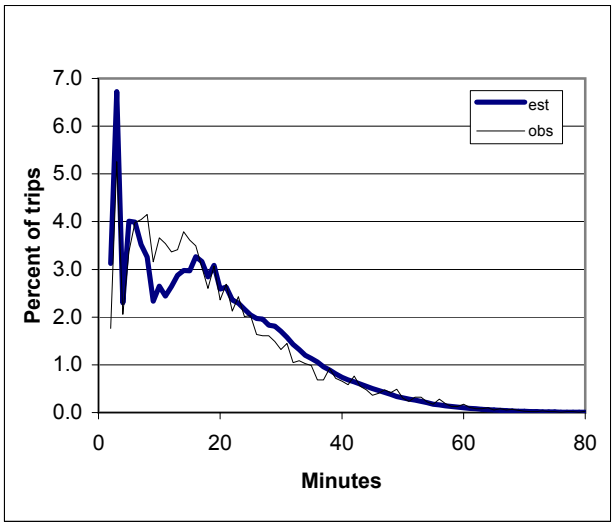
Mean trip length (minutes)
Est 14.25
Obs 14.86



Mean trip length (minutes)
Est 14.92
Obs 15.22

Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Time includes terminal time.
- Intrazonal impedance = one-half the lowest interzonal time or distance.
- Includes only trips within the 1994 Household Travel Survey area.
- Calibration subdirectory, cmptlfci.rpt.
- Last time interval is "80 or more" minutes.

Estimated and Observed Trip Length Frequency Distributions, by Income Strata
Internal Trips, NHB
Impedance Measure: Composite Time (Highway and Transit) in Minutes

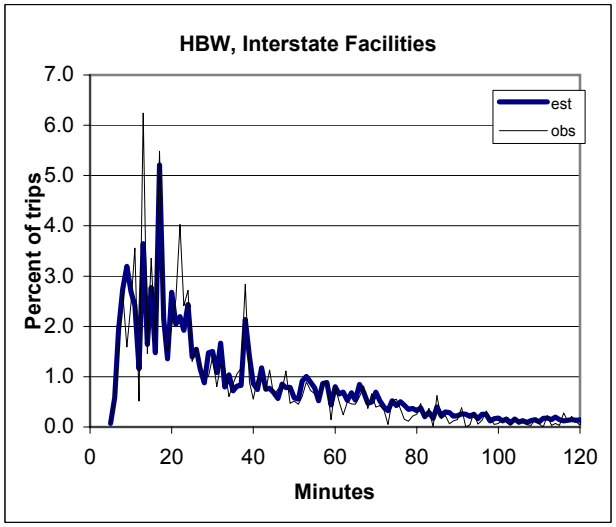


Mean trip length (minutes)

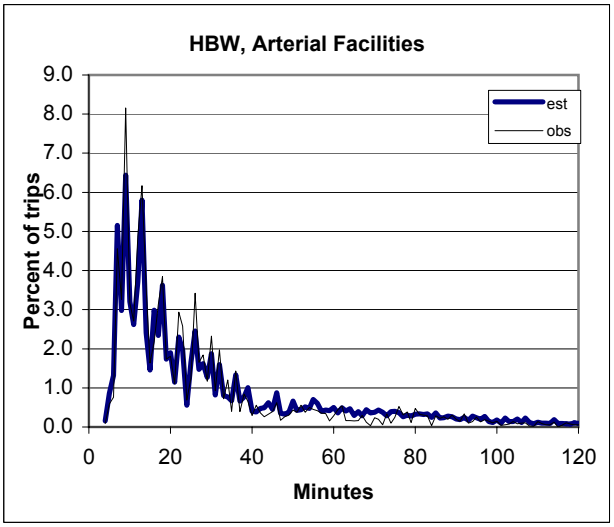
Est	18.48
Obs	18.41

Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Time includes terminal time.
- Intrazonal impedance = one-half the lowest interzonal time or distance.
- Includes only trips within the 1994 Household Travel Survey area.
- Calibration subdirectory, cmptlfci.rpt.
- Last time interval is "80 or more" minutes.

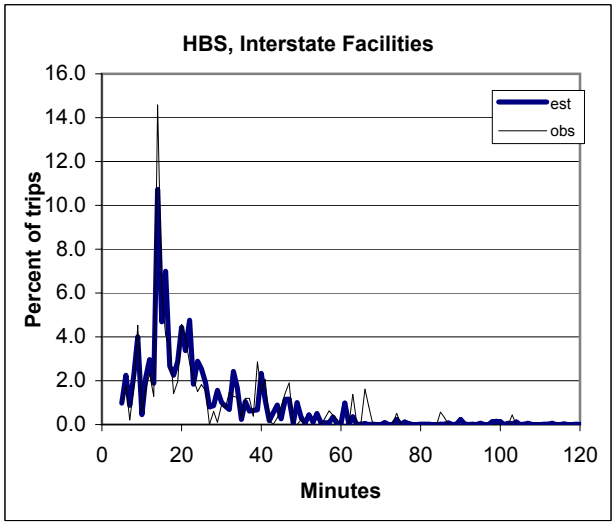
Est. and Obs. Trip Length Frequency Distributions, by Purpose and Facility Type
External Trips
Impedance Measure: Highway Time in Minutes



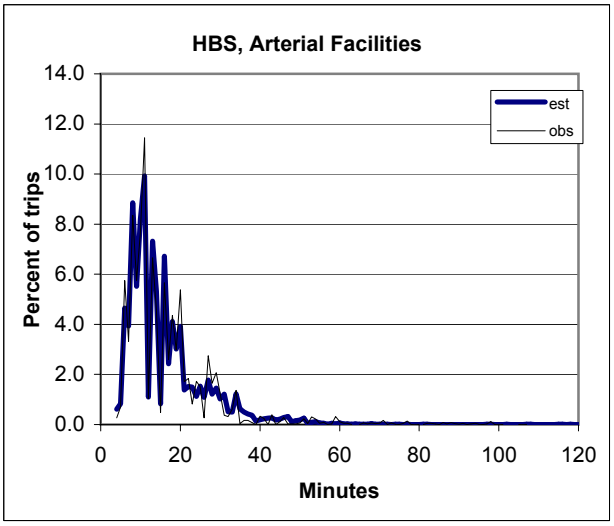
Mean trip length (minutes)
Est 37.97
Obs 36.33



Mean trip length (minutes)
Est 31.99
Obs 28.93



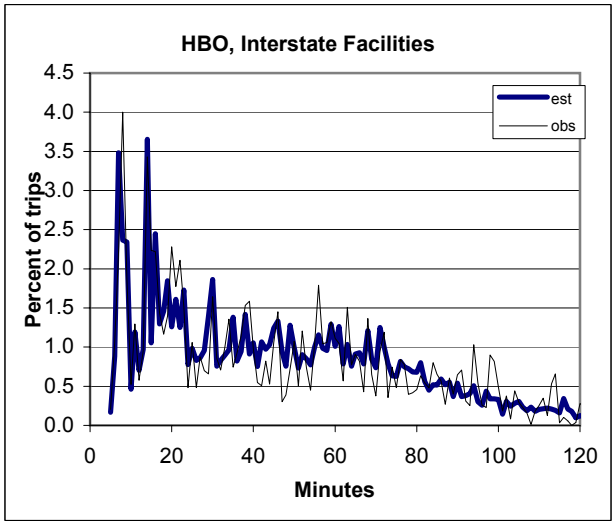
Mean trip length (minutes)
Est 22.87
Obs 23.45



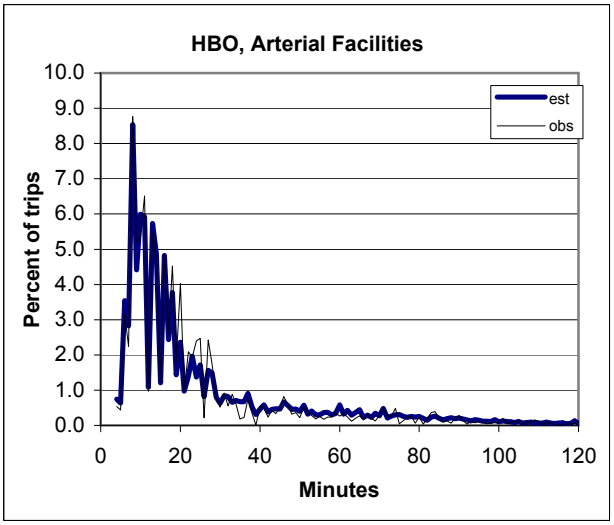
Mean trip length (minutes)
Est 15.94
Obs 16.43

Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Time includes terminal time at attraction end.
- Includes all external trips.
- Calibration subdirectory, cmptlfcx.rpt.

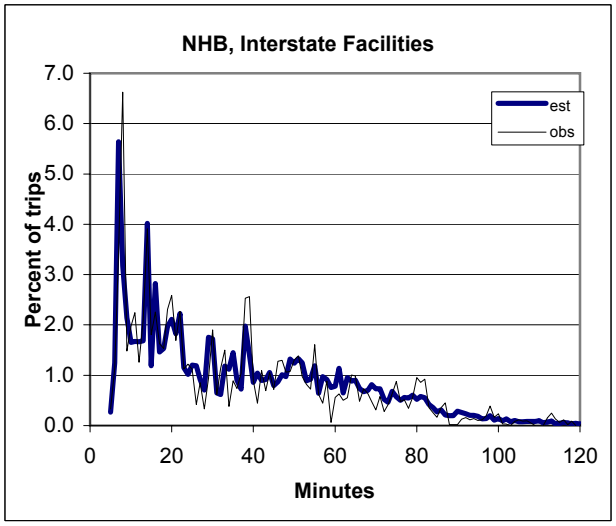
Est. and Obs. Trip Length Frequency Distributions, by Purpose and Facility Type
External Trips
Impedance Measure: Highway Time in Minutes



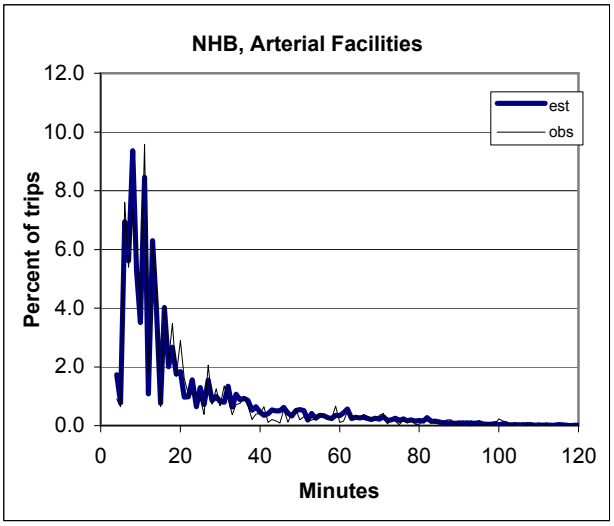
Mean trip length (minutes)
Est 46.11
Obs 46.86



Mean trip length (minutes)
Est 26.34
Obs 24.88



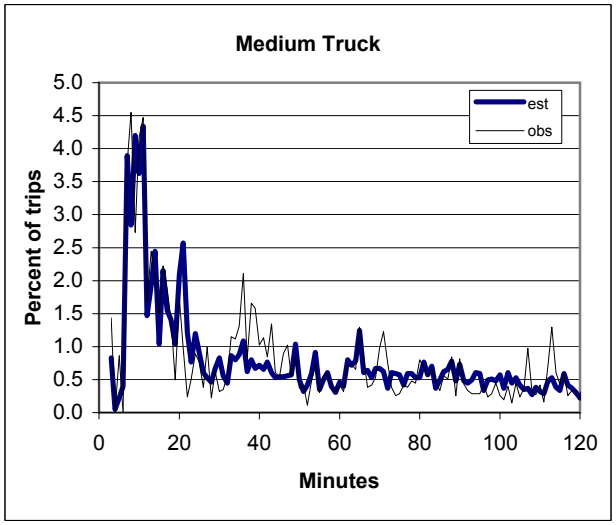
Mean trip length (minutes)
Est 37.18
Obs 36.96



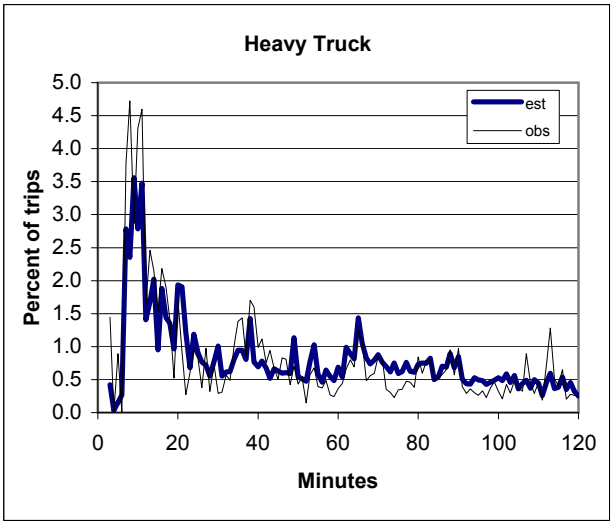
Mean trip length (minutes)
Est 21.81
Obs 21.65

Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Time includes terminal time at attraction end.
- Includes all external trips.
- Calibration subdirectory, cmptlfcx.rpt.

Est. and Obs. Trip Length Frequency Distributions, by Purpose and Facility Type
External Trips
Impedance Measure: Highway Time in Minutes



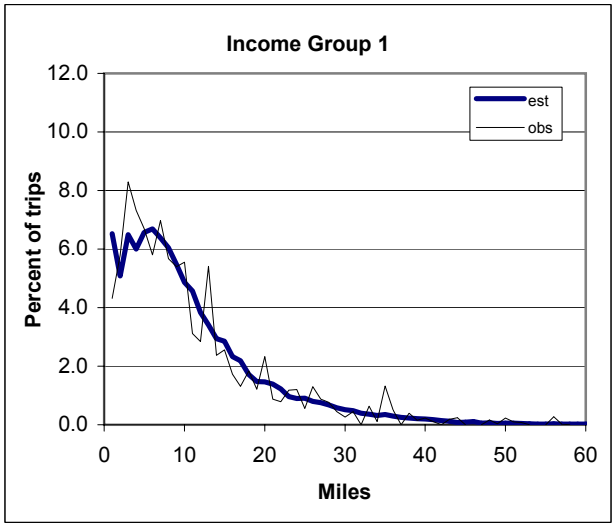
Mean trip length (minutes)
Est 48.08
Obs 45.35



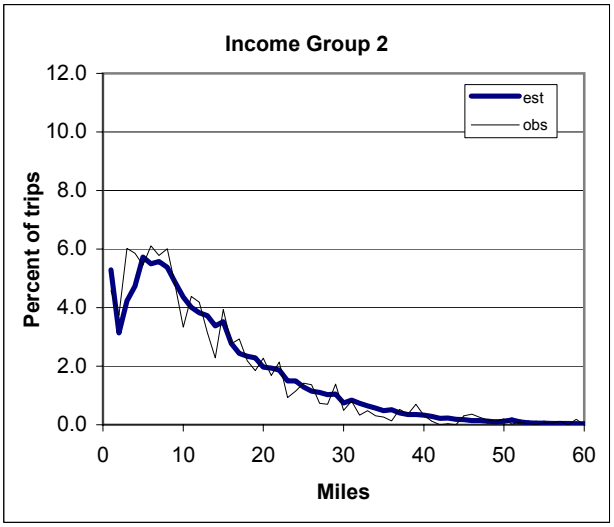
Mean trip length (minutes)
Est 50.66
Obs 45.89

Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Time includes terminal time at attraction end.
- Includes all external trips.
- Calibration subdirectory, cmptlfcx.rpt.

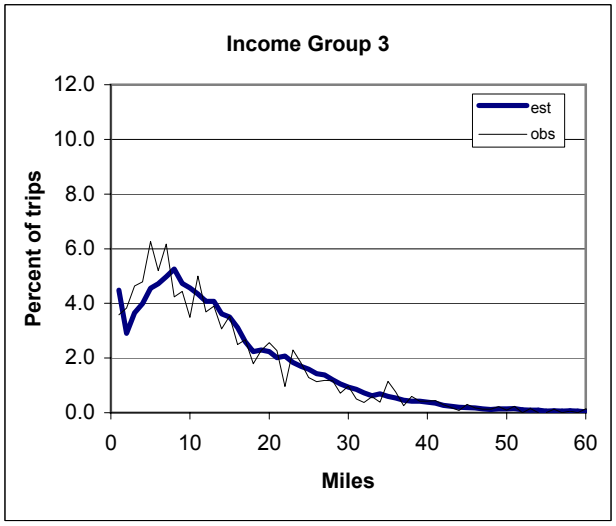
Estimated and Observed Trip Length Frequency Distributions, by Income Strata
Internal Trips, HBW
Impedance Measure: Highway Distance in Miles *



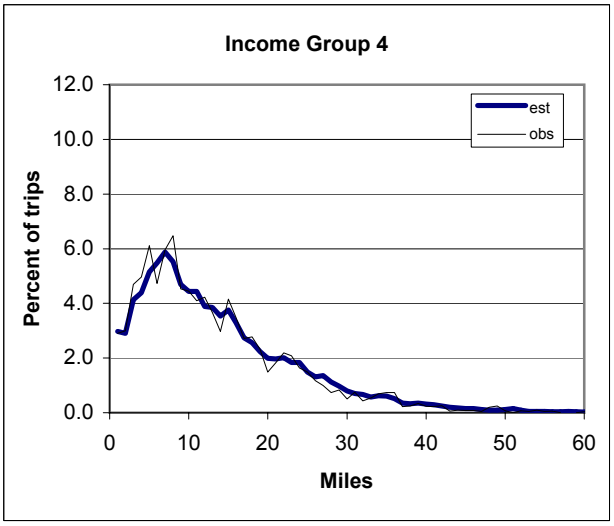
Mean trip length (miles)
Est 10.48
Obs 10.58



Mean trip length (miles)
Est 13.08
Obs 12.29



Mean trip length (miles)
Est 14.12
Obs 13.52

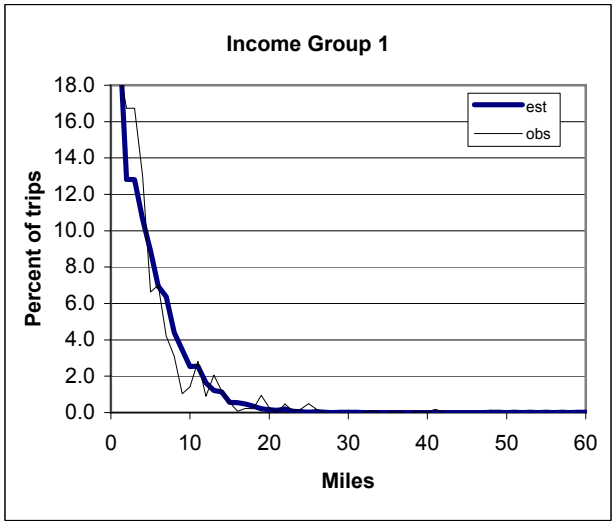


Mean trip length (miles)
Est 13.53
Obs 12.97

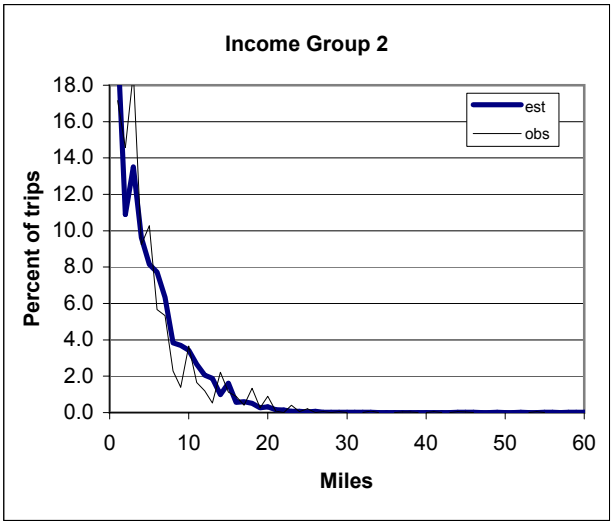
Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Intrazonal trips are not reflected.
- Includes only trips within the 1994 Household Travel Survey area.
- Calibration subdirectory, cmptlfdi.rpt.

* AM peak period highway distance is used for HBW. Off-peak highway distance is used for HBS, HBO, and NHB.

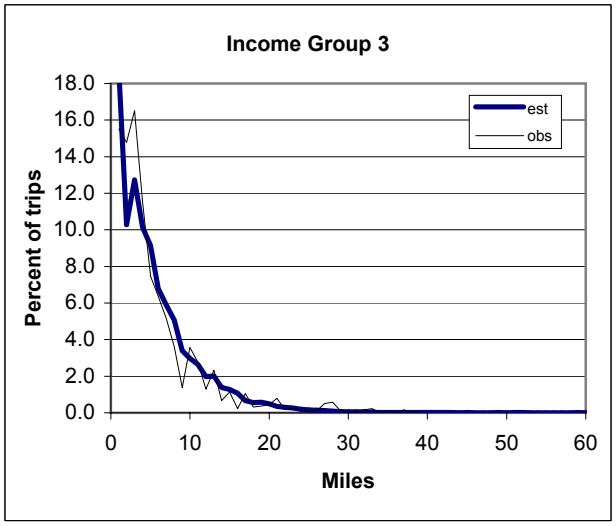
Estimated and Observed Trip Length Frequency Distributions, by Income Strata
Internal Trips, HBS
Impedance Measure: Highway Distance in Miles *



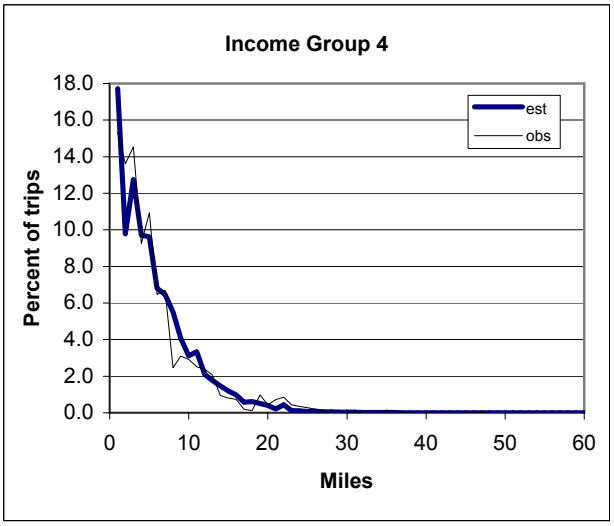
Mean trip length (miles)
Est 4.58
Obs 4.40



Mean trip length (miles)
Est 4.94
Obs 4.69



Mean trip length (miles)
Est 5.39
Obs 5.20

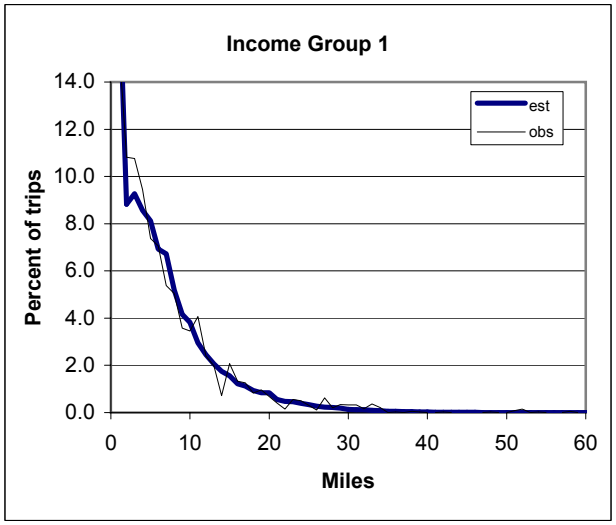


Mean trip length (miles)
Est 5.33
Obs 5.32

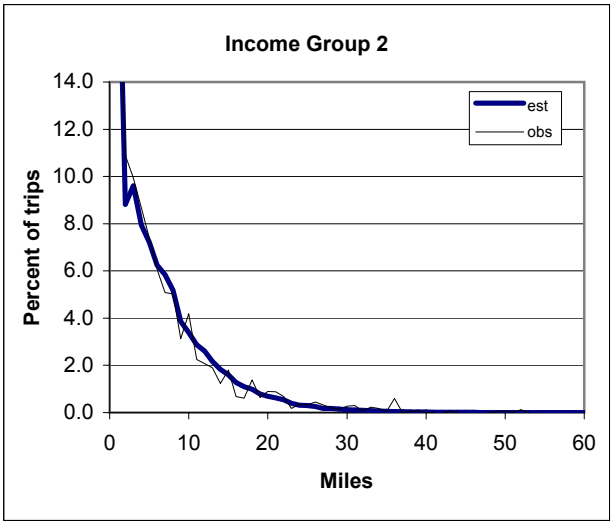
Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Intrazonal trips are not reflected.
- Includes only trips within the 1994 Household Travel Survey area.
- Calibration subdirectory, cmptlfdi.rpt.

* AM peak period highway distance is used for HBW. Off-peak highway distance is used for HBS, HBO, and NHB.

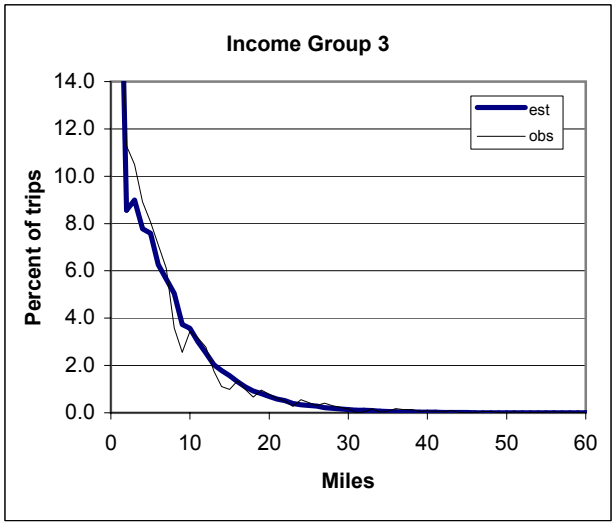
Estimated and Observed Trip Length Frequency Distributions, by Income Strata
Internal Trips, HBO
Impedance Measure: Highway Distance in Miles *



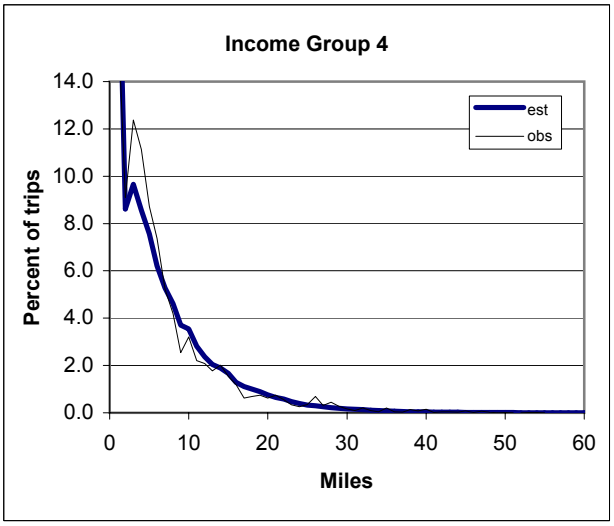
Mean trip length (miles)
Est 6.31
Obs 6.61



Mean trip length (miles)
Est 6.02
Obs 6.33



Mean trip length (miles)
Est 6.01
Obs 6.30

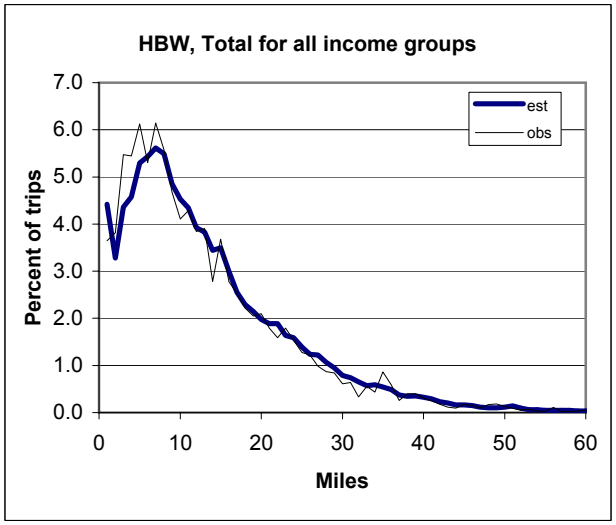


Mean trip length (miles)
Est 6.22
Obs 6.31

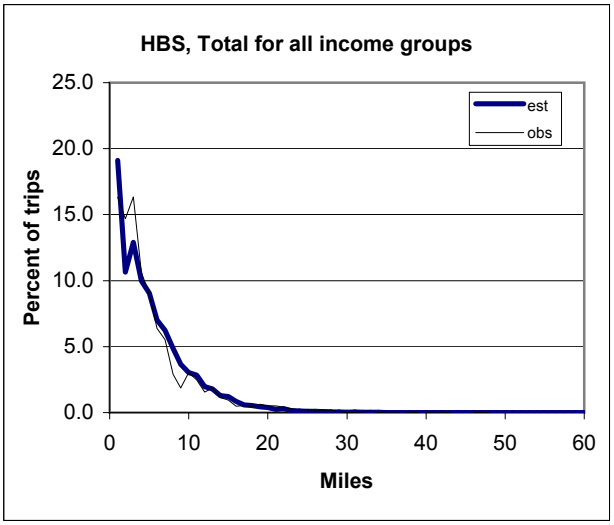
Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Intrazonal trips are not reflected.
- Includes only trips within the 1994 Household Travel Survey area.
- Calibration subdirectory, cmptlfdi.rpt.

* AM peak period highway distance is used for HBW. Off-peak highway distance is used for HBS, HBO, and NHB.

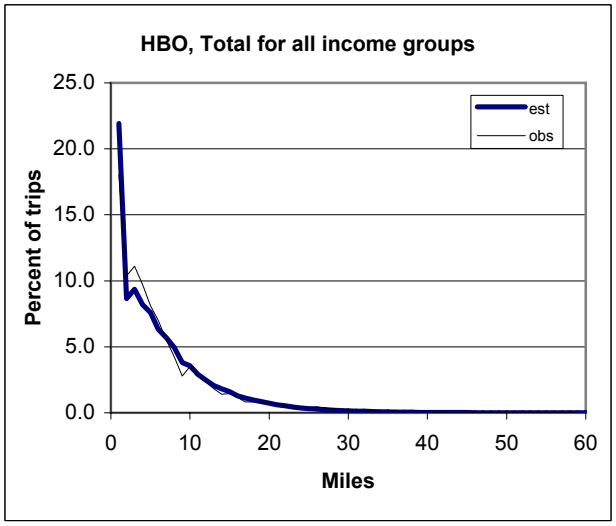
Estimated and Observed Trip Length Frequency Distributions, by Trip Purpose
Internal Trips
Impedance Measure: Highway Distance in Miles *



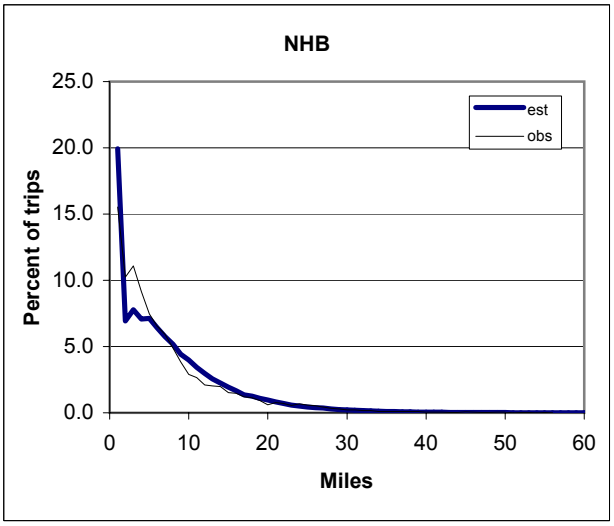
Mean trip length (miles)
Est 13.16
Obs 12.65



Mean trip length (miles)
Est 5.15
Obs 5.01



Mean trip length (miles)
Est 6.13
Obs 6.35



Mean trip length (miles)
Est 7.11
Obs 6.95

Notes:
- Observed trips are from the 1994 Household Travel Survey
- Estimated trips are based on simulated productions and attractions.
- Intrazonal trips are not reflected.
- Includes only trips within the 1994 Household Travel Survey area.
- Calibration subdirectory, cmptlfdi.rpt.

* AM peak period highway distance is used for HBW. Off-peak highway distance is used for HBS, HBO, and NHB.

Appendix G
Trip Generation Adjustment Factors by Income Group

HBW Trip Generation Adjustment Factors by Income Group

Superdistrict Number	Superdistrict Area	Production				Attraction			
		Income 1	Income 2	Income 3	Income 4	Income 1	Income 2	Income 3	Income 4
1	DC core	1.51	1.00	1.00	2.85	1.14	1.00	1.05	1.08
2	DC ncore NW	1.00	1.00	1.00	2.82	1.84	1.00	1.00	1.00
3	DC ncore NE	1.00	0.58	1.00	1.65	1.58	1.00	0.59	0.51
4	DC ncore SW	0.61	0.40	1.00	1.42	1.27	1.29	1.27	1.35
5	Mtg. IBelt W.	1.00	1.00	1.00	0.91	1.00	0.80	0.72	0.87
6	Mtg. IBelt E.	1.00	0.50	1.54	2.02	1.00	1.00	0.37	1.00
7	Mtg. OBelt W.	1.00	0.64	1.00	1.00	0.51	1.00	1.00	1.00
8	Mtg. OBelt E.	1.00	0.63	0.92	0.95	0.54	0.67	0.87	0.83
9	Mtg. OBelt N.	0.61	1.27	1.63	1.34	0.38	0.61	0.68	1.00
10	PG IBelt N.	0.71	0.81	1.00	1.00	1.00	1.00	1.00	0.54
11	PG IBelt S.	1.32	0.68	1.00	1.00	1.00	1.28	0.43	0.54
12	PG OBelt N.	1.17	1.58	1.35	0.77	1.00	0.80	1.00	0.61
13	PG OBelt S.	1.11	1.00	1.49	1.00	1.27	1.00	1.00	1.00
14	Frederick	0.75	1.00	1.46	1.00	1.00	1.30	1.24	1.00
15	Carroll	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	Howard	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
17	Anne Arundel	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	Calvert	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
19	Chs/StM	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	Arl. core	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.54
21	Arl. ncore S.	1.00	0.66	1.00	1.00	0.37	1.44	1.33	1.18
22	Arl. ncore N.	1.77	1.00	1.22	1.89	1.00	1.00	1.00	1.32
23	Alexandria	1.37	0.71	1.25	1.64	1.00	1.00	1.00	1.00
24	FFX IBelt S.	1.00	0.70	0.81	1.00	1.00	1.00	0.71	1.00
25	FFX IBelt N.	1.00	1.00	0.41	1.00	1.00	1.00	1.00	2.03
26	FFX OBelt S.	0.75	0.78	1.28	1.25	1.00	1.00	1.00	1.36
27	FFX OBelt N.	1.82	0.78	1.13	1.19	0.83	0.78	0.86	1.24
28	Loudoun E.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.91
29	Loudoun W.	2.47	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	PW S.	1.00	1.00	1.14	1.24	1.00	1.00	1.00	1.00
31	PW N.	1.00	1.00	0.53	1.00	0.30	1.00	0.44	0.67
32	Stafford	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
33	Fauquier	1.00	0.59	1.00	1.00	1.00	1.00	1.00	1.00
34	Clk./Jeff.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
35	Spots./Frbg.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	KGeo.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
37	Ext./Unused	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HBS Trip Generation Adjustment Factors by Income Group

Superdistrict Number	Superdistrict Area	Production				Attraction			
		Income 1	Income 2	Income 3	Income 4	Income 1	Income 2	Income 3	Income 4
1	DC core	0.32	0.29	1.00	1.00	1.00	1.00	0.60	0.39
2	DC ncore NW	1.08	0.71	1.15	2.08	1.00	1.00	1.00	2.04
3	DC ncore NE	0.76	0.52	1.00	1.00	1.00	0.34	0.29	0.12
4	DC ncore SW	1.00	0.34	0.50	1.00	1.00	1.00	0.39	0.43
5	Mtg. IBelt W.	2.31	1.00	2.01	1.00	1.00	1.00	1.00	2.29
6	Mtg. IBelt E.	1.00	1.00	3.09	1.00	1.00	1.00	1.00	1.00
7	Mtg. OBelt W.	1.00	1.00	1.00	1.00	1.00	1.00	1.47	1.97
8	Mtg. OBelt E.	1.93	0.57	1.47	1.00	1.59	0.64	1.53	1.27
9	Mtg. OBelt N.	1.73	1.96	1.55	1.00	1.43	2.27	1.37	1.00
10	PG IBelt N.	1.00	1.00	1.00	1.00	1.60	1.00	0.63	0.35
11	PG IBelt S.	0.69	0.56	1.00	0.10	1.00	1.00	0.62	0.13
12	PG OBelt N.	1.49	1.88	1.53	0.75	1.00	2.18	1.00	1.00
13	PG OBelt S.	1.00	0.65	1.68	1.00	1.00	1.00	1.56	0.50
14	Frederick	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00
15	Carroll	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	Howard	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
17	Anne Arundel	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	Calvert	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
19	Chs/StM	1.00	1.00	1.00	1.00	1.00	0.67	1.00	1.00
20	Arl. core	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
21	Arl. ncore S.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00
22	Arl. ncore N.	1.00	1.00	1.00	1.00	2.10	2.55	1.36	2.48
23	Alexandria	1.00	1.00	1.00	1.56	1.00	1.00	1.00	1.00
24	FFX IBelt S.	1.00	1.00	1.00	1.00	1.00	1.00	0.65	0.78
25	FFX IBelt N.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	FFX OBelt S.	0.40	1.00	1.73	1.03	0.47	1.00	1.42	1.54
27	FFX OBelt N.	1.00	1.00	1.74	1.54	0.44	0.82	1.00	1.49
28	Loudoun E.	1.00	0.72	1.00	1.00	1.00	1.00	1.00	1.00
29	Loudoun W.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	PW S.	0.37	1.00	1.54	1.36	0.31	1.00	1.53	1.00
31	PW N.	1.00	1.00	1.00	1.00	1.00	1.00	0.62	0.68
32	Stafford	1.00	1.00	1.00	1.48	1.00	1.00	0.49	1.00
33	Fauquier	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
34	Clk./Jeff.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
35	Spots./Frbg.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	KGeo.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
37	Ext./Unused	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HBO Trip Generation Adjustment Factors by Income Group

Superdistrict Number	Superdistrict Area	Production				Attraction			
		Income 1	Income 2	Income 3	Income 4	Income 1	Income 2	Income 3	Income 4
1	DC core	1.00	0.38	0.49	0.67	1.07	0.63	0.62	0.76
2	DC ncore NW	1.00	1.00	1.45	2.95	1.29	1.68	1.10	1.76
3	DC ncore NE	1.00	0.61	1.00	1.00	1.88	1.19	0.50	0.44
4	DC ncore SW	1.00	0.33	1.00	1.00	1.51	1.00	0.51	0.34
5	Mtg. IBelt W.	1.00	1.46	1.40	1.00	1.00	1.16	1.81	1.91
6	Mtg. IBelt E.	1.00	1.00	1.00	1.00	1.00	1.00	0.86	0.78
7	Mtg. OBelt W.	1.00	0.65	1.00	1.48	1.00	1.00	0.73	1.61
8	Mtg. OBelt E.	1.35	0.49	1.20	1.00	1.00	0.72	1.17	1.10
9	Mtg. OBelt N.	1.00	1.42	1.98	1.00	1.00	1.55	1.67	1.33
10	PG IBelt N.	0.86	0.76	1.00	1.00	2.02	1.47	0.66	0.50
11	PG IBelt S.	0.81	0.57	1.00	0.35	1.00	1.00	0.69	0.27
12	PG OBelt N.	0.71	1.00	1.37	0.86	1.00	1.00	1.32	0.65
13	PG OBelt S.	1.00	1.08	1.54	0.67	1.36	1.31	1.28	0.70
14	Frederick	1.00	0.65	1.38	1.00	1.43	1.00	1.28	0.61
15	Carroll	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	Howard	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
17	Anne Arundel	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	Calvert	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
19	Chs/StM	1.00	0.82	1.00	1.00	1.00	1.41	1.14	0.76
20	Arl. core	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.68
21	Arl. ncore S.	1.00	0.48	1.00	1.88	1.00	1.00	0.61	0.85
22	Arl. ncore N.	3.22	0.70	1.00	1.68	2.35	1.00	1.00	1.83
23	Alexandria	1.00	0.50	1.00	1.00	0.50	1.00	1.15	0.89
24	FFX IBelt S.	1.00	0.41	1.00	1.33	1.55	1.00	1.00	1.20
25	FFX IBelt N.	1.00	1.00	0.38	1.00	1.00	1.00	1.00	1.88
26	FFX OBelt S.	1.00	0.45	1.24	1.00	0.49	0.59	1.13	1.35
27	FFX OBelt N.	1.00	0.72	1.10	1.21	0.57	0.64	0.82	1.69
28	Loudoun E.	1.00	1.00	0.70	1.00	1.00	1.00	1.00	1.55
29	Loudoun W.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	PW S.	1.00	0.63	1.00	1.39	1.00	1.00	1.00	1.00
31	PW N.	0.43	0.83	0.75	1.00	1.00	1.00	0.71	0.56
32	Stafford	1.00	0.69	0.74	1.00	1.00	1.00	1.00	0.72
33	Fauquier	0.42	1.00	0.68	1.00	1.00	1.00	0.57	0.55
34	Clk./Jeff.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
35	Spots./Frbg.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	KGeo.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
37	Ext./Unused	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

NHB Trip Generation Adjustment Factors by Income Group

Superdistrict Number	Superdistrict Area	Production				Attraction			
		Income 1	Income 2	Income 3	Income 4	Income 1	Income 2	Income 3	Income 4
1	DC core	1.06	1.00	1.00	1.00	1.06	1.00	1.00	1.00
2	DC ncore NW	1.11	1.00	1.00	1.00	1.11	1.00	1.00	1.00
3	DC ncore NE	0.74	1.00	1.00	1.00	0.74	1.00	1.00	1.00
4	DC ncore SW	0.65	1.00	1.00	1.00	0.65	1.00	1.00	1.00
5	Mtg. IBelt W.	1.08	1.00	1.00	1.00	1.08	1.00	1.00	1.00
6	Mtg. IBelt E.	0.78	1.00	1.00	1.00	0.78	1.00	1.00	1.00
7	Mtg. OBelt W.	1.25	1.00	1.00	1.00	1.25	1.00	1.00	1.00
8	Mtg. OBelt E.	1.14	1.00	1.00	1.00	1.14	1.00	1.00	1.00
9	Mtg. OBelt N.	1.34	1.00	1.00	1.00	1.34	1.00	1.00	1.00
10	PG IBelt N.	0.90	1.00	1.00	1.00	0.90	1.00	1.00	1.00
11	PG IBelt S.	0.69	1.00	1.00	1.00	0.69	1.00	1.00	1.00
12	PG OBelt N.	1.05	1.00	1.00	1.00	1.05	1.00	1.00	1.00
13	PG OBelt S.	1.22	1.00	1.00	1.00	1.22	1.00	1.00	1.00
14	Frederick	1.13	1.00	1.00	1.00	1.13	1.00	1.00	1.00
15	Carroll	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	Howard	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
17	Anne Arundel	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	Calvert	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
19	Chs/StM	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	Arl. core	0.76	1.00	1.00	1.00	0.76	1.00	1.00	1.00
21	Arl. ncore S.	0.88	1.00	1.00	1.00	0.88	1.00	1.00	1.00
22	Arl. ncore N.	1.35	1.00	1.00	1.00	1.35	1.00	1.00	1.00
23	Alexandria	1.10	1.00	1.00	1.00	1.10	1.00	1.00	1.00
24	FFX IBelt S.	1.07	1.00	1.00	1.00	1.07	1.00	1.00	1.00
25	FFX IBelt N.	1.24	1.00	1.00	1.00	1.24	1.00	1.00	1.00
26	FFX OBelt S.	1.04	1.00	1.00	1.00	1.04	1.00	1.00	1.00
27	FFX OBelt N.	1.07	1.00	1.00	1.00	1.07	1.00	1.00	1.00
28	Loudoun E.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
29	Loudoun W.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	PW S.	0.93	1.00	1.00	1.00	0.93	1.00	1.00	1.00
31	PW N.	1.10	1.00	1.00	1.00	1.10	1.00	1.00	1.00
32	Stafford	0.62	1.00	1.00	1.00	0.62	1.00	1.00	1.00
33	Fauquier	0.63	1.00	1.00	1.00	0.63	1.00	1.00	1.00
34	Clk./Jeff.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
35	Spots./Frbg.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	KGeo.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
37	Ext./Unused	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00