National Capital Region
Transportation Planning Board

MEMORANDUM

TO: Files

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SUBJECT: Transmittal Package: TPB Gen3/Ver. 1.1.0 Travel Demand Forecasting Model, Transportation Networks, and Land Use Data Associated with the Air Quality Conformity Analysis of Visualize 2050

DATE: April 21, 2026

PURPOSE

After six years of development, the National Capital Region Transportation Planning Board (TPB) Generation-3, or Gen3, Travel Demand Forecasting Model is now deemed ready for production use. Version 1.1.0 is the first production-use model in a new family of activity-based travel demand models developed under the Generation 3 framework. This memorandum documents a transmittal package for the Gen3/Version 1.1.0 Travel Demand Forecasting Model, as well as its associated input files.

TPB staff develop, maintain, and improve, with consultant assistance, a series of regional travel demand models that are used for the regional transportation planning process in the metropolitan Washington region. TPB currently offers two production-use versions of the TPB regional travel demand forecasting model: (1) **Gen2/Ver. 2.4.6 Travel Model** which is an aggregate, traditional four-step, trip-based travel demand forecasting model. It is the latest member of the Generation-2 (Gen2) Model family, which was originally calibrated and validated to year-2007 conditions,[1] and was later re-validated to year-2010, year-2014, and year-2018 conditions. The Gen2/Ver. 2.4.6 Travel Model includes model inputs associated with the air quality conformity (AQC) analysis of Visualize 2050, TPB's latest Long-Range Transportation Plan (LRTP)/Metropolitan Transportation Plan (MTP) for the National Capital Region, and the FY 2025-2028 Transportation Improvement Program (TIP), including the Visualize 2050 network inputs and Round 10.0 Cooperative Forecasts of Land Use. As of December 2025, the Gen2/Ver. 2.4.6 Travel Model has been officially adopted by the TPB as part of the AQC analysis of Visualize 2050; (2) **Gen3/Ver. 1.1.0 Travel Model** which is a disaggregate, activity-based travel demand forecasting model that was calibrated and validated to 2018 conditions.[2] The resident demand components of the model are developed primarily on the open-

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[1] Ronald Milone et al., "Calibration Report for the TPB Travel Forecasting Model, Version 2.3, on the 3,722-Zone Area System," Final Report (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, January 20, 2012), https://www.mwcog.org/assets/1/28/V2.3_Calibration_Report_v141.pdf

[2] See:
RSG and Baseline Mobility Group. "Gen3 Model Calibration and Validation Report." Final Report. Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, February 7, 2024. https://www.mwcog.org/assets/1/6/Gen3_Model_Calibration_and_Validation_Report.pdf

source ActivitySim platform, while the exogenous demand and supply components are developed using the proprietary Bentley Cube software. Like its Gen2 predecessors, the Gen3 Travel Demand Forecasting Model covers a modeled area of 6,800 square miles and 3,722 Transportation Analysis Zones (TAZs). The Gen3/Version 1.1.0 Model is documented in a travel model user's guide included in this transmittal.[3] The Gen3 Model has not been officially adopted by the TPB as a production-use model as part of an LRTP/MTP analysis. Instead, it is deemed ready for production use based on staff evaluation. TPB staff anticipate transitioning to the Gen3 Model to support future regional transportation planning efforts.

Compared to the Gen2 Model family, the Gen3 Model has both its strengths and challenges:

Strengths:

- The Gen3 Model is a tour-based model, which maintains continuity of information across chains of trips.
- The Gen3 Model provides disaggregated demand outputs, making it better suited for certain types of studies, such as pricing studies and equity studies.
- The Gen3 Model explicitly models certain aspects of travel demand, such as telecommuting, transit subsidy and vehicle type choices, enabling in-depth policy analyses in those areas.
- The disaggregate demand data provided by the Gen3 Model can be used to feed a disaggregate supply model, such as a dynamic traffic assignment (DTA) in the future, when such models are more tractable.

Challenges:

- The Gen3 Model is more complex. It takes more time to develop (estimate, calibrate, validate) and is more difficult to debug when something goes wrong.
- The Gen3 Model requires more computing resources and can take longer to run, depending on the amount of parallel processing that is used.
- The Gen3 Model requires staff with higher levels of modeling and analysis skills.

The remainder of the memo includes the following:

1. Contents of the model transmittal package,
2. Notes on applying the model,
3. Control totals resulting from an application of the model in the 2018, 2025, 2026, 2030, 2040, 2045 and 2050 scenarios.

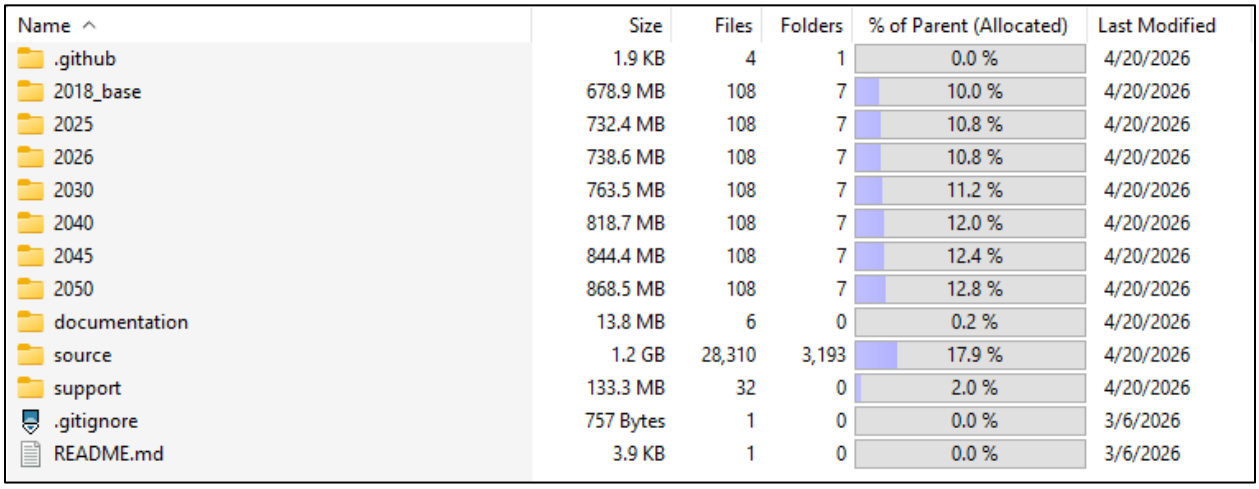
CONTENTS OF THE MODEL TRANSMITTAL PACKAGE

Model Files: This transmittal package contains model files for executing the Gen3/Version 1.1.0 Model and input data for seven analysis years: 2018, 2025, 2026, 2030, 2040, 2045 and 2050 (Visualize 2050). All the modeling files are organized in a structured subdirectory system shown in Figure *1*.

[3] "User's Guide, For the COG/TPB Gen3/Version 1.1.0 Travel Demand Forecasting Model (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, April 16, 2026), https://www.mwcog.org/assets/1/6/Gen3_Model_V1.1.0_Model_User_Guide_TPB_final.pdf

Figure 1 also displays the size, number of files, number of folders, and the last modified date for each folder. After receiving a Gen3 Model transmittal package from TPB staff, model users should verify these statistics to ensure that the download was completed properly.

Figure 1: Structured Subdirectory System in Gen3 Model



Name	Size	Files	Folders	% of Parent (Allocated)	Last Modified
.github	1.9 KB	4	1	0.0 %	4/20/2026
2018_base	678.9 MB	108	7	10.0 %	4/20/2026
2025	732.4 MB	108	7	10.8 %	4/20/2026
2026	738.6 MB	108	7	10.8 %	4/20/2026
2030	763.5 MB	108	7	11.2 %	4/20/2026
2040	818.7 MB	108	7	12.0 %	4/20/2026
2045	844.4 MB	108	7	12.4 %	4/20/2026
2050	868.5 MB	108	7	12.8 %	4/20/2026
documentation	13.8 MB	6	0	0.2 %	4/20/2026
source	1.2 GB	28,310	3,193	17.9 %	4/20/2026
support	133.3 MB	32	0	2.0 %	4/20/2026
.gitignore	757 Bytes	1	0	0.0 %	3/6/2026
README.md	3.9 KB	1	0	0.0 %	3/6/2026

The **/.github** folder is used with Git, version control software, to manage source code. Model users should NOT modify any files in this folder. The **/source** folder contains scripts and setting files to run various components of the model. Specifically, the **/configs** subfolder contains the ActivitySim configuration files, the **/scripts** subfolder contains the batch scripts, Cube scripts and Python scripts used to run the model, the **/software** subfolder contains the supporting software executables. The **/visualizer** subfolder contains the ABM Visualizer setup and survey data. The **/support** folder contains supporting data that model users are NOT expected to change. Scenario folders **/2018_base**, **/2025**, **/2026** , **/2030** , **/2040** , **/2045** and **/2050** contain the inputs files and scenario-specific batch files for analysis. Lastly, the **/documentation**[4] folder includes model related documentations that are listed below:

- RSG, Baseline Mobility Group, and COG, "User's Guide for the COG/TPB Gen3/Version 1.1.0 Travel Demand Forecasting Model" (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, April 16, 2026). **(Gen3_Model_V1.1.0_Model_User_Guide_TPB_Final.pdf)**
- "Highway and Transit Networks Developed for the Gen3 Travel Model" (Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, October 28, 2025). **(Gen3_Travel_Model_Network_Report.pdf)**
- RSG and Baseline Mobility Group. "Gen3/Ver. 1.0.4 Model Calibration and Validation Report." Final Report. Washington, D.C.: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, August 25, 2025. **(Gen3_Ver1.0.4_Model_Calibration_and_Validation_Final.pdf)**
- Bahar Shahverdi. "Additional Model Calibration Included in the Gen3/Version 1.1.0 Travel Model", COG/TPB Memorandum, February 20, 2026, 2026. **(Gen3_Model_v1.1.0_Calibration_Efforts_Final.pdf)**

[4] Documentation related to the prior Gen3 Model versions can be found on the following webpage: https://www.mwcog.org/transportation/data-and-tools/modeling/gen3-developmental-travel-model/

- Glenn Lang and Ray Ngo. "Gen3/Ver. 1.1.0 Travel Model Validation", COG/TPB Memorandum, April 6, 2026. **(Gen3_Model_v1.1.0_validation_memo_Final. Pdf)**

2018 Inputs: The Gen3 Model was estimated, calibrated and validated to 2018 conditions, and thus 2018 represents the model base year. In support of the Gen3 Model development, the 2018 model inputs were assembled during 2020 using the then most up-to-date transportation networks and land use data. The 2018 transportation networks were generated from a network database that was largely consistent with but slightly more recent than the one used for the 2022 Update of the LRTP, known as Visualize 2045, while the 2018 TAZ-level land-use data came from Round 9.1a of COG's Cooperative Forecasting program.

2025, 2026, 2030, 2040, 2045 and 2050 Inputs: This transmittal package also contains model inputs for all the analysis years from the AQC analysis of Visualize 2050 and the FY 2025-2028 TIP, which represent the current and forecast years of TPB's latest LRTP/MTP. It is worth noting that the inputs files for year 2018 and for years 2025-2050 were assembled from different sources. The transportation networks used in the Gen3/Ver. 1.1.0 Model are drawn from the AQC analysis of Visualize 2050. A complete listing of all transit, highway and HOV/HOT projects assumed in the Visualize 2050 and the FY 2026-2029 TIP can be found in Appendix B of the Air Quality Conformity report[5] and are also displayed on an online interactive map on the COG website: http://www.mwcog.org/V50FutureTransportationMap. In addition, the TAZ-level land-use data for years 2025 to 2050 are drawn from the Round 10.0 Cooperative Forecasts of Land Use, which were used in the AQC analysis of Visualize 2050 and were officially approved by the TPB on December 17, 2025.The Round 10.0 Land Use Forecasts data include adjustments that reflect certain effects of the Covid-19 pandemic.[6]

To request the model and its associated inputs, interested parties should follow the procedures listed on COG/DTP's Data Requests webpage: https://www.mwcog.org/transportation/data-and-tools/modeling/data-requests/

APPLYING THE MODEL

Under the "root" subdirectory of each scenario folder, two batch script files, run_model.bat and run_ModelSteps.bat, can be found. The primary model script, run_model.bat, executes the entire model based on the scenario specific inputs. Specifically, run_model.bat calls run_ModelSteps.bat which subsequently executes all the individual model steps.

Model users are strongly encouraged to read the following chapters of the user's guide prior to running this script:

- Chapter 2: System Architecture
- Chapter 3: Data Inputs & Outputs

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[5] Robert d'Abadie, "Air Quality Conformity Analysis Report Visualize 2050 and the FY 2026-2029 Transportation Improvement Program," Full Report (Washington, D.C.: National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, December 17, 2025). https://www.mwcog.org/documents/2026/01/23/visualize-2050-national-capital-region-transportation-plan/

[6] Ray Ngo to Feng Xie et al., "Developing land use input files for the Gen2/Version 2.4.6 Travel Model using the draft Round 10.0 Cooperative Forecasts, dated 3/22/24, and the latest employment definition adjustment factors," Memorandum, January 23, 2025.

- Chapter 4: Running the Model

Specifically, Chapter 2 discusses the hardware requirements for running the Gen3 Model. While the Gen3 Model can run on a Microsoft Windows workstation or server with a minimum specification of a 16-core CPU processor, 206 GB of RAM and 500 GB of disk space, a higher system specification of 32+ logical/virtual cores, 256+ GB of RAM and 1200+ GB of disk space is recommended for better model runtime performance. This chapter also discusses the installation and configuration of prerequisite software for running the model, including ActivitySim, Cube Voyager, and a Python Package Manager (e.g., UV for Gen3/Version 1.1.0 and Miniforge3/Anaconda for prior model versions). Furthermore, Chapter 2 discusses the configuration options provided in the run_model.bat file. Chapter 3 includes a detailed listing of the input and output files in the Gen3 Model, while Chapter 4 describes in more detail how a Gen3 Model run can be set up and executed on different platforms.

As noted in the Gen3 Model user's guide, the model was developed and applied by COG/TPB staff on on-demand cloud-based servers on Amazon Web Services (AWS) using Cube Voyager 6.5.1 CE, so it is generally recommended you use Cube 6.5.1 CE with the Gen3 Model. The Gen3 Model also provides an option for model users to use OpenPaths Cube 2025, although the model inputs and outputs have not been optimized for the new OpenPaths network format. See the user's guide for more details. Cube Voyager software is proprietary software, available for purchase from Bentley Systems, Inc. Note that model outputs are marginally different using Cube 6.5.1 CE versus using Cube 2025, even with the same model input. Also, note that the model outputs are not included with this transmittal, due to their large size (about 500 GB per alternative), but specific output files may be made available upon request.

CONTROL TOTALS

TPB staff have executed all modeling scenarios using cloud-based on-demand Amazon Web Services (AWS) servers (TMWS, also known as "instances"). The following table contains a listing of regional control totals by year generated after a complete execution of the model.[7] The Cube version and computer configuration associated with those model runs are noted in the table, as model outputs vary slightly depending on the Cube software version and number of CPU cores. Model users are encouraged to execute the model out of the box using the same Cube software and CPU specification to verify those statistics.

[7] Specifically, the scenario specific reginal control totals are generated in each scenario folder at "\outputs\reports\View_from_Space_Summary_Gen3.csv"

Table 1: Control Totals: Demographic and Travel Statistics

		2018	2025	2026	2030	2040	2045	2050
	Cube Version	*6.5.1 TMWS*	*6.5.1 TMWS*	*6.5.1 TMWS*	*6.5.1 TMWS*	*6.5.1 TMWS*	*6.5.1 TMWS*	*6.5.1 TMWS*
	Computer (Cores, RAM GB)	*(32, 256)*	*(32, 256)*	*(32, 256)*	*(32, 256)*	*(32, 256)*	*(32, 256)*	*(32, 256)*
1	*path*	*\2018_base*	*\2025*	*\2026*	*\2030*	*\2040*	*\2045*	*\2050*
2	**I. Overview**							
3	total population	7,164,105	7,681,406	7,756,153	8,053,932	8,722,717	9,040,688	9,332,974
4	total households	2,704,396	2,924,239	2,957,873	3,092,815	3,396,571	3,533,770	3,669,571
5	total tours	8,590,798	9,228,704	9,314,174	9,675,806	10,482,444	10,860,904	11,213,036
6	total trips	22,121,511	23,688,534	23,913,293	24,820,496	26,861,750	27,819,502	28,707,555
7	total person stops	4,939,915	5,231,126	5,284,945	5,468,884	5,896,862	6,097,694	6,281,483
8	total vmt	108,067,529	115,691,321	116,505,265	120,259,798	128,888,190	132,969,641	136,905,722
9	tours per person	1.2	1.2	1.2	1.2	1.2	1.2	1.2
10	trips per person	3.09	3.08	3.08	3.08	3.08	3.08	3.08
11	stops per person	0.69	0.68	0.68	0.68	0.68	0.67	0.67
12	trips per household	8.18	8.1	8.08	8.03	7.91	7.87	7.82
13	Employment by category							
14	industrial	395,960	420,011	424,105	440,763	477,714	500,145	521,226
15	retail	759,657	776,857	784,504	815,349	885,472	922,799	956,335
16	office	2,249,346	2,196,918	2,223,743	2,331,332	2,578,022	2,672,154	2,766,651
17	other	707,249	793,650	800,726	829,446	894,453	926,797	961,502
18	total employment	4,112,001	4,187,436	4,233,250	4,416,890	4,835,661	5,021,895	5,205,714
19	% industrial	9.60%	10.00%	10.00%	10.00%	9.90%	10.00%	10.00%
20	% retail	18.50%	18.60%	18.50%	18.50%	18.30%	18.40%	18.40%
21	% office	54.70%	52.50%	52.50%	52.80%	53.30%	53.20%	53.10%
22	% other	17.20%	19.00%	18.90%	18.80%	18.50%	18.50%	18.50%
23	Persons by person type							
24	FT Worker	3,098,090	3,373,653	3,410,948	3,562,816	3,899,621	4,050,593	4,203,578
25	PT Worker	520,159	562,137	568,303	590,754	641,797	666,670	689,758
26	Univ Student	286,846	299,111	301,226	310,946	332,546	343,029	351,451
27	Non-Worker	816,764	841,900	847,004	867,693	915,487	944,304	956,599
28	Retiree	701,696	737,215	743,106	767,370	826,351	856,674	883,455
29	Driving-age Student	211,089	227,940	230,720	239,648	260,917	271,411	282,264
30	Non-driving-age Student	967,166	1,033,585	1,043,230	1,080,342	1,163,062	1,201,684	1,238,315
31	Pre-Schooler	562,295	605,865	611,616	634,363	682,936	706,323	727,554
32	total population	7,164,105	7,681,406	7,756,153	8,053,932	8,722,717	9,040,688	9,332,974
33	% FT Worker	43.20%	43.90%	44.00%	44.20%	44.70%	44.80%	45.00%
34	% PT Worker	7.30%	7.30%	7.30%	7.30%	7.40%	7.40%	7.40%
35	% Univ Student	4.00%	3.90%	3.90%	3.90%	3.80%	3.80%	3.80%
36	% Non-Worker	11.40%	11.00%	10.90%	10.80%	10.50%	10.40%	10.20%
37	% Retiree	9.80%	9.60%	9.60%	9.50%	9.50%	9.50%	9.50%
38	% Driving-age Student	2.90%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
39	% Non-driving-age Student	13.50%	13.50%	13.50%	13.40%	13.30%	13.30%	13.30%
40	% Pre-Schooler	7.80%	7.90%	7.90%	7.90%	7.80%	7.80%	7.80%
41	Non-GQ households by size							
42	1 person	726,083	862,547	874,763	926,563	1,047,628	1,099,209	1,159,405
43	2 persons	842,270	912,421	923,338	967,825	1,069,275	1,114,191	1,157,492
44	3 persons	451,618	463,112	467,736	484,546	522,904	540,932	557,017
45	4+ persons	684,425	686,159	692,036	713,881	756,764	779,438	795,657
46	total non-GQ households	2,704,396	2,924,239	2,957,873	3,092,815	3,396,571	3,533,770	3,669,571
47	% 1 person	26.80%	29.50%	29.60%	30.00%	30.80%	31.10%	31.60%
48	% 2 persons	31.10%	31.20%	31.20%	31.30%	31.50%	31.50%	31.50%
49	% 3 persons	16.70%	15.80%	15.80%	15.70%	15.40%	15.30%	15.20%
50	% 4+ persons	25.30%	23.50%	23.40%	23.10%	22.30%	22.10%	21.70%
51	households by income							
52	<$50,000	617,027	664,477	672,420	704,341	780,109	814,065	847,582
53	$50,000-$99,999	718,594	777,223	786,175	822,146	903,585	940,795	978,187
54	$100,000-$149,999	555,357	603,080	610,067	637,781	699,953	728,535	756,570
55	$150,000 and above	813,418	879,459	889,211	928,547	1,012,924	1,050,375	1,087,232
56	total households	2,704,396	2,924,239	2,957,873	3,092,815	3,396,571	3,533,770	3,669,571
57	% <$50,000	22.80%	22.70%	22.70%	22.80%	23.00%	23.00%	23.10%
58	% $50,000-$99,999	26.60%	26.60%	26.60%	26.60%	26.60%	26.60%	26.70%
59	% $100,000-$149,999	20.50%	20.60%	20.60%	20.60%	20.60%	20.60%	20.60%
60	% $150,000 and above	30.10%	30.10%	30.10%	30.00%	29.80%	29.70%	29.60%
61	**II. Long-Term Model Summaries**							

Table 1: Continued

		2018	2025	2026	2030	2040	2045	2050
	Cube Version	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*
	Computer (Cores, RAM GB)	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*
1	*path*	*\2018_base*	*\2025*	*\2026*	*\2030*	*\2040*	*\2045*	*\2050*
62	Households by car ownership							
63	0 car	286,009	320,125	324,451	343,044	386,741	405,635	422,534
64	1 car	887,744	991,751	1,006,487	1,061,092	1,188,959	1,243,401	1,306,317
65	2 cars	986,061	1,038,489	1,048,197	1,091,359	1,182,997	1,226,932	1,265,664
66	3 cars	363,737	382,083	385,300	397,869	426,404	440,039	452,039
67	4+ cars	180,845	191,791	193,438	199,451	211,470	217,763	223,017
68	total households	2,704,396	2,924,239	2,957,873	3,092,815	3,396,571	3,533,770	3,669,571
69	% 0 car	10.60%	10.90%	11.00%	11.10%	11.40%	11.50%	11.50%
70	% 1 car	32.80%	33.90%	34.00%	34.30%	35.00%	35.20%	35.60%
71	% 2 cars	36.50%	35.50%	35.40%	35.30%	34.80%	34.70%	34.50%
72	% 3 cars	13.40%	13.10%	13.00%	12.90%	12.60%	12.50%	12.30%
73	% 4+ cars	6.70%	6.60%	6.50%	6.40%	6.20%	6.20%	6.10%
74	Work from home (wfh)							
75	wfh workers	191,183	207,116	209,840	219,513	239,346	249,014	257,778
76	total workers	3,778,136	4,109,221	4,154,697	4,337,488	4,742,919	4,926,809	5,111,523
77	% wfh workers	5.10%	5.00%	5.10%	5.10%	5.00%	5.10%	5.00%
78	Telecommute Frequency							
79	1 day a week	325,304	358,850	361,525	377,586	415,018	432,248	449,884
80	2 to 3 days a week	226,943	249,489	252,141	263,358	287,916	299,397	312,097
81	4 days a week	110,403	119,111	120,462	125,936	137,930	143,140	148,024
82	No telecommute	2,924,303	3,174,655	3,210,729	3,351,095	3,662,709	3,803,010	3,943,740
83	total workers	3,586,953	3,902,105	3,944,857	4,117,975	4,503,573	4,677,795	4,853,745
84	% 1 day a week	9.10%	9.20%	9.20%	9.20%	9.20%	9.20%	9.30%
85	% 2 to 3 days a week	6.30%	6.40%	6.40%	6.40%	6.40%	6.40%	6.40%
86	% 4 days a week	3.10%	3.10%	3.10%	3.10%	3.10%	3.10%	3.00%
87	% No telecommute	81.50%	81.40%	81.40%	81.40%	81.30%	81.30%	81.30%
88	Average mandatory tour lengths in miles							
89	work tour length	13.24	13.22	13.21	13.14	13.08	13.04	13.1
90	university tour length	11.53	12.15	11.98	12.06	12.12	12.3	12.44
91	school tour length	4.9	5.05	5	5.09	5.46	5.82	5.51
92	**III. Tour-Level Summaries**							
93	Persons by Daily Activity Pattern (DAP)							
94	Mandatory	3,731,663	4,048,607	4,088,542	4,258,695	4,634,062	4,809,227	4,980,481
95	Non-Mandatory	2,124,655	2,233,419	2,250,501	2,322,713	2,489,411	2,567,991	2,628,328
96	Home	1,307,787	1,399,380	1,417,110	1,472,524	1,599,244	1,663,470	1,724,165
97	total population	7,164,105	7,681,406	7,756,153	8,053,932	8,722,717	9,040,688	9,332,974
98	% Mandatory	52.10%	52.70%	52.70%	52.90%	53.10%	53.20%	53.40%
99	% Non-Mandatory	29.70%	29.10%	29.00%	28.80%	28.50%	28.40%	28.20%
100	% Home	18.30%	18.20%	18.30%	18.30%	18.30%	18.40%	18.50%
101	Mandatory tours by purpose & frequency							
102	1 work tour	2,533,932	2,763,338	2,792,593	2,914,868	3,186,775	3,310,940	3,434,934
103	2 work tours	102,960	110,776	112,368	117,236	127,223	132,290	135,991
104	1 school tour	1,039,442	1,115,936	1,124,378	1,164,935	1,252,735	1,296,261	1,336,446
105	2 school tours	38,115	39,992	40,304	41,819	45,071	46,459	48,217
106	1 work & 1 school	17,214	18,565	18,899	19,837	22,258	23,277	24,893
107	total mandatory tours	3,731,663	4,048,607	4,088,542	4,258,695	4,634,062	4,809,227	4,980,481
108	% 1 work tour	67.90%	68.30%	68.30%	68.40%	68.80%	68.80%	69.00%
109	% 2 work tours	2.80%	2.70%	2.70%	2.80%	2.70%	2.80%	2.70%
110	% 1 school tour	27.90%	27.60%	27.50%	27.40%	27.00%	27.00%	26.80%
111	% 2 school tours	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
112	% 1 work & 1 school	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
113	Tour rate by person type (active persons only)							
114	FT Worker	1.33	1.33	1.33	1.33	1.33	1.33	1.33
115	PT Worker	1.45	1.45	1.46	1.45	1.46	1.46	1.46
116	Univ Student	1.52	1.52	1.52	1.52	1.52	1.52	1.52
117	Non-Worker	1.57	1.57	1.57	1.57	1.57	1.57	1.58
118	Retiree	1.39	1.39	1.4	1.39	1.39	1.39	1.39
119	Driving-age Student	1.32	1.31	1.31	1.32	1.32	1.32	1.32
120	Non-driving-age Student	1.21	1.21	1.21	1.21	1.21	1.21	1.21
121	Pre-Schooler	1.21	1.21	1.21	1.21	1.21	1.21	1.21

Table 1: Continued

		2018	2025	2026	2030	2040	2045	2050
	Cube Version	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*
	Computer (Cores, RAM GB)	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*
1	*path*	*\2018_base*	*\2025*	*\2026*	*\2030*	*\2040*	*\2045*	*\2050*
122	Persons by frequency of Non-Mandatory tours							
123	0 tour	4,718,531	5,082,294	5,134,948	5,335,295	5,788,437	6,005,735	6,212,274
124	1 tour	1,818,029	1,933,417	1,950,975	2,023,963	2,188,703	2,263,215	2,327,545
125	2 tours	469,625	498,152	501,110	520,360	558,383	577,723	593,265
126	3+ tours	157,920	167,543	169,120	174,314	187,194	194,015	199,890
127	total population	7,164,105	7,681,406	7,756,153	8,053,932	8,722,717	9,040,688	9,332,974
128	% 0 tour	65.90%	66.20%	66.20%	66.20%	66.40%	66.40%	66.60%
129	% 1 tour	25.40%	25.20%	25.20%	25.10%	25.10%	25.00%	24.90%
130	% 2 tours	6.60%	6.50%	6.50%	6.50%	6.40%	6.40%	6.40%
131	% 3+ tours	2.20%	2.20%	2.20%	2.20%	2.10%	2.10%	2.10%
132	Joint tours by tour composition							
133	All Adult	196,952	202,337	203,679	208,479	223,815	229,978	234,282
134	All Children	332	307	302	310	369	370	378
135	Mixed	115,635	122,799	124,498	128,763	137,505	141,962	146,554
136	total joint tours	312,919	325,443	328,479	337,552	361,689	372,310	381,214
137	% All Adult	62.90%	62.20%	62.00%	61.80%	61.90%	61.80%	61.50%
138	% All Children	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
139	% Mixed	37.00%	37.70%	37.90%	38.10%	38.00%	38.10%	38.40%
140	Average Non-Mandatory tour lengths (Miles)							
141	Escorting	5.16	5.08	5.08	5	4.95	4.93	4.87
142	Indi-Maintenance	5.84	5.8	5.79	5.77	5.7	5.67	5.64
143	Indi-Discretionary	7.24	7.18	7.14	7.1	6.95	6.91	6.83
144	Joint-Maintenance	6.1	6.16	6.15	6.19	6.1	6.1	6.06
145	Joint-Discretionary	6.96	6.87	6.82	6.8	6.76	6.75	6.66
146	At-Work	4.81	4.76	4.74	4.72	4.66	4.65	4.65
147	All Tours	6.1	6.05	6.03	6	5.91	5.88	5.83
148	Tour departures by TOD							
149	NT1	442,412	482,896	488,620	524,383	576,517	604,251	634,320
150	AM	3,516,650	3,784,910	3,817,212	3,938,417	4,270,499	4,419,563	4,555,909
151	MD	2,675,003	2,863,276	2,890,335	3,013,860	3,257,458	3,375,252	3,482,452
152	PM	1,216,767	1,300,818	1,312,435	1,364,576	1,472,181	1,522,565	1,570,430
153	NT2	350,763	381,792	386,495	404,256	446,870	466,897	485,246
154	total tour departures	8,201,595	8,813,692	8,895,097	9,245,492	10,023,525	10,388,528	10,728,357
155	% NT1	5.40%	5.50%	5.50%	5.70%	5.80%	5.80%	5.90%
156	% AM	42.90%	42.90%	42.90%	42.60%	42.60%	42.50%	42.50%
157	% MD	32.60%	32.50%	32.50%	32.60%	32.50%	32.50%	32.50%
158	% PM	14.80%	14.80%	14.80%	14.80%	14.70%	14.70%	14.60%
159	% NT2	4.30%	4.30%	4.30%	4.40%	4.50%	4.50%	4.50%
160	Tour arrivals by TOD							
161	NT1	5,576	6,052	6,203	6,270	7,215	7,700	7,980
162	AM	243,171	261,649	263,613	273,265	294,327	306,124	315,811
163	MD	2,203,892	2,358,229	2,380,947	2,468,825	2,673,214	2,766,399	2,855,382
164	PM	3,836,589	4,112,183	4,147,809	4,304,725	4,640,491	4,799,443	4,942,782
165	NT2	1,912,367	2,075,579	2,096,525	2,192,407	2,408,278	2,508,862	2,606,402
166	total tour arrivals	8,201,595	8,813,692	8,895,097	9,245,492	10,023,525	10,388,528	10,728,357
167	% NT1	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
168	% AM	3.00%	3.00%	3.00%	3.00%	2.90%	2.90%	2.90%
169	% MD	26.90%	26.80%	26.80%	26.70%	26.70%	26.60%	26.60%
170	% PM	46.80%	46.70%	46.60%	46.60%	46.30%	46.20%	46.10%
171	% NT2	23.30%	23.50%	23.60%	23.70%	24.00%	24.20%	24.30%
172	Tours by tour mode							
173	Auto SOV	3,293,076	3,530,733	3,559,386	3,689,851	3,972,945	4,103,503	4,230,271
174	Auto HOV2	1,844,256	1,941,578	1,957,779	2,014,015	2,144,784	2,206,656	2,260,140
175	Auto HOV3+	1,441,284	1,529,705	1,541,412	1,589,275	1,700,608	1,756,095	1,806,543
176	Walk	813,598	908,631	921,647	979,639	1,119,579	1,184,311	1,246,093
177	Bike	128,773	141,320	143,377	150,675	168,488	176,969	184,350
178	Walk-Transit	378,594	428,102	434,123	459,067	513,587	535,930	556,267
179	PNR-Transit	86,763	100,795	102,375	114,236	126,690	134,418	139,393
180	KNR-Transit	25,802	28,342	28,600	29,250	32,065	32,659	33,674
181	School Bus	462,164	494,449	498,841	518,533	560,029	581,990	602,920

Table 1: Continued

		2018	2025	2026	2030	2040	2045	2050
	Cube Version	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*
	Computer (Cores, RAM GB)	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*
1	*path*	*\2018_base*	*\2025*	*\2026*	*\2030*	*\2040*	*\2045*	*\2050*
182	Ride Hail	116,488	125,049	126,634	131,265	143,669	148,373	153,385
183	total tours	8,590,798	9,228,704	9,314,174	9,675,806	10,482,444	10,860,904	11,213,036
184	% Auto SOV	38.30%	38.30%	38.20%	38.10%	37.90%	37.80%	37.70%
185	% Auto HOV2	21.50%	21.00%	21.00%	20.80%	20.50%	20.30%	20.20%
186	% Auto HOV3+	16.80%	16.60%	16.50%	16.40%	16.20%	16.20%	16.10%
187	% Walk	9.50%	9.80%	9.90%	10.10%	10.70%	10.90%	11.10%
188	% Bike	1.50%	1.50%	1.50%	1.60%	1.60%	1.60%	1.60%
189	% Walk-Transit	4.40%	4.60%	4.70%	4.70%	4.90%	4.90%	5.00%
190	% PNR-Transit	1.00%	1.10%	1.10%	1.20%	1.20%	1.20%	1.20%
191	% KNR-Transit	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%
192	% School Bus	5.40%	5.40%	5.40%	5.40%	5.30%	5.40%	5.40%
193	% Ride Hail	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%
194	Work tours by tour mode							
195	Auto SOV	1,614,809	1,743,161	1,760,739	1,828,479	1,981,338	2,048,731	2,118,677
196	Auto HOV2	381,484	402,630	406,880	417,356	442,706	455,756	466,423
197	Auto HOV3+	179,248	191,373	192,225	199,254	217,310	227,127	239,380
198	Walk	136,887	161,531	163,799	177,677	210,423	226,431	241,286
199	Bike	65,817	72,752	73,837	77,841	87,801	92,363	96,431
200	Walk-Transit	229,684	263,568	268,226	284,853	321,372	336,027	349,918
201	PNR-Transit	84,307	97,994	99,480	111,283	123,352	131,006	135,879
202	KNR-Transit	24,893	27,307	27,578	28,096	30,852	31,413	32,387
203	School Bus	0	0	0	0	0	0	0
204	Ride Hail	39,937	43,139	43,464	44,338	48,325	49,943	51,428
205	total work tours	2,757,066	3,003,455	3,036,228	3,169,177	3,463,479	3,598,797	3,731,809
206	% Auto SOV	58.60%	58.00%	58.00%	57.70%	57.20%	56.90%	56.80%
207	% Auto HOV2	13.80%	13.40%	13.40%	13.20%	12.80%	12.70%	12.50%
208	% Auto HOV3+	6.50%	6.40%	6.30%	6.30%	6.30%	6.30%	6.40%
209	% Walk	5.00%	5.40%	5.40%	5.60%	6.10%	6.30%	6.50%
210	% Bike	2.40%	2.40%	2.40%	2.50%	2.50%	2.60%	2.60%
211	% Walk-Transit	8.30%	8.80%	8.80%	9.00%	9.30%	9.30%	9.40%
212	% PNR-Transit	3.10%	3.30%	3.30%	3.50%	3.60%	3.60%	3.60%
213	% KNR-Transit	0.90%	0.90%	0.90%	0.90%	0.90%	0.90%	0.90%
214	% School Bus	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
215	% Ride Hail	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%
216	**IV. Trip-Level Summaries**							
217	Outbound half-tours by stop frequency							
218	0 stop	7,101,662	7,653,498	7,724,245	8,031,346	8,711,470	9,029,549	9,329,460
219	1 stop	1,070,519	1,133,794	1,144,732	1,184,725	1,278,311	1,321,287	1,359,275
220	2 stops	270,459	286,056	287,648	297,644	319,871	330,518	341,073
221	3+ stops	148,158	155,356	157,549	162,091	172,792	179,550	183,228
222	total outbound tours	8,590,798	9,228,704	9,314,174	9,675,806	10,482,444	10,860,904	11,213,036
223	% 0 stop	82.70%	82.90%	82.90%	83.00%	83.10%	83.10%	83.20%
224	% 1 stop	12.50%	12.30%	12.30%	12.20%	12.20%	12.20%	12.10%
225	% 2 stops	3.10%	3.10%	3.10%	3.10%	3.10%	3.00%	3.00%
226	% 3+ stops	1.70%	1.70%	1.70%	1.70%	1.60%	1.70%	1.60%
227	Inbound half-tours by stop frequency							
228	0 stop	6,535,483	7,049,935	7,111,767	7,394,156	8,016,139	8,311,324	8,583,714
229	1 stop	1,422,643	1,506,534	1,523,219	1,579,443	1,707,365	1,765,439	1,819,416
230	2 stops	436,655	464,087	468,513	483,466	523,752	541,141	558,756
231	3+ stops	196,017	208,148	210,675	218,741	235,188	243,000	251,150
232	total inbound tours	8,590,798	9,228,704	9,314,174	9,675,806	10,482,444	10,860,904	11,213,036
233	% 0 stop	76.10%	76.40%	76.40%	76.40%	76.50%	76.50%	76.60%
234	% 1 stop	16.60%	16.30%	16.40%	16.30%	16.30%	16.30%	16.20%
235	% 2 stops	5.10%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
236	% 3+ stops	2.30%	2.30%	2.30%	2.30%	2.20%	2.20%	2.20%
237	Tours by stop frequency							
238	0 stop	5,627,782	6,090,423	6,143,619	6,391,929	6,938,269	7,196,310	7,437,321
239	1 stop	1,685,095	1,784,211	1,803,555	1,870,451	2,020,365	2,088,430	2,152,878
240	2 stops	753,564	799,930	806,578	834,872	901,078	932,571	960,710
241	3 stops	389,889	412,147	416,460	430,308	463,871	479,334	492,288

Table 1: Continued

		2018	2025	2026	2030	2040	2045	2050
	Cube Version	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*
	Computer (Cores, RAM GB)	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*
1	*path*	*\2018_base*	*\2025*	*\2026*	*\2030*	*\2040*	*\2045*	*\2050*
242	4 stops	101,568	107,110	108,782	111,657	120,126	124,034	128,078
243	5 stops	25,647	27,124	27,354	28,397	30,186	31,366	32,557
244	6+ stops	7,253	7,759	7,826	8,192	8,549	8,859	9,204
245	total tours	8,590,798	9,228,704	9,314,174	9,675,806	10,482,444	10,860,904	11,213,036
246	% 0 stop	65.50%	66.00%	66.00%	66.10%	66.20%	66.30%	66.30%
247	% 1 stop	19.60%	19.30%	19.40%	19.30%	19.30%	19.20%	19.20%
248	% 2 stops	8.80%	8.70%	8.70%	8.60%	8.60%	8.60%	8.60%
249	% 3 stops	4.50%	4.50%	4.50%	4.40%	4.40%	4.40%	4.40%
250	% 4 stops	1.20%	1.20%	1.20%	1.20%	1.10%	1.10%	1.10%
251	% 5 stops	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%
252	% 6+ stops	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
253	Stops by stop purpose							
254	Work	355,598	384,508	388,666	404,153	440,002	457,860	473,699
255	University	5,227	5,473	5,621	5,952	6,275	6,598	6,611
256	School	0	0	0	0	0	0	0
257	Escorting	949,650	1,009,259	1,020,097	1,056,046	1,140,187	1,178,883	1,215,787
258	Shopping	1,251,086	1,322,657	1,333,851	1,379,741	1,488,019	1,535,704	1,580,943
259	Maintenance	833,765	881,072	889,675	920,241	990,496	1,024,142	1,055,055
260	Eating	630,733	667,226	674,681	698,292	755,361	780,772	804,208
261	Visitor	293,393	308,880	312,456	323,229	347,840	359,797	371,662
262	Discretionary	378,579	399,867	404,326	419,400	451,907	468,586	481,128
263	At-Work	0	0	0	0	0	0	0
264	total trip stops	4,698,031	4,978,942	5,029,373	5,207,054	5,620,087	5,812,342	5,989,093
265	% Work	7.60%	7.70%	7.70%	7.80%	7.80%	7.90%	7.90%
266	% University	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
267	% School	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
268	% Escorting	20.20%	20.30%	20.30%	20.30%	20.30%	20.30%	20.30%
269	% Shopping	26.60%	26.60%	26.50%	26.50%	26.50%	26.40%	26.40%
270	% Maintenance	17.70%	17.70%	17.70%	17.70%	17.60%	17.60%	17.60%
271	% Eating	13.40%	13.40%	13.40%	13.40%	13.40%	13.40%	13.40%
272	% Visitor	6.20%	6.20%	6.20%	6.20%	6.20%	6.20%	6.20%
273	% Discretionary	8.10%	8.00%	8.00%	8.10%	8.00%	8.10%	8.00%
274	% At-Work	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
275	Aver. out-of-direction dist. by tour purpose							
276	Work	3.04	3.01	3	2.99	2.93	2.91	2.89
277	University	4.35	4.28	4.32	4.25	4.17	4.14	4.12
278	School	4.89	4.84	4.83	4.79	4.67	4.6	4.58
279	Escorting	3.33	3.29	3.29	3.28	3.22	3.21	3.19
280	Indi-Maintenance	3.37	3.32	3.31	3.29	3.22	3.2	3.18
281	Indi-Discretionary	2.85	2.83	2.83	2.8	2.76	2.74	2.72
282	Joint-Maintenance	3.26	3.22	3.23	3.19	3.17	3.14	3.11
283	Joint-Discretionary	2.94	2.91	2.93	2.91	2.85	2.84	2.82
284	At-Work	2.32	2.27	2.29	2.23	2.2	2.16	2.15
285	total average distance	3.17	3.13	3.13	3.11	3.05	3.03	3.01
286	Stop departures by TOD							
287	NT1	79,474	85,817	87,033	92,704	101,809	107,188	112,216
288	AM	868,420	921,255	930,587	953,004	1,031,296	1,063,618	1,091,911
289	MD	1,496,858	1,569,994	1,586,326	1,644,127	1,764,142	1,822,968	1,875,844
290	PM	1,549,832	1,642,965	1,658,933	1,715,105	1,840,593	1,900,905	1,953,153
291	NT2	703,447	758,911	766,494	802,114	882,247	917,663	955,969
292	total trip stop departures	4,698,031	4,978,942	5,029,373	5,207,054	5,620,087	5,812,342	5,989,093
293	% NT1	1.70%	1.70%	1.70%	1.80%	1.80%	1.80%	1.90%
294	% AM	18.50%	18.50%	18.50%	18.30%	18.40%	18.30%	18.20%
295	% MD	31.90%	31.50%	31.50%	31.60%	31.40%	31.40%	31.30%
296	% PM	33.00%	33.00%	33.00%	32.90%	32.80%	32.70%	32.60%
297	% NT2	15.00%	15.20%	15.20%	15.40%	15.70%	15.80%	16.00%
298	Trip departures by TOD							
299	NT1	488,944	533,464	540,011	578,518	636,703	668,083	701,034
300	AM	4,435,210	4,764,501	4,807,354	4,956,618	5,373,032	5,560,266	5,730,450
301	MD	6,556,929	6,983,430	7,050,349	7,324,492	7,908,191	8,183,542	8,438,303

Table 1: Continued

		2018	2025	2026	2030	2040	2045	2050
	Cube Version	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*
	Computer (Cores, RAM GB)	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*
1	*path*	*\2018_base*	*\2025*	*\2026*	*\2030*	*\2040*	*\2045*	*\2050*
302	PM	6,630,975	7,084,475	7,148,028	7,414,271	7,984,877	8,256,150	8,499,559
303	NT2	2,989,163	3,240,456	3,273,825	3,424,139	3,764,334	3,921,357	4,076,461
304	total trip departures	21,101,221	22,606,326	22,819,567	23,698,038	25,667,137	26,589,398	27,445,807
305	% NT1	2.30%	2.40%	2.40%	2.40%	2.50%	2.50%	2.60%
306	% AM	21.00%	21.10%	21.10%	20.90%	20.90%	20.90%	20.90%
307	% MD	31.10%	30.90%	30.90%	30.90%	30.80%	30.80%	30.70%
308	% PM	31.40%	31.30%	31.30%	31.30%	31.10%	31.10%	31.00%
309	% NT2	14.20%	14.30%	14.30%	14.40%	14.70%	14.70%	14.90%
310	Trips by trip mode							
311	Auto SOV	10,052,479	10,751,310	10,845,373	11,233,287	12,095,318	12,492,901	12,879,993
312	Auto HOV2	5,102,648	5,351,554	5,397,420	5,558,754	5,933,328	6,116,741	6,265,586
313	Auto HOV3+	3,158,820	3,355,662	3,382,976	3,491,420	3,742,753	3,870,187	3,988,748
314	Walk	1,640,943	1,832,782	1,861,491	1,974,841	2,261,625	2,391,633	2,512,265
315	Bike	270,463	296,518	300,212	315,979	354,107	371,195	387,217
316	Walk-Transit	677,835	778,958	790,824	840,137	937,884	976,792	1,015,122
317	PNR-Transit	173,526	201,590	204,750	228,472	253,380	268,836	278,786
318	KNR-Transit	51,604	56,684	57,200	58,500	64,130	65,318	67,348
319	School Bus	702,236	752,325	759,255	792,061	858,107	893,447	927,671
320	Ride Hail	290,957	311,151	313,792	327,045	361,118	372,452	384,819
321	total trips	22,121,511	23,688,534	23,913,293	24,820,496	26,861,750	27,819,502	28,707,555
322	% Auto SOV	45.40%	45.40%	45.40%	45.30%	45.00%	44.90%	44.90%
323	% Auto HOV2	23.10%	22.60%	22.60%	22.40%	22.10%	22.00%	21.80%
324	% Auto HOV3+	14.30%	14.20%	14.10%	14.10%	13.90%	13.90%	13.90%
325	% Walk	7.40%	7.70%	7.80%	8.00%	8.40%	8.60%	8.80%
326	% Bike	1.20%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%
327	% Walk-Transit	3.10%	3.30%	3.30%	3.40%	3.50%	3.50%	3.50%
328	% PNR-Transit	0.80%	0.90%	0.90%	0.90%	0.90%	1.00%	1.00%
329	% KNR-Transit	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
330	% School Bus	3.20%	3.20%	3.20%	3.20%	3.20%	3.20%	3.20%
331	% Ride Hail	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%
332	Trips on work tours by trip mode							
333	Auto SOV	4,932,549	5,319,744	5,375,390	5,579,713	6,051,430	6,260,640	6,479,082
334	Auto HOV2	940,001	995,096	1,004,877	1,034,210	1,105,152	1,143,280	1,174,521
335	Auto HOV3+	314,731	337,950	338,799	353,225	387,970	406,847	431,737
336	Walk	315,481	372,346	378,386	406,291	477,738	511,610	542,273
337	Bike	135,842	150,370	152,188	160,700	181,846	190,923	199,830
338	Walk-Transit	439,736	505,999	515,642	548,388	617,743	644,874	671,180
339	PNR-Transit	168,614	195,988	198,960	222,566	246,704	262,012	271,758
340	KNR-Transit	49,786	54,614	55,156	56,192	61,704	62,826	64,774
341	School Bus	0	0	0	0	0	0	0
342	Ride Hail	108,597	119,295	119,988	123,941	137,135	141,984	147,067
343	total trips on work tours	7,405,337	8,051,402	8,139,386	8,485,226	9,267,422	9,624,996	9,982,222
344	% Auto SOV	66.60%	66.10%	66.00%	65.80%	65.30%	65.00%	64.90%
345	% Auto HOV2	12.70%	12.40%	12.30%	12.20%	11.90%	11.90%	11.80%
346	% Auto HOV3+	4.30%	4.20%	4.20%	4.20%	4.20%	4.20%	4.30%
347	% Walk	4.30%	4.60%	4.60%	4.80%	5.20%	5.30%	5.40%
348	% Bike	1.80%	1.90%	1.90%	1.90%	2.00%	2.00%	2.00%
349	% Walk-Transit	5.90%	6.30%	6.30%	6.50%	6.70%	6.70%	6.70%
350	% PNR-Transit	2.30%	2.40%	2.40%	2.60%	2.70%	2.70%	2.70%
351	% KNR-Transit	0.70%	0.70%	0.70%	0.70%	0.70%	0.70%	0.60%
352	% School Bus	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
353	% Ride Hail	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
354	**V. Exogenous Trip Summary**							
355	Inp_HBWAutoDrXI	307,041	314,830	317,791	330,066	360,291	374,938	390,382
356	Inp_HBSAutoDrXI	50,402	50,927	51,397	53,344	58,196	60,576	63,088
357	Inp_HBOAutoDrXI	151,310	155,405	157,003	163,645	179,982	187,873	196,221
358	Inp_NHBAutoDrXI	72,931	74,839	75,394	77,685	83,422	86,287	89,275
359	Inp_CVXI	42,452	43,192	43,651	45,549	50,224	52,478	54,869
360	Inp_TruckXI	28,070	28,493	28,734	29,691	32,029	33,140	34,305
361	Inp_AutoDrXI	624,136	639,193	645,236	670,289	732,115	762,152	793,835

Table 1: Continued

		2018	2025	2026	2030	2040	2045	2050
	Cube Version	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*
	Computer (Cores, RAM GB)	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*
1	*path*	*\2018_base*	*\2025*	*\2026*	*\2030*	*\2040*	*\2045*	*\2050*
362	Inp_HBWAutoDrIX	192,020	196,167	197,779	204,441	221,093	229,313	237,940
363	Inp_HBSAutoDrIX	51,483	52,266	52,746	54,729	59,602	61,951	64,429
364	Inp_HBOAutoDrIX	214,293	217,863	220,131	229,543	252,761	264,012	275,926
365	Inp_NHBAutoDrIX	72,917	74,833	75,387	77,672	83,415	86,274	89,264
366	Inp_CVIX	42,453	43,187	43,648	45,547	50,221	52,478	54,866
367	Inp_TruckIX	28,070	28,493	28,734	29,691	32,029	33,140	34,305
368	Inp_AutoDrIX	573,166	584,316	589,691	611,932	667,092	694,028	722,425
369	Ext_ALLAdr	1,111,808	1,136,515	1,147,044	1,190,484	1,298,082	1,350,517	1,405,791
370	Ext_ComVeh	84,905	86,389	87,308	91,104	100,458	104,969	109,749
371	Ext_Medium_Trk	25,329	25,679	25,879	26,673	28,620	29,551	30,528
372	Ext_Heavy_Trk	30,607	31,108	31,398	32,527	35,279	36,574	37,936
373	Int_CommVeh	1,129,317	1,160,955	1,173,767	1,223,848	1,339,763	1,392,202	1,441,730
374	Int_Med_Truck	463,981	494,316	499,421	519,954	565,672	587,913	610,334
375	Int_Hvy_Truck	108,836	117,248	118,446	123,413	134,354	140,163	145,643
376	ALL_CV	1,214,222	1,247,345	1,261,075	1,314,952	1,440,221	1,497,171	1,551,479
377	ALL_Mtk	489,310	519,996	525,300	546,626	594,292	617,464	640,862
378	ALL_Htk	139,443	148,356	149,844	155,940	169,633	176,737	183,579
379	THRU_Truck	36,545	37,059	37,446	39,072	43,085	45,017	47,069
380	THRU_Auto&CV	45,819	47,781	48,270	50,288	55,199	57,543	60,017
381	Taxi_AutoDrv	133,877	135,697	137,783	143,770	157,456	163,549	169,620
382	Visitor/Tourist Adr	272,272	275,874	280,134	292,405	320,119	332,554	344,791
383	School AutroDrv	0	0	0	0	0	0	0
384	Final_Medium_Truck	539,710	570,107	574,753	594,401	638,252	659,381	681,400
385	Final_Heavy_Truck	147,578	155,148	156,261	161,113	171,943	177,645	183,219
386	AirPax_AutoDrv	77,465	84,762	86,529	93,618	108,972	117,071	120,682
387	Final_Comm_Veh	1,403,991	1,442,089	1,454,829	1,505,742	1,622,395	1,675,062	1,725,933
388	All_Vehs_Assigned	17,553,712	18,561,257	18,726,901	19,380,763	20,866,972	21,563,501	22,227,816
389	**VI. Highway Assignment Summaries**							
390	VMT by facility type							
391	freeway	64,033,270	67,964,946	68,449,942	70,760,811	75,942,750	77,932,269	79,906,425
392	major arterial	43,545,685	44,394,420	44,598,759	45,642,769	48,892,642	51,317,076	52,921,289
393	minor arterial	36,660,437	38,042,501	38,384,646	39,614,488	42,239,565	43,226,932	44,660,853
394	collector	10,590,998	11,427,245	11,592,102	12,166,919	13,543,782	14,162,465	14,992,028
395	expressway	10,580,427	12,389,544	12,448,433	13,285,967	14,647,134	15,202,145	15,519,867
396	ramp	1,714,691	1,797,921	1,804,041	1,850,250	1,964,428	2,007,870	2,057,885
397	Total VMT	167,125,511	176,016,579	177,277,926	183,321,207	197,230,303	203,848,760	210,058,349
398	% freeway	38.30%	38.60%	38.60%	38.60%	38.50%	38.20%	38.00%
399	% major arterial	26.10%	25.20%	25.20%	24.90%	24.80%	25.20%	25.20%
400	% minor arterial	21.90%	21.60%	21.70%	21.60%	21.40%	21.20%	21.30%
401	% collector	6.30%	6.50%	6.50%	6.60%	6.90%	6.90%	7.10%
402	% expressway	6.30%	7.00%	7.00%	7.20%	7.40%	7.50%	7.40%
403	% ramp	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
404	VMT by time of day							
405	AM VMT	34,431,257	36,163,813	36,420,696	36,973,756	39,767,755	40,914,646	41,855,643
406	MD VMT	49,936,192	52,204,345	52,608,830	54,632,089	58,667,260	60,686,468	62,594,734
407	PM VMT	47,872,469	50,201,206	50,498,296	52,103,170	55,402,444	56,964,216	58,307,079
408	NT VMT	34,885,592	37,447,214	37,750,102	39,612,190	43,392,843	45,283,429	47,300,892
409	Total VMT	167,125,511	176,016,579	177,277,926	183,321,207	197,230,303	203,848,760	210,058,349
410	% AM VMT	20.60%	20.50%	20.50%	20.20%	20.20%	20.10%	19.90%
411	% MD VMT	29.90%	29.70%	29.70%	29.80%	29.70%	29.80%	29.80%
412	% PM VMT	28.60%	28.50%	28.50%	28.40%	28.10%	27.90%	27.80%
413	% NT VMT	20.90%	21.30%	21.30%	21.60%	22.00%	22.20%	22.50%
414	VHT by time of day							
415	AM VHT	1,284,455	1,379,827	1,395,433	1,413,301	1,673,405	1,762,480	1,878,599
416	MD VHT	1,066,293	1,129,001	1,140,556	1,200,705	1,323,415	1,376,552	1,443,879
417	PM VHT	1,629,175	1,754,384	1,769,735	1,881,724	2,126,848	2,215,903	2,362,687
418	NT VHT	670,840	724,566	731,804	773,016	857,045	897,660	946,810
419	Total VHT	4,650,765	4,987,780	5,037,530	5,268,747	5,980,714	6,252,596	6,631,977
420	% AM VHT	27.60%	27.70%	27.70%	26.80%	28.00%	28.20%	28.30%
421	% MD VHT	22.90%	22.60%	22.60%	22.80%	22.10%	22.00%	21.80%

Table 1: Continued

		2018	2025	2026	2030	2040	2045	2050
	Cube Version	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*	*6.5.1*
	Computer (Cores, RAM GB)	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*	*TMWS (32, 256)*
1	*path*	*\2018_base*	*\2025*	*\2026*	*\2030*	*\2040*	*\2045*	*\2050*
422	% PM VHT	35.00%	35.20%	35.10%	35.70%	35.60%	35.40%	35.60%
423	% NT VHT	14.40%	14.50%	14.50%	14.70%	14.30%	14.40%	14.30%
424	VHD by time of day							
425	AM VHD	644,979	708,502	718,964	724,656	929,055	994,117	1,089,767
426	MD VHD	155,182	175,735	179,163	199,654	244,490	257,996	287,133
427	PM VHD	738,850	821,054	830,207	909,418	1,089,063	1,145,754	1,263,646
428	NT VHD	37,905	45,109	46,229	52,044	65,412	70,355	80,682
429	Total VHD	1,576,917	1,750,402	1,774,565	1,885,774	2,328,021	2,468,223	2,721,229
430	% AM VHD	40.90%	40.50%	40.50%	38.40%	39.90%	40.30%	40.00%
431	% MD VHD	9.80%	10.00%	10.10%	10.60%	10.50%	10.50%	10.60%
432	% PM VHD	46.90%	46.90%	46.80%	48.20%	46.80%	46.40%	46.40%
433	% NT VHD	2.40%	2.60%	2.60%	2.80%	2.80%	2.90%	3.00%
434	Average speed by time of day (VMT/VHT)							
435	AM speed	26.81	26.21	26.1	26.16	23.76	23.21	22.28
436	MD speed	46.83	46.24	46.13	45.5	44.33	44.09	43.35
437	PM speed	29.38	28.61	28.53	27.69	26.05	25.71	24.68
438	NT speed	52	51.68	51.58	51.24	50.63	50.45	49.96
439	Daily average speed	35.94	35.29	35.19	34.79	32.98	32.6	31.67
440	Additional region-level VMT metrics							
441	VMT per Capita	23.33	22.91	22.86	22.76	22.61	22.55	22.51
442	VMT per household	61.8	60.19	59.93	59.27	58.07	57.69	57.24
443	**VII. Transit Assignment Summaries**							
444	Transit boardings by line haul and access modes							
445	All Bus - PNR Access	20,376	20,605	21,681	23,144	26,014	26,551	27,703
446	All Bus - KNR Access	3,071	3,292	3,269	3,727	4,059	4,306	4,497
447	All Bus - Walk Access	415,799	454,220	460,238	491,412	539,486	562,319	584,550
448	Bus/Metro - PNR Access	41,946	67,088	68,590	92,996	106,172	113,096	118,104
449	Bus/Metro - KNR Access	7,336	10,489	10,621	11,516	14,065	14,208	15,057
450	Bus/Metro - Walk Access	250,521	347,613	355,965	393,607	445,100	465,104	488,888
451	Commuter Rail - PNR/KNR Access	34,160	35,056	35,235	37,854	43,811	52,013	55,880
452	Commuter Rail - Walk Access	61,912	65,277	65,538	68,964	76,227	86,547	91,305
453	Metrorail Only - PNR Access	48,253	50,264	50,403	50,515	53,741	54,460	55,549
454	Metrorail Only - KNR Access	27,911	29,192	29,370	29,557	31,648	31,974	32,660
455	Metrorail Only - Walk Access	551,979	597,398	607,447	645,131	714,426	740,369	765,032
456	Total transit boardings	1,463,268	1,680,500	1,708,361	1,848,428	2,054,755	2,150,950	2,239,230
457	Transit boardings (transfers included) by mode							
458	Metrorail boardings	820,379	950,842	966,816	1,030,909	1,142,192	1,188,708	1,234,990
459	commuter rail boardings	56,191	57,074	57,087	59,030	66,719	76,157	79,996
460	light rail boardings	0	0	0	14,204	15,390	15,757	15,919
461	bus/streetcar/BRT boardings	586,697	672,583	684,457	744,283	830,452	870,327	908,323
462	Total transit boardings	1,463,267	1,680,499	1,708,360	1,848,426	2,054,753	2,150,949	2,239,228
463	% Metrorail boardings	56.10%	56.60%	56.60%	55.80%	55.60%	55.30%	55.20%
464	% commuter rail boardings	3.80%	3.40%	3.30%	3.20%	3.20%	3.50%	3.60%
465	% light rail boardings	0.00%	0.00%	0.00%	0.80%	0.70%	0.70%	0.70%
466	% bus/streetcar/BRT boardings	40.10%	40.00%	40.10%	40.30%	40.40%	40.50%	40.60%
467	Metrorail station entries (no transfers)	622,282	716,530	728,331	776,197	856,108	889,731	922,780
468	Boardings by MARC/VRE/Metrorail line							
469	MARC/Brunswick	6,216	8,721	8,693	8,528	10,012	17,222	18,522
470	MARC/Camden	7,039	11,821	12,008	11,752	12,944	12,927	13,446
471	MARC/Penn	28,065	28,536	28,367	30,607	30,901	32,000	33,036
472	Metro/Blue Line	121,314	104,403	107,110	118,592	128,992	134,153	138,851
473	Metro/Green Line	125,975	161,622	165,220	172,846	192,508	198,283	205,662
474	Metro/Orange Line	125,137	121,687	121,846	124,753	130,515	133,950	138,935
475	Metro/Red Line	289,111	331,077	336,305	354,512	387,348	405,920	420,999
476	Metro/Silver Line	87,914	140,877	143,037	154,739	175,719	182,008	188,083
477	Metro/Yellow Line	70,926	91,172	93,295	105,464	127,109	134,391	142,457
478	VRE/Fredericksburg	11,112	4,116	4,118	4,473	7,677	8,270	9,387
479	VRE/Manassas	3,757	3,878	3,899	3,668	5,182	5,736	5,603
480	All MARC lines	41,322	49,078	49,069	50,888	53,858	62,150	65,005
481	All VRE lines	14,869	7,995	8,017	8,142	12,860	14,007	14,991
482	All Metrorail lines	820,379	950,842	966,816	1,030,909	1,142,192	1,188,708	1,234,990