Appendix E

Mobile Model Runs and Documentation

Highway Mobile Source

Emissions Summary

HIGHWAY MOBILE SOURCE EMISSIONS SUMMARY -- 8-HOUR OZONE, CHRISTIAN COUNTY

YEAR: 2002 | Mobile Model Used: M6.2 | THE ENTIRE COUNTY IS CONSIDERED. THEREFORE, THE APPORTIONMENT FACTOR IS EQUAL TO 100%.

COUNTY: Christian

SCENARIO: M6.2 Defaults

MOBILE6.2 Default Controls

2002

ROAD CLASS	DVMT	VOC EF	CO EF	NOx EF	VOC tpd	CO tpd	NOx tpd	County Apport. Factor	CHRISTIAN COUNTY VOC tpd	CHRISTIAN COUNTY CO tpd	CHRISTIAN COUNTY NOx tpd
R INTERST	424,166	1.214	17.220	11.996	0.57	8.05	5.61				
R PRIN ART	321,828	1.549	20.723	2.282	0.55	7.35	0.81				
R MIN ART	15,158	1.576	20.022	2.192	0.03	0.33	0.04				
R MAJ COLL	212,873	1.565	20.743	2.053	0.37	4.87	0.48				
R MIN COLL	85,581	1.618	19.482	1.934	0.15	1.84	0.18				
R LOCAL	114,772	1.724	17.669	1.831	0.22	2.24	0.23				
U INTERST	89,098	1.318	18.933	9.218	0.13	1.86	0.91				
U FREEWAY	70,317	1.542	23.264	2.604	0.12	1.80	0.20				
U PRIN ART	555,780	1.724	17.531	1.915	1.06	10.74	1.17				
U MIN ART	237,786	1.806	17.289	1.930	0.47	4.53	0.51				
U COLL	71,208	1.862	17.443	1.818	0.15	1.37	0.14				
U LOCAL	166,180	2.711	17.407	1.844	0.50	3.19	0.34				
	2,364,746				4.30	48.18	10.62	100.0%	4.30	48.18	10.62

Area-specific VMT Fractions, provided by TDOT, were incorporated into the MOBILE6.2 input file for Christian County

YEAR: 2004 | Mobile Model Used: M6.2 | THE ENTIRE COUNTY IS CONSIDERED. THEREFORE, THE APPORTIONMENT FACTOR IS EQUAL TO 100%.

COUNTY: Christian

SCENARIO: M6.2 Defaults

MOBILE6.2 Default Controls

2004

ROAD CLASS	DVMT	VOC EF	CO EF	NOx EF	VOC tpd	CO tpd	NOx tpd	County Apport. Factor	CHRISTIAN COUNTY VOC tpd	CHRISTIAN COUNTY CO tpd	CHRISTIAN COUNTY NOx tpd
R INTERST	467,348	1.001	13.498	9.598	0.52	6.95	4.95				
R PRIN ART	354,753	1.286	16.180	1.978	0.50	6.33	0.77				
R MIN ART	16,171	1.311	15.652	1.895	0.02	0.28	0.03				
R MAJ COLL	223,505	1.300	16.189	1.804	0.32	3.99	0.44				
R MIN COLL	91,509	1.348	15.238	1.693	0.14	1.54	0.17				
R LOCAL	122,654	1.442	13.872	1.597	0.19	1.88	0.22				
U INTERST	96,252	1.087	14.790	7.428	0.12	1.57	0.79				
U FREEWAY	76,890	1.274	18.079	2.247	0.11	1.53	0.19				
U PRIN ART	591,324	1.441	13.779	1.651	0.94	8.98	1.08				
U MIN ART	246,306	1.510	13.606	1.663	0.41	3.69	0.45				
U COLL	73,568	1.555	13.726	1.583	0.13	1.11	0.13				
U LOCAL	175,462	2.245	13.973	1.629	0.43	2.70	0.32				
	2,535,743				3.83	40.56	9.53	100.0%	3.83	40.56	9.53

Area-specific VMT Fractions, provided by TDOT, were incorporated into the MOBILE6.2 input file for Christian County

YEAR: 2007 | Mobile Model Used: M6.2 | THE ENTIRE COUNTY IS CONSIDERED. THEREFORE, THE APPORTIONMENT FACTOR IS EQUAL TO 100%.

COUNTY: Christian

SCENARIO: M6.2 Defaults

MOBILE6.2 Default Controls

2007

ROAD CLASS	DVMT	VOC EF	CO EF	NOx EF	VOC tpd	CO tpd	NOx tpd	County Apport. Factor	CHRISTIAN COUNTY VOC tpd	CHRISTIAN COUNTY CO tpd	CHRISTIAN COUNTY NOx tpd
R INTERST	532,120	0.763	9.704	7.253	0.45	5.69	4.26				
R PRIN ART	404,140	0.969	11.532	1.526	0.43	5.14	0.68				
R MIN ART	17,690	0.988	11.170	1.461	0.02	0.22	0.03				
R MAJ COLL	239,454	0.979	11.533	1.397	0.26	3.04	0.37				
R MIN COLL	100,401	1.016	10.885	1.309	0.11	1.20	0.14				
R LOCAL	134,479	1.087	9.963	1.235	0.16	1.48	0.18				
U INTERST	106,983	0.824	10.572	5.623	0.10	1.25	0.66				
U FREEWAY	86,749	0.957	12.826	1.728	0.09	1.23	0.17				
U PRIN ART	644,641	1.087	9.907	1.272	0.77	7.04	0.90				
U MIN ART	259,086	1.138	9.824	1.281	0.33	2.81	0.37				
U COLL	77,109	1.171	9.929	1.220	0.10	0.84	0.10				
U LOCAL	189,386	1.679	10.584	1.272	0.35	2.21	0.27				
	2,792,239				3.17	32.15	8.13	100.0%	3.17	32.15	8.13

Area-specific VMT Fractions, provided by TDOT, were incorporated into the MOBILE6.2 input file for Christian County

YEAR: 2010 | Mobile Model Used: M6.2 | THE ENTIRE COUNTY IS CONSIDERED. THEREFORE, THE APPORTIONMENT FACTOR IS EQUAL TO 100%.

COUNTY: Christian

SCENARIO: M6.2 Defaults

MOBILE6.2 Default Controls

2010

ROAD CLASS	DVMT	VOC EF	CO EF	NOx EF	VOC tpd	CO tpd	NOx tpd	County Apport. Factor	CHRISTIAN COUNTY VOC tpd	CHRISTIAN COUNTY CO tpd	CHRISTIAN COUNTY NOx tpd
R INTERST	596,893	0.603	7.725	5.171	0.40	5.08	3.40				
R PRIN ART	453,527	0.756	9.386	1.159	0.38	4.69	0.58				
R MIN ART	19,209	0.770	9.092	1.111	0.02	0.19	0.02				
R MAJ COLL	255,403	0.764	9.381	1.068	0.22	2.64	0.30				
R MIN COLL	109,293	0.790	8.853	1.003	0.10	1.07	0.12				
R LOCAL	146,303	0.841	8.090	0.947	0.14	1.30	0.15				
U INTERST	117,714	0.648	8.476	4.030	0.08	1.10	0.52				
U FREEWAY	96,609	0.749	10.429	1.304	0.08	1.11	0.14				
U PRIN ART	697,958	0.841	8.053	0.973	0.65	6.20	0.75				
U MIN ART	271,866	0.878	7.989	0.980	0.26	2.39	0.29				
U COLL	80,649	0.902	8.075	0.939	0.08	0.72	0.08				
U LOCAL	203,311	1.280	8.798	0.986	0.29	1.97	0.22				
	3,048,735				2.68	28.47	6.59	100.0%	2.68	28.47	6.59

Area-specific VMT Fractions, provided by TDOT, were incorporated into the MOBILE6.2 input file for Christian County

HIGHWAY MOBILE SOURCE EMISSIONS SUMMARY -- 8-HOUR OZONE, CHRISTIAN COUNTY

YEAR:	2013	Mobile Model Used:	M6.2			THE ENTIRE COUNTY IS CONSIDERED. THEREFORE, THE APPORTIONMENT FACTOR IS EQUAL TO 100%.				
COUNTY:	Christian									
SCENARIO:	M6.2 Defaults									
ROAD CLASS	DVMT		VOC EF	CO EF	NOx EF		VOC tpd	CO tpd	NOx tpd	
R INTERST	664,610		0.488	6.402	3.376		0.36	4.69	2.47	
R PRIN ART	500,955		0.605	7.967	0.848		0.33	4.40	0.47	
R MIN ART	20,429		0.615	7.717	0.815		0.01	0.17	0.02	
R MAJ COLL	269,285		0.611	7.967	0.791		0.18	2.37	0.23	
R MIN COLL	116,559		0.630	7.519	0.747		0.08	0.97	0.10	
R LOCAL	154,024		0.668	6.873	0.708		0.11	1.17	0.12	
U INTERST	130,341		0.524	7.078	2.657		0.08	1.02	0.38	
U FREEWAY	105,333		0.602	8.855	0.945		0.07	1.03	0.11	
U PRIN ART	748,624		0.669	6.839	0.723		0.55	5.64	0.60	
U MIN ART	288,260		0.697	6.797	0.728		0.22	2.16	0.23	
U COLL	83,971		0.715	6.883	0.704		0.07	0.64	0.07	
U LOCAL	215,605		1.014	7.719	0.739		0.24	1.83	0.18	
	3,297,996						2.31	26.09	4.97	

MOBILE6.2 Default Controls

2013

Area-specific VMT Fractions, provided by TDOT, were incorporated into the MOBILE6.2 input file for Christian County

County Apport. Factor: 100.0%

CHRISTIAN COUNTY		
VOC tpd	CO tpd	NOx tpd
2.31	26.09	4.97

YEAR:	2016	Mobile Model Used:	M6.2			THE ENTIRE COUNTY IS CONSIDERED. THEREFORE, THE APPORTIONMENT FACTOR IS EQUAL TO 100%.				
COUNTY:	Christian									
SCENARIO:	M6.2 Defaults									
ROAD CLASS	DVMT		VOC EF	CO EF	NOx EF		VOC tpd	CO tpd	NOx tpd	
R INTERST	732,327		0.413	5.714	2.265		0.33	4.61	1.83	
R PRIN ART	548,382		0.508	7.186	0.637		0.31	4.34	0.39	
R MIN ART	21,648		0.515	6.962	0.614		0.01	0.17	0.01	
R MAJ COLL	283,167		0.512	7.189	0.601		0.16	2.24	0.19	
R MIN COLL	123,825		0.527	6.786	0.570		0.07	0.93	0.08	
R LOCAL	161,745		0.559	6.209	0.542		0.10	1.11	0.10	
U INTERST	142,968		0.442	6.338	1.802		0.07	1.00	0.28	
U FREEWAY	114,057		0.505	7.990	0.705		0.06	1.00	0.09	
U PRIN ART	799,291		0.560	6.178	0.552		0.49	5.44	0.49	
U MIN ART	304,654		0.583	6.149	0.556		0.20	2.07	0.19	
U COLL	87,293		0.599	6.235	0.542		0.06	0.60	0.05	
U LOCAL	227,900		0.857	7.141	0.566		0.22	1.79	0.14	
	3,547,256						2.08	25.31	3.83	

MOBILE6.2 Default Controls

2016

Area-specific VMT Fractions, provided by TDOT, were incorporated into the MOBILE6.2 input file for Christian County

County Apport. Factor: 100.0%

CHRISTIAN COUNTY		
VOC tpd	CO tpd	NOx tpd
2.08	25.31	3.83

Speed and DVMT Data

From

Kentucky Transportation Cabinet

Daily VMT Estimates and Forecasts
For Redesignation SIP Development Request 1/25/05

Christian County (excluding Fort Campbell)

HPMS Roadway Classification (FC)	MOBILE 6 Facility Type	% M6 Freeway	% M6 Ramp	2003 Speed (mph)	2,002	2,003	2,004	2,005	2,006	2,007	2,008	2,009	2,010	2,011	2,012	2,013	2,014	2,015	2,016
Rural Interstate	Freeway	98.5	1.5	70.7	424,166	445,757	467,348	488,939	510,530	532,120	553,711	575,302	596,893	619,465	642,038	664,610	687,183	709,755	732,327
Rural Principal Arterial	Arter/Coll			55.0	321,828	338,291	354,753	371,215	387,678	404,140	420,603	437,065	453,527	469,336	485,146	500,955	516,764	532,573	548,382
Rural Minor Arterial	Arter/Coll			51.1	15,158	15,664	16,171	16,677	17,184	17,690	18,196	18,703	19,209	19,616	20,022	20,429	20,835	21,242	21,648
Rural Major Collector	Arter/Coll			54.1	212,873	218,189	223,505	228,822	234,138	239,454	244,771	250,087	255,403	260,090	264,656	269,285	273,912	278,540	283,167
Rural Minor Collector	Arter/Coll			47.1	85,581	88,545	91,509	94,473	97,437	100,401	103,365	106,329	109,293	111,715	114,137	116,559	118,981	121,403	123,825
Rural Local	Arter/Coll			36.1	114,772	118,713	122,654	126,596	130,537	134,479	138,420	142,361	146,303	148,876	151,450	154,024	156,598	159,171	161,745
Urban Interstate	Freeway	92.4	7.6	72.0	89,098	92,675	96,252	99,829	103,406	106,983	110,560	114,137	117,714	121,923	126,132	130,341	134,550	138,759	142,968
Urban Freeway	Freeway	92.4	7.6	72.8	70,317	73,604	76,890	80,177	83,463	86,749	90,036	93,322	96,609	99,517	102,425	105,333	108,241	111,149	114,057
Urban Principal Arterial	Arter/Coll			35.7	555,780	573,552	591,324	609,097	626,869	644,641	662,413	680,186	697,958	714,847	731,736	748,624	765,513	782,402	799,291
Urban Minor Arterial	Arter/Coll			31.0	237,786	242,046	246,306	250,566	254,826	259,086	263,346	267,606	271,866	277,331	282,795	288,260	293,725	299,189	304,654
Urban Collector	Arter/Coll			28.8	71,208	72,388	73,568	74,749	75,929	77,109	78,289	79,469	80,649	81,756	82,864	83,971	85,078	86,185	87,293
Urban Local	Local			12.9	166,180	170,821	175,462	180,104	184,745	189,386	194,028	198,669	203,311	207,409	211,507	215,605	219,703	223,802	227,900
Total VMT					2,364,746	2,450,245	2,535,743	2,621,242	2,706,740	2,792,239	2,877,738	2,963,236	3,048,735	3,131,822	3,214,909	3,297,996	3,381,083	3,464,169	3,547,256

NOTE:
The Christian County Travel Demand Model (January, 2005) VMT by HPMS functional class future year output (2010 and 2016) was post processed in the following manner: TDM output was post processed for use in developing the 8-hour ozone state implementation plan (SIP).
1) Factored by the ratio of the base year (2002) model output VMT (by functional class) to the HPMS 2002 VMT (by functional class).
2) A seasonal adjustment factor was applied to adjust the annual average daily VMT produced by the TDM to average daily VMT for July, thus more reasonably representing the ozone season.
3) VMT for all other years other than 2002, 2010 and 2016 were determined by interpolation.
2003 speeds (column E) were determined by evaluating Christian County data using the new UK speed study HERS methodology --2002 HPMS data was supplemented with 2003 collected data
2003 speeds used for all forecasted years
Default value of 12.9mph for functional class of "urban local" roads was used since existing local or state data are insufficient to determine a better value.

Source: Kentucky Transportation Cabinet, Division of Multimodal Programs - January, 2005

Planning Assumptions

From

Kentucky Transportation Cabinet

MOBILE 6.2 Parameters for Christian County, Kentucky

1.0 Introduction

The following sections describe the MOBILE6.2 inputs used to calculate emission factors for NOx, VOCs, and CO. The model inputs include: VMT distribution by vehicle type by road type (Section 1.1), vehicle age distribution by vehicle type (Section 1.2), average speeds by road type (Section 1.3) and temperature, humidity and fuel RVP inputs for the area (Section 1.4). Vehicle miles of travel estimates and seasonal adjustment factors are discussed in Sections 1.5 and 1.6.

1.1 Fractions of Vehicle Miles Traveled (VMT) by Vehicle Type

VMT mix is required as an input to the MOBILE6.2 model. The VMT mix indicates the fraction of total highway VMT that is accumulated by each vehicle type. The model needs 16 composite vehicle classes for the VMT mix. Different vehicle types have different emission rates. For example, class8b heavy-duty diesel vehicles (gross vehicle weight rating greater than 60,000 pounds) have approximately 10 times higher NO_X emission factors per mile of travel than light duty gasoline vehicles (i.e., passenger cars). As such, it is necessary to develop VMT fractions by vehicle type to estimate emissions accurately. These VMT fractions for each Highway Performance Monitoring System (HPMS) roadway type for each analysis year were developed for Montgomery County, Tennessee by Dr. Terry Miller, Associate Professor, Department of Civil and Environmental Engineering, The University of Tennessee, as described in the following sections and presented in Tables 1.4 through 1.9. The Interagency Consultation team agreed that these values would be appropriate for Christian County and these values were used for the Christian County analysis.

1.0.1 VMT Fractions According to 3 TDOT Classes

The report, "2002 Average Truck Percentage by Functional Class (Urban and Rural)", provided by Tennessee Department of Transportation (TDOT), was used to develop the 2002 VMT fractions for 16 vehicle types required as an input to the MOBILE6.2 model at the county/roadway type level. This report provides the fraction of VMT in each county for single-unit truck and multi-unit truck (i.e., tractor-trailers) categories. This was determined, based on vehicle classification counts by vehicle type (i.e., cars, pickups, single unit truck and multiunit tractor-trailer trucks) on different roadways for both rural and urban areas. TDOT performed these counts at 141 sites throughout the state of Tennessee in 2002. The summary of the results of vehicle classification counts is shown in Table 1-1.

TDOT only provided the truck fractions for single unit truck and multi truck categories in the report. The other vehicle categories, such as passenger cars, motorcycles, other 2- axle 4-tire vehicles, and buses, were grouped under "Other" category. Roadway classes in this analysis included interstates, arterials and collectors for rural areas, and interstates, freeway/expressways, arterials and collectors for urban areas. The 2002 rural and urban VMT fractions for the 95 counties among the two vehicle types are listed in Table 1-2.

Table 1-1. TDOT Statewide Vehicle Classification Counts in 2002

Facility Type	No. Sites Sampled	Cars (%)	Motor-cycles (%)	Pickups, Panels, & Vans (%)	Buses (%)	Single Unit Trucks (%)	Tractor/ Trailer Trucks (%)	Total (%)	LDGVs Cars & Trucks (%)	HDVs (%)
RURAL										
Interstates	8	55.93	0.2	14.43	0.21	3.91	25.47	100	70.4	29.4
Principal Arterials	23	70.59	0.73	20.63	0.06	2.33	5.67	100	91.2	8
Minor Arterials	41	72.92	0.46	21.24	0.07	2.04	3.24	100	94.2	5.3
Major Collectors	11	67.06	1.69	27.05	0.01	1.97	2.18	100	94.1	4.2
Minor Collectors	4	68.56	0.97	27.8	0.05	1.92	0.71	100	96.4	2.6
Total Rural	87	64.6	0.45	18.28	0.13	2.94	13.66	100	82.9	16.6
URBAN										
Interstates	6	71.41	0.05	17.02	0.29	2.95	8.5	100	88.4	11.5
Freeways	1	78.58	0.28	14.26	0.04	2.03	4.86	100	92.8	6.9
Principal Arterials	19	78.48	0.45	16.04	0.11	2.03	2.94	100	94.5	5
Minor Arterials	26	81.63	0.38	14.3	0.12	1.77	1.86	100	95.9	3.6
Collectors	2	83.93	0.24	13.89	0.07	1.27	0.64	100	97.8	1.9
Total Urban	54	77.39	0.29	15.86	0.17	2.25	4.6	100	93.3	6.9
Total All Systems	141	72.92	0.35	16.71	0.16	2.49	7.77	100	89.6	10.3

1.0.2 Converting the 3 TDOT Classes to EPA's 28 Vehicle Types

While TDOT provided VMT fractions for 3 vehicle types, the EPA's MOBILE6.2 model requires 16 vehicle categories for the VMT fraction input parameter. Therefore, to obtain VMT fractions by 16 vehicle types, the truck mix, provided by TDOT, needed to be allocated to the 16 vehicle types found in MOBILE6.2. However, as a first step, it needed to be converted to 28 vehicle classes (since the MOBILE6.2 model provides the default VMT fractions for 28 vehicle types) and then be consolidated to 16 vehicle types as required for input to EPA's MOBILE6.2 model.

The two-type truck mixes provided by TDOT and the supplementary category, "Other", were allocated among the 28 vehicle types using default values in MOBILE6.2. The 28 vehicle types were distributed within the 3 TDOT classes based on the national

Table 1-2. Truck Mix of the Two Categories Provided by TDOT

		RURAL						URBAN							
COUNTY		INTERSTATE		ARTERIALS		COLLECTOR		INTERSTATE		FW/EXPWY		ARTERIALS		COLLECTOR	
CODE	NAME	SUT	TT	SUT	TT	SUT	TT	SUT	TT	SUT	TT	SUT	TT	SUT	TT
1	Anderson	0.051	0.237	0.022	0.018	0.02	0.012					0.022	0.013	0.02	0.01
2	Bedford	0.06	0.22	0.037	0.058	0.022	0.011					0.031	0.041	0.024	0.011
3	Benton	0.07	0.33	0.053	0.102	0.027	0.011								
4	Bledsoe			0.044	0.03	0.023	0.01								
5	Blount	0.02	0.01	0.016	0.025	0.029	0.01	0.02	0.01	0.005	0.003	0.029	0.017	0.03	0.011
6	Bradley	0.044	0.217	0.027	0.04	0.031	0.012	0.05	0.24	0.031	0.039	0.022	0.022	0.026	0.01
7	Campbell	0.074	0.321	0.039	0.04	0.033	0.012					0.03	0.017	0.02	0.01
8	Cannon			0.026	0.022	0.027	0.01								
9	Carroll	0.06	0.3	0.039	0.054	0.03	0.02					0.026	0.036	0.021	0.011
10	Carter			0.042	0.03	0.026	0.01			0.04	0.1	0.029	0.013	0.025	0.01
11	Cheatham	0.051	0.208	0.029	0.008	0.029	0.011								
12	Chester			0.068	0.09	0.032	0.011					0.047	0.056	0.032	0.016
13	Claiborne			0.041	0.06	0.03	0.017								
14	Clay			0.04	0.04	0.02	0.01								
15	Cocke	0.03	0.311	0.031	0.014	0.026	0.01	0.03	0.304			0.028	0.011	0.025	0.01
16	Coffee	0.07	0.244	0.033	0.03	0.029	0.01	0.072	0.262			0.026	0.025	0.023	0.009
17	Crockett			0.023	0.114	0.03	0.012								
18	Cumberland	0.069	0.267	0.048	0.054	0.03	0.019	0.07	0.248			0.035	0.023	0.03	0.01
19	Davidson			0.029	0.012	0.048	0.036	0.035	0.128	0.023	0.037	0.026	0.018	0.034	0.01
20	Decatur	0.06	0.29	0.067	0.079	0.028	0.017								
21	Dekalb			0.05	0.027	0.026	0.013								
22	Dickson	0.07	0.35	0.024	0.014	0.03	0.01	0.07	0.349			0.03	0.011	0.025	0.01
23	Dyer	0.04	0.25	0.036	0.106	0.028	0.019	0.031	0.184	0.027	0.17	0.022	0.037	0.02	0.011
24	Fayette	0.06	0.331	0.037	0.04	0.027	0.013								
25	Fentress			0.031	0.05	0.03	0.014								
26	Franklin			0.031	0.036	0.028	0.013					0.029	0.023	0.021	0.01
27	Gibson			0.03	0.043	0.027	0.014					0.033	0.028	0.024	0.01
28	Giles	0.03	0.411	0.042	0.05	0.028	0.01					0.035	0.026	0.023	0.01
29	Grainger			0.029	0.063	0.029	0.011								
30	Greene	0.039	0.288	0.048	0.034	0.029	0.011					0.026	0.023	0.027	0.01
31	Grundy	0.09	0.279	0.026	0.034	0.048	0.03								
32	Hamblen	0.034	0.286	0.042	0.026	0.029	0.011	0.049	0.25			0.029	0.017	0.026	0.01
33	Hamilton	0.047	0.181	0.045	0.046	0.027	0.01	0.046	0.137	0.039	0.03	0.025	0.013	0.024	0.01
34	Hancock			0.028	0.013	0.022	0.011								
35	Hardeman			0.039	0.054	0.024	0.01					0.026	0.031	0.023	0.01
36	Hardin			0.047	0.083	0.031	0.017					0.028	0.032	0.02	0.01
37	Hawkins			0.032	0.034	0.031	0.011					0.028	0.017	0.024	0.01
38	Haywood	0.072	0.347	0.037	0.047	0.032	0.018	0.07	0.336			0.031	0.023	0.031	0.012
39	Henderson	0.06	0.317	0.061	0.066	0.048	0.023					0.032	0.038	0.026	0.012
40	Henry			0.04	0.078	0.038	0.021					0.025	0.031	0.03	0.011
41	Hickman	0.07	0.34	0.032	0.027	0.03	0.02								
42	Houston			0.026	0.024	0.033	0.013								
43	Humphreys	0.07	0.34	0.039	0.08	0.023	0.01								
44	Jackson			0.037	0.029	0.026	0.02								
45	Jefferson	0.048	0.256	0.029	0.037	0.027	0.011	0.05	0.24			0.024	0.022	0.027	0.014
46	Johnson			0.034	0.05	0.038	0.013								
47	Knox	0.045	0.146	0.029	0.021	0.025	0.013	0.037	0.102	0.01	0.02	0.019	0.021	0.026	0.014
48	Lake			0.056	0.048	0.023	0.013								

Units in fraction
FW/EXPWY stands for freeway/expressway
SUT stands for Single Unit Truck
TT stands for Tractor Trailer

Table 1-2. Continued.

		RURAL						URBAN							
COUNTY		INTERSTATE		ARTERIALS		COLLECTOR		INTERSTATE		FW/EXPWY		ARTERIALS		COLLECTOR	
CODE	NAME	SUT	TT	SUT	TT	SUT	TT	SUT	TT	SUT	TT	SUT	TT	SUT	TT
49	Lauderdale			0.059	0.067	0.032	0.02					0.04	0.027	0.018	0.009
50	Lawrence			0.04	0.054	0.037	0.013					0.033	0.023	0.02	0.01
51	Lewis			0.043	0.048	0.028	0.01								
52	Lincoln			0.049	0.076	0.031	0.016					0.035	0.042	0.02	0.01
53	Loudon	0.054	0.22	0.032	0.048	0.026	0.012	0.05	0.205			0.032	0.014	0.036	0.01
54	McMinn	0.042	0.303	0.037	0.036	0.03	0.017	0.04	0.317			0.027	0.017	0.02	0.01
55	McNairy			0.056	0.096	0.032	0.012								
56	Macon			0.03	0.03	0.026	0.014								
57	Madison	0.06	0.309	0.031	0.053	0.032	0.011	0.052	0.254			0.024	0.028	0.024	0.011
58	Marion	0.083	0.248	0.021	0.045	0.038	0.016								
59	Marshall	0.03	0.34	0.036	0.028	0.023	0.011	0.03	0.34			0.034	0.015	0.031	0.015
60	Maury	0.03	0.319	0.041	0.033	0.033	0.01	0.03	0.295	0.064	0.055	0.024	0.026	0.033	0.01
61	Meigs			0.046	0.052	0.022	0.011								
62	Monroe	0.04	0.262	0.03	0.031	0.031	0.01	0.04	0.27			0.031	0.017	0.02	0.01
63	Montgomery	0.04	0.31	0.03	0.026	0.039	0.011	0.032	0.236			0.029	0.021	0.032	0.011
64	Moore			0.03	0.058	0.036	0.013								
65	Morgan			0.029	0.032	0.03	0.011								
66	Obion			0.037	0.074	0.03	0.016					0.03	0.038	0.032	0.01
67	Overton			0.043	0.04	0.024	0.01								
68	Perry			0.04	0.07	0.03	0.039								
69	Pickett			0.042	0.06	0.026	0.009								
70	Polk			0.031	0.051	0.031	0.018								
71	Putnam	0.051	0.239	0.036	0.02	0.038	0.01	0.05	0.256	0.031	0.058	0.021	0.01	0.035	0.01
72	Rhea			0.036	0.051	0.021	0.01					0.03	0.029	0.03	0.015
73	Roane	0.061	0.23	0.03	0.019	0.026	0.01	0.058	0.213			0.032	0.01	0.023	0.01
74	Robertson	0.044	0.191	0.03	0.027	0.021	0.013	0.046	0.152			0.025	0.019	0.022	0.01
75	Rutherford	0.043	0.194	0.033	0.054	0.035	0.013	0.024	0.146	0.05	0.14	0.058	0.017	0.028	0.01
76	Scott			0.046	0.048	0.03	0.01								
77	Sequatchie			0.06	0.082	0.02	0.013								
78	Sevier			0.01	0.018	0.038	0.01	0.055	0.205			0.022	0.013	0.046	0.01
79	Shelby	0.06	0.33	0.035	0.016	0.035	0.015	0.039	0.113	0.02	0.01	0.026	0.018	0.023	0.011
80	Smith	0.052	0.264	0.039	0.02	0.024	0.016								
81	Stewart			0.039	0.058	0.036	0.012								
82	Sullivan	0.03	0.276	0.027	0.021	0.03	0.01	0.028	0.191	0.017	0.028	0.022	0.014	0.023	0.01
83	Sumner	0.05	0.16	0.019	0.025	0.027	0.011	0.045	0.15	0.03	0.01	0.033	0.017	0.022	0.011
84	Tipton			0.042	0.052	0.024	0.011					0.036	0.055	0.039	0.012
85	Trousdale			0.038	0.05	0.02	0.01								
86	Unicoi			0.04	0.092	0.036	0.018					0.046	0.031	0.036	0.011
87	Union			0.028	0.05	0.03	0.01								
88	Van Buren			0.04	0.079	0.036	0.011								
89	Warren			0.039	0.041	0.032	0.01					0.036	0.02	0.026	0.01
90	Washington	0.03	0.24	0.04	0.017	0.029	0.01	0.02	0.045	0.04	0.1	0.037	0.016	0.033	0.012
91	Wayne			0.034	0.073	0.033	0.016								
92	Weakley			0.036	0.031	0.027	0.014					0.025	0.014	0.02	0.01
93	White			0.036	0.06	0.028	0.011								
94	Williamson	0.033	0.218	0.022	0.044	0.028	0.013	0.02	0.101			0.025	0.019	0.026	0.011
95	Wilson	0.042	0.258	0.03	0.045	0.026	0.011	0.03	0.211	0.05	0.14	0.029	0.021	0.026	0.01

Units in fraction
FW/EXPWY stands for freeway/expressway
SUT stands for Single Unit Truck
TT stands for Tractor Trailer

default distribution of vehicles within each of the 3 TDOT classes. The steps are described below.

(1) The 2002, 2010, 2016, 2020 and 2030 default MOBILE6.2 VMT fractions for 28 vehicle types were obtained by running the MOBILE6.2 model for the respective calendar year. This is shown in Table 1-3.

(2) Each of the 28 MOBILE6.2 vehicle types was assigned to one of the 3 TDOT vehicle type classifications as follows:

   a. HDGV3, HDDV3, HDGV4, HDDV4, HDGV5, HDDV5, HDGV6, HDDV6, HDGV7, HDDV7, HDGB, HDDBT, and HDDBS were assigned to the single-unit truck (SUT) category.

   b. HDGV8A, HDDV8A, HDGV8B, and HDDV8B were assigned to the tractor-trailer (TT) multiunit truck category.

   c. LDGV, LDDV, MC, LDGT1, LDGT2, LDGT3, LDGT4, LDDT12, LDDT34, HDGV2B, and HDDV2B were assigned to the "others" category

(3) Within each TDOT vehicle classification (as defined in the previous step), the percentage of the VMT attributable to each EPA vehicle type was calculated. This is shown in Table 1-3.

(4) The TDOT VMT fractions for the three major vehicle classifications (single-unit, multiunit, and others) for each roadway type were separately multiplied by the relative percentages of VMT fractions for each MOBILE6.2 vehicle type included within the TDOT vehicle category (Column labeled "Apportioned VMT fraction" in Table 1-3).

Table 1-3. Apportioned VMT Fraction for the 28 Vehicle Types.

		2002		2010		2016		2020		2030	
Vehicle category by TDOT definition	MOBILE6 vehicle category	**MOBILE6 default VMT**	Apportioned VMT fraction (percent)	**MOBILE6 default VMT**	Apportioned VMT fraction (percent)	**MOBILE6 default VMT**	Apportioned VMT fraction (percent)	**MOBILE6 default VMT**	Apportioned VMT fraction (percent)	**MOBILE6 default VMT**	Apportioned VMT fraction (percent)
SINGLE UNIT TRUCK	HDGV3	0.001027	3.39%	0.001033	3.29%	0.001065	3.36%	0.001092	3.41%	0.001092	3.41%
	HDGV4	0.000522	1.72%	0.000353	1.12%	0.000306	0.97%	0.000305	0.95%	0.000305	0.95%
	HDGV5	0.001164	3.84%	0.001068	3.40%	0.001038	3.28%	0.001042	3.25%	0.001042	3.25%
	HDGV6	0.002489	8.22%	0.002285	7.28%	0.002246	7.09%	0.002249	7.01%	0.002249	7.01%
	HDGV7	0.001132	3.74%	0.000952	3.03%	0.000923	2.91%	0.000921	2.87%	0.000921	2.87%
	HDDV3	0.002778	9.18%	0.002792	8.89%	0.002789	8.80%	0.002815	8.78%	0.002815	8.78%
	HDDV4	0.002438	8.05%	0.002828	9.01%	0.002947	9.30%	0.002986	9.31%	0.002986	9.31%
	HDDV5	0.001085	3.58%	0.001327	4.23%	0.001406	4.44%	0.001437	4.48%	0.001437	4.48%
	HDDV6	0.005944	19.63%	0.006480	20.64%	0.006584	20.78%	0.006682	20.84%	0.006682	20.84%
	HDDV7	0.008851	29.24%	0.009360	29.82%	0.009455	29.84%	0.009571	29.85%	0.009571	29.85%
	HDGB	0.000496	1.64%	0.000167	0.53%	0.000086	0.27%	0.000083	0.26%	0.000083	0.26%
	HDDBT	0.000926	3.06%	0.000948	3.02%	0.000953	3.01%	0.000968	3.02%	0.000968	3.02%
	HDDBS	0.001423	4.70%	0.001796	5.72%	0.001888	5.96%	0.001911	5.96%	0.001911	5.96%
	Total	0.030275	100.00%	0.031389	100.00%	0.031686	100.00%	0.032062	100.00%	0.032062	100.00%
MULTI TRUCK	HDGV8A	0.000004	0.01%	0.000003	0.01%	0.000003	0.01%	0.000003	0.01%	0.000003	0.01%
	HDGV8B	0	0.00%	0.000000	0.00%	0.000000	0.00%	0	0.00%	0	0.00%
	HDDV8A	0.010936	21.91%	0.011180	21.91%	0.011244	21.92%	0.011356	21.91%	0.011356	21.91%
	HDDV8B	0.038966	78.08%	0.039850	78.09%	0.040041	78.07%	0.040469	78.08%	0.040469	78.08%
	Total	0.049906	100.00%	0.051033	100.00%	0.051288	100.00%	0.051828	100.00%	0.051828	100.00%
OTHERS	LDGV	0.463793	50.42%	0.354031	38.58%	0.300117	32.73%	0.279024	30.46%	0.279024	30.46%
	LDDV	0.000781	0.08%	0.000315	0.03%	0.000269	0.03%	0.000251	0.03%	0.000251	0.03%
	MC	0.005983	0.65%	0.005367	0.58%	0.005155	0.56%	0.005049	0.55%	0.005049	0.55%
	LDGT1	0.070491	7.66%	0.089058	9.71%	0.098228	10.71%	0.101635	11.09%	0.101635	11.09%
	LDGT2	0.234672	25.51%	0.296474	32.31%	0.327002	35.66%	0.33834	36.93%	0.33834	36.93%
	LDGT3	0.071379	7.76%	0.090052	9.81%	0.099310	10.83%	0.102749	11.22%	0.102749	11.22%
	LDGT4	0.032825	3.57%	0.041411	4.51%	0.045667	4.98%	0.047251	5.16%	0.047251	5.16%
	LDDT12	0.000221	0.02%	0.000009	0.00%	0.000000	0.00%	0	0.00%	0	0.00%
	LDDT34	0.001451	0.16%	0.001914	0.21%	0.002128	0.23%	0.002207	0.24%	0.002207	0.24%
	HDGV2B	0.028896	3.14%	0.029868	3.26%	0.030158	3.29%	0.030589	3.34%	0.030589	3.34%
	HDDV2B	0.009326	1.01%	0.009077	0.99%	0.008995	0.98%	0.009014	0.98%	0.009014	0.98%
	Total	0.919818	100.00%	0.917576	100.00%	0.917029	100.00%	0.916109	100.00%	0.916109	100.00%
TOTAL		1.000		1.000		1.000		1.000		1.000	

For example, the multi truck category included the MOBILE 6.2 HDGV8A, HDGV8B, HDDV8A, and HDDV8B vehicle types. The default 2002 MOBILE6.2 VMT fraction for HDDV8Bs was divided by the sum of the HDGV8A, HDGV8B, HDDV8A, and HDDV8B default 2002 MOBILE6.2 VMT fractions. This yielded a value of 78.08% in Table 1-4. This number was multiplied by the TDOT vehicle fraction for the multi truck category. Thus, the allocated vehicle fraction for HDDV8B was obtained. In the case of rural interstates in Montgomery County, this yielded a value of 0.24204. This was done separately for each roadway type in rural and urban areas. Tables 1-4 though 1-8 show the results of the allocated vehicle fractions for 28 MOBILE6.2 vehicle types for Montgomery County in 2002, 2010, 2016, 2020, and 2030, respectively.

Table 1-4. VMT Fractions for Montgomery County for the year 2002

				RURAL						URBAN							
				INTERSTATE		ARTERIALS		COLLECTOR & LOCAL		INTERSTATE & RAMP		FW/EXPWY		ARTERIALS		COLLECTOR & LOCAL	
Vehicle category by TDOT definition	MOBILE6 vehicle category	MOBILE6 default VMT for 2002	Apportioned VMT fraction (percent)	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction
	HDGV3	0.001027	3.39%		0.00136		0.00102		0.00132		0.00109				0.00098		0.00109
	HDGV4	0.000522	1.72%		0.00069		0.00052		0.00067		0.00055				0.00050		0.00055
	HDGV5	0.001164	3.84%		0.00154		0.00115		0.00150		0.00123				0.00111		0.00123
	HDGV6	0.002489	8.22%		0.00329		0.00247		0.00321		0.00263				0.00238		0.00263
	HDGV7	0.001132	3.74%		0.00150		0.00112		0.00146		0.00120				0.00108		0.00120
SINGLE	HDDV3	0.002778	9.18%		0.00367		0.00275		0.00358		0.00294				0.00266		0.00294
UNIT	HDDV4	0.002438	8.05%	0.040	0.00322	0.030	0.00242	0.039	0.00314	0.032	0.00258			0.029	0.00234	0.032	0.00258
TRUCK	HDDV5	0.001085	3.58%		0.00143		0.00108		0.00140		0.00115				0.00104		0.00115
	HDDV6	0.005944	19.63%		0.00785		0.00589		0.00766		0.00628				0.00569		0.00628
	HDDV7	0.008851	29.24%		0.01169		0.00877		0.01140		0.00936				0.00848		0.00936
	HDGB	0.000496	1.64%		0.00066		0.00049		0.00064		0.00052				0.00048		0.00052
	HDDBT	0.000926	3.06%		0.00122		0.00092		0.00119		0.00098				0.00089		0.00098
	HDDBS	0.001423	4.70%		0.00188		0.00141		0.00183		0.00150				0.00136		0.00150
	Total	0.030275	100.00%														
	HDGV8A	0.000004	0.01%		0.00002		0.00000		0.00000		0.00002				0.00000		0.00000
MULTI	HDGV8B	0	0.00%	0.310	0.00000	0.026	0.00000	0.011	0.00000	0.236	0.00000			0.021	0.00000	0.011	0.00000
TRUCK	HDDV8A	0.010936	21.91%		0.06793		0.00570		0.00241		0.05172				0.00460		0.00241
	HDDV8B	0.038966	78.08%		0.24204		0.02030		0.00859		0.18427				0.01640		0.00859
	Total	0.049906	100.00%														
	LDGV	0.463793	50.42%		0.32774		0.47599		0.47901		0.36909				0.47901		0.48254
	LDDV	0.000781	0.08%		0.00055		0.00080		0.00081		0.00062				0.00081		0.00081
	MC	0.005983	0.65%		0.00423		0.00614		0.00618		0.00476				0.00618		0.00622
	LDGT1	0.070491	7.66%		0.04981		0.07234		0.07280		0.05610				0.07280		0.07334
	LDGT2	0.234672	25.51%	0.650	0.16583	0.944	0.24084	0.950	0.24237	0.732	0.18675			0.950	0.24237	0.957	0.24416
OTHERS	LDGT3	0.071379	7.76%		0.05044		0.07326		0.07372		0.05680				0.07372		0.07426
	LDGT4	0.032825	3.57%		0.02320		0.03369		0.03390		0.02612				0.03390		0.03415
	LDDT12	0.000221	0.02%		0.00016		0.00023		0.00023		0.00018				0.00023		0.00023
	LDDT34	0.001451	0.16%		0.00103		0.00149		0.00150		0.00115				0.00150		0.00151
	HDGV2B	0.028896	3.14%		0.02042		0.02966		0.02984		0.02300				0.02984		0.03006
	HDDV2B	0.009326	1.01%		0.00659		0.00957		0.00963		0.00742				0.00963		0.00970
	Total	0.919818	100.00%														
TOTAL		1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			1.000	1.000	1.000	1.000

Table 1-5. VMT Fractions for Montgomery County for the year 2010

				RURAL						URBAN							
				INTERSTATE		ARTERIALS		COLLECTOR & LOCAL		INTERSTATE & RAMP		FW/EXPWY		ARTERIALS		COLLECTOR & LOCAL	
Vehicle category by TDOT definition	MOBILE vehicle category	MOBILE default VMT for 2010	Apportioned VMT fraction (percent)	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction
	HDGV3	0.001033	3.29%		0.00132		0.00099		0.00128		0.00105				0.00095		0.00105
	HDGV4	0.000353	1.12%		0.00045		0.00034		0.00044		0.00036				0.00033		0.00036
	HDGV5	0.001068	3.40%		0.00136		0.00102		0.00133		0.00109				0.00099		0.00109
	HDGV6	0.002285	7.28%		0.00291		0.00218		0.00284		0.00233				0.00211		0.00233
	HDGV7	0.000952	3.03%		0.00121		0.00091		0.00118		0.00097				0.00088		0.00097
SINGLE	HDDV3	0.002792	8.89%		0.00356		0.00267		0.00347		0.00285				0.00258		0.00285
UNIT	HDDV4	0.002828	9.01%	0.040	0.00360	0.030	0.00270	0.039	0.00351	0.032	0.00288			0.029	0.00261	0.032	0.00288
TRUCK	HDDV5	0.001327	4.23%		0.00169		0.00127		0.00165		0.00135				0.00123		0.00135
	HDDV6	0.00648	20.64%		0.00826		0.00619		0.00805		0.00661				0.00599		0.00661
	HDDV7	0.00936	29.82%		0.01193		0.00895		0.01163		0.00954				0.00865		0.00954
	HDGB	0.000167	0.53%		0.00021		0.00016		0.00021		0.00017				0.00015		0.00017
	HDDBT	0.000948	3.02%		0.00121		0.00091		0.00118		0.00097				0.00088		0.00097
	HDDBS	0.001796	5.72%		0.00229		0.00172		0.00223		0.00183				0.00166		0.00183
	Total	0.031389	100.00%														
	HDGV8A	0.000003	0.01%		0.00002		0.00000		0.00000		0.00001				0.00000		0.00000
MULTI	HDGV8B	0	0.00%	0.310	0.00000	0.026	0.00000	0.011	0.00000	0.236	0.00000			0.021	0.00000	0.011	0.00000
TRUCK	HDDV8A	0.01118	21.91%		0.06791		0.00570		0.00241		0.05170				0.00460		0.00241
	HDDV8B	0.03985	78.09%		0.24207		0.02030		0.00859		0.18428				0.01640		0.00859
	Total	0.051033	100.00%														
	LDGV	0.354031	38.58%		0.25079		0.36423		0.36654		0.28243				0.36654		0.36924
	LDDV	0.000315	0.03%		0.00022		0.00032		0.00033		0.00025				0.00033		0.00033
	MC	0.005367	0.58%		0.00380		0.00552		0.00556		0.00428				0.00556		0.00560
	LDGT1	0.089058	9.71%		0.06309		0.09162		0.09221		0.07105				0.09221		0.09288
	LDGT2	0.296474	32.31%	0.650	0.21002	0.944	0.30501	0.950	0.30695	0.732	0.23651			0.950	0.30695	0.957	0.30921
OTHERS	LDGT3	0.090052	9.81%		0.06379		0.09265		0.09323		0.07184				0.09323		0.09392
	LDGT4	0.041411	4.51%		0.02934		0.04260		0.04287		0.03304				0.04287		0.04319
	LDDT12	0.000009	0.00%		0.00001		0.00001		0.00001		0.00001				0.00001		0.00001
	LDDT34	0.001914	0.21%		0.00136		0.00197		0.00198		0.00153				0.00198		0.00200
	HDGV2B	0.029868	3.26%		0.02116		0.03073		0.03092		0.02383				0.03092		0.03115
	HDDV2B	0.009077	0.99%		0.00643		0.00934		0.00940		0.00724				0.00940		0.00947
	Total	0.917576	100.00%														
TOTAL		1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			1.000	1.000	1.000	1.000

Table 1-6. VMT Fractions for Montgomery County for the year 2016

				RURAL						URBAN							
				INTERSTATE		ARTERIALS		COLLECTOR & LOCAL		INTERSTATE & RAMP		FW/EXPWY		ARTERIALS		COLLECTOR & LOCAL	
Vehicle category by TDOT definition	MOBILE6 vehicle category	MOBILE6 default VMT for 2016	Apportioned VMT fraction (percent)	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction
	HDGV3	0.001065	3.36%		0.00134		0.00101		0.00131		0.00108				0.00097		0.00108
	HDGV4	0.000306	0.97%		0.00039		0.00029		0.00038		0.00031				0.00028		0.00031
	HDGV5	0.001038	3.28%		0.00131		0.00098		0.00128		0.00105				0.00095		0.00105
	HDGV6	0.002246	7.09%		0.00284		0.00213		0.00276		0.00227				0.00206		0.00227
	HDGV7	0.000923	2.91%		0.00117		0.00087		0.00114		0.00093				0.00084		0.00093
SINGLE	HDDV3	0.002789	8.80%		0.00352		0.00264		0.00343		0.00282				0.00255		0.00282
UNIT	HDDV4	0.002947	9.30%	0.040	0.00372	0.030	0.00279	0.039	0.00363	0.032	0.00298			0.029	0.00270	0.032	0.00298
TRUCK	HDDV5	0.001406	4.44%		0.00177		0.00133		0.00173		0.00142				0.00129		0.00142
	HDDV6	0.006584	20.78%		0.00831		0.00623		0.00810		0.00665				0.00603		0.00665
	HDDV7	0.009455	29.84%		0.01194		0.00895		0.01164		0.00955				0.00865		0.00955
	HDGB	0.000086	0.27%		0.00011		0.00008		0.00011		0.00009				0.00008		0.00009
	HDDBT	0.000953	3.01%		0.00120		0.00090		0.00117		0.00096				0.00087		0.00096
	HDDBS	0.001888	5.96%		0.00238		0.00179		0.00232		0.00191				0.00173		0.00191
	Total	0.031686	100.00%														
	HDGV8A	0.000003	0.01%		0.00002		0.00000		0.00000		0.00001				0.00000		0.00000
MULTI	HDGV8B	0	0.00%	0.310	0.00000	0.026	0.00000	0.011	0.00000	0.236	0.00000			0.021	0.00000	0.011	0.00000
TRUCK	HDDV8A	0.011244	21.92%		0.06796		0.00570		0.00241		0.05174				0.00460		0.00241
	HDDV8B	0.040041	78.07%		0.24202		0.02030		0.00859		0.18425				0.01639		0.00859
	Total	0.051288	100.00%														
	LDGV	0.300117	32.73%		0.21273		0.30894		0.31091		0.23956				0.31091		0.31320
	LDDV	0.000269	0.03%		0.00019		0.00028		0.00028		0.00021				0.00028		0.00028
	MC	0.005155	0.56%		0.00365		0.00531		0.00534		0.00411				0.00534		0.00538
	LDGT1	0.098228	10.71%		0.06963		0.10112		0.10176		0.07841				0.10176		0.10251
	LDGT2	0.327002	35.66%	0.650	0.23178	0.944	0.33662	0.950	0.33876	0.732	0.26102			0.950	0.33876	0.957	0.34126
OTHERS	LDGT3	0.09931	10.83%		0.07039		0.10223		0.10288		0.07927				0.10288		0.10364
	LDGT4	0.045667	4.98%		0.03237		0.04701		0.04731		0.03645				0.04731		0.04766
	LDDT12	0	0.00%		0.00000		0.00000		0.00000		0.00000				0.00000		0.00000
	LDDT34	0.002128	0.23%		0.00151		0.00219		0.00220		0.00170				0.00220		0.00222
	HDGV2B	0.030158	3.29%		0.02138		0.03104		0.03124		0.02407				0.03124		0.03147
	HDDV2B	0.008995	0.98%		0.00638		0.00926		0.00932		0.00718				0.00932		0.00939
	Total	0.917029	100.00%														
TOTAL		1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			1.000	1.000	1.000	1.000

Table 1-7. VMT Fractions for Montgomery County for the year 2020

				RURAL						URBAN							
				INTERSTATE		ARTERIALS		COLLECTOR & LOCAL		INTERSTATE & RAMP		FW/EXPWY		ARTERIALS		COLLECTOR & LOCAL	
Vehicle category by TDOT definition	MOBILE6 vehicle category	MOBILE6 default VMT for 2020	Apportioned VMT fraction (percent)	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction
	HDGV3	0.001092	3.41%		0.00136		0.00102		0.00133		0.00109				0.00099		0.00109
	HDGV4	0.000305	0.95%		0.00038		0.00029		0.00037		0.00030				0.00028		0.00030
	HDGV5	0.001042	3.25%		0.00130		0.00097		0.00127		0.00104				0.00094		0.00104
	HDGV6	0.002249	7.01%		0.00281		0.00210		0.00274		0.00224				0.00203		0.00224
	HDGV7	0.000921	2.87%		0.00115		0.00086		0.00112		0.00092				0.00083		0.00092
SINGLE	HDDV3	0.002815	8.78%		0.00351		0.00263		0.00342		0.00281				0.00255		0.00281
UNIT	HDDV4	0.002986	9.31%	0.040	0.00373	0.030	0.00279	0.039	0.00363	0.032	0.00298			0.029	0.00270	0.032	0.00298
TRUCK	HDDV5	0.001437	4.48%		0.00179		0.00134		0.00175		0.00143				0.00130		0.00143
	HDDV6	0.006682	20.84%		0.00834		0.00625		0.00813		0.00667				0.00604		0.00667
	HDDV7	0.009571	29.85%		0.01194		0.00896		0.01164		0.00955				0.00866		0.00955
	HDGB	0.000083	0.26%		0.00010		0.00008		0.00010		0.00008				0.00008		0.00008
	HDDBT	0.000968	3.02%		0.00121		0.00091		0.00118		0.00097				0.00088		0.00097
	HDDBS	0.001911	5.96%		0.00238		0.00179		0.00232		0.00191				0.00173		0.00191
	Total	0.032062	100.00%														
	HDGV8A	0.000003	0.01%		0.00002		0.00000		0.00000		0.00001				0.00000		0.00000
MULTI	HDGV8B	0	0.00%	0.310	0.00000	0.026	0.00000	0.011	0.00000	0.236	0.00000			0.021	0.00000	0.011	0.00000
TRUCK	HDDV8A	0.011356	21.91%		0.06792		0.00570		0.00241		0.05171				0.00460		0.00241
	HDDV8B	0.040469	78.08%		0.24206		0.02030		0.00859		0.18428				0.01640		0.00859
	Total	0.051828	100.00%														
	LDGV	0.279024	30.46%		0.19797		0.28752		0.28935		0.22295				0.28935		0.29148
	LDDV	0.000251	0.03%		0.00018		0.00026		0.00026		0.00020				0.00026		0.00026
	MC	0.005049	0.55%		0.00358		0.00520		0.00524		0.00403				0.00524		0.00527
	LDGT1	0.101635	11.09%		0.07211		0.10473		0.10539		0.08121				0.10539		0.10617
	LDGT2	0.33834	36.93%	0.650	0.24006	0.944	0.34864	0.950	0.35086	0.732	0.27034			0.950	0.35086	0.957	0.35344
OTHERS	LDGT3	0.102749	11.22%		0.07290		0.10588		0.10655		0.08210				0.10655		0.10734
	LDGT4	0.047251	5.16%		0.03353		0.04869		0.04900		0.03776				0.04900		0.04936
	LDDT12	0	0.00%		0.00000		0.00000		0.00000		0.00000				0.00000		0.00000
	LDDT34	0.002207	0.24%		0.00157		0.00227		0.00229		0.00176				0.00229		0.00231
	HDGV2B	0.030589	3.34%		0.02170		0.03152		0.03172		0.02444				0.03172		0.03195
	HDDV2B	0.009014	0.98%		0.00640		0.00929		0.00935		0.00720				0.00935		0.00942
	Total	0.916109	100.00%														
TOTAL		1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			1.000	1.000	1.000	1.000

Table 1-8. VMT Fractions for Montgomery County for the year 2030

				RURAL						URBAN							
				INTERSTATE		ARTERIALS		COLLECTOR & LOCAL		INTERSTATE & RAMP		FW/EXPWY		ARTERIALS		COLLECTOR & LOCAL	
Vehicle category by TDOT definition	MOBILE6 vehicle category	MOBILE6 default VMT for 2030	Apportioned VMT fraction (percent)	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction	Vehicle fraction provided by TDOT	Allocated vehicle fraction
	HDGV3	0.001092	3.41%		0.00136		0.00102		0.00133		0.00109				0.00099		0.00109
	HDGV4	0.000305	0.95%		0.00038		0.00029		0.00037		0.00030				0.00028		0.00030
	HDGV5	0.001042	3.25%		0.00130		0.00097		0.00127		0.00104				0.00094		0.00104
	HDGV6	0.002249	7.01%		0.00281		0.00210		0.00274		0.00224				0.00203		0.00224
	HDGV7	0.000921	2.87%		0.00115		0.00086		0.00112		0.00092				0.00083		0.00092
SINGLE	HDDV3	0.002815	8.78%		0.00351		0.00263		0.00342		0.00281				0.00255		0.00281
UNIT	HDDV4	0.002986	9.31%	0.040	0.00373	0.030	0.00279	0.039	0.00363	0.032	0.00298			0.029	0.00270	0.032	0.00298
TRUCK	HDDV5	0.001437	4.48%		0.00179		0.00134		0.00175		0.00143				0.00130		0.00143
	HDDV6	0.006682	20.84%		0.00834		0.00625		0.00813		0.00667				0.00604		0.00667
	HDDV7	0.009571	29.85%		0.01194		0.00896		0.01164		0.00955				0.00866		0.00955
	HDGB	0.000083	0.26%		0.00010		0.00008		0.00010		0.00008				0.00008		0.00008
	HDDBT	0.000968	3.02%		0.00121		0.00091		0.00118		0.00097				0.00088		0.00097
	HDDBS	0.001911	5.96%		0.00238		0.00179		0.00232		0.00191				0.00173		0.00191
	Total	0.032062	100.00%														
	HDGV8A	0.000003	0.01%		0.00002		0.00000		0.00000		0.00001				0.00000		0.00000
MULTI	HDGV8B	0	0.00%	0.310	0.00000	0.026	0.00000	0.011	0.00000	0.236	0.00000			0.021	0.00000	0.011	0.00000
TRUCK	HDDV8A	0.011356	21.91%		0.06792		0.00570		0.00241		0.05171				0.00460		0.00241
	HDDV8B	0.040469	78.08%		0.24206		0.02030		0.00859		0.18428				0.01640		0.00859
	Total	0.051828	100.00%														
	LDGV	0.279024	30.46%		0.19797		0.28752		0.28935		0.22295				0.28935		0.29148
	LDDV	0.000251	0.03%		0.00018		0.00026		0.00026		0.00020				0.00026		0.00026
	MC	0.005049	0.55%		0.00358		0.00520		0.00524		0.00403				0.00524		0.00527
	LDGT1	0.101635	11.09%		0.07211		0.10473		0.10539		0.08121				0.10539		0.10617
	LDGT2	0.33834	36.93%	0.650	0.24006	0.944	0.34864	0.950	0.35086	0.732	0.27034			0.950	0.35086	0.957	0.35344
OTHERS	LDGT3	0.102749	11.22%		0.07290		0.10588		0.10655		0.08210				0.10655		0.10734
	LDGT4	0.047251	5.16%		0.03353		0.04869		0.04900		0.03776				0.04900		0.04936
	LDDT12	0	0.00%		0.00000		0.00000		0.00000		0.00000				0.00000		0.00000
	LDDT34	0.002207	0.24%		0.00157		0.00227		0.00229		0.00176				0.00229		0.00231
	HDGV2B	0.030589	3.34%		0.02170		0.03152		0.03172		0.02444				0.03172		0.03195
	HDDV2B	0.009014	0.98%		0.00640		0.00929		0.00935		0.00720				0.00935		0.00942
	Total	0.916109	100.00%														
TOTAL		1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000			1.000	1.000	1.000	1.000

1.0.3 Use of Developed VMT Fractions in the MOBILE6.2 Model

The VMT fraction values for 28 vehicle types were generated at the roadway type level. However, the MOBILE6.2 model requires VMT fractions for 16 combined vehicle types as an input. Many of the 28 individual classes are in pairs: a gasoline-fueled class and a corresponding diesel-fueled class.

The 16 vehicle classes required as an input in the MOBILE6.2 model are:

1) LDV: Light-Duty Vehicles (Passenger Cars)
2) LDT1: Light-Duty Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW)
3) LDT2: Light-Duty Trucks 2 (0-6,000 lbs. GVWR, 3,751-5,750 lbs. LVW)
4) LDT3: Light-Duty Trucks 3 (6,001-8,500 lbs. GVWR, 0-3,750 lbs. LVW)
5) LDT4: Light-Duty Trucks 4 (6,001-8,500 lbs. GVWR, 3,751-5,750 lbs. LVW)
6) HDV2B: Class 2b Heavy Duty Vehicles (8,501-10,000 lbs. GVWR)
7) HDV3: Class 3 Heavy Duty Vehicles (10,001-14,000 lbs. GVWR)
8) HDV4: Class 4 Heavy Duty Vehicles (14,001-16,000 lbs. GVWR)
9) HDV5: Class 5 Heavy Duty Vehicles (16,001-19,500 lbs. GVWR)
10) HDV6: Class 6 Heavy Duty Vehicles (19,501-26,000 lbs. GVWR)
11) HDV7: Class 7 Heavy Duty Vehicles (26,001-33,000 lbs. GVWR)
12) HDV8A: Class 8a Heavy Duty Vehicles (33,001-60,000 lbs. GVWR)
13) HDV8B: Class 8b Heavy Duty Vehicles (>60,000 lbs. GVWR)
14) HDBS: School Buses
15) HDBT: Transit and Urban Buses
16) MC: Motorcycles (All)

The VMT fractions for the 28 vehicle classes were regrouped, resulting in 16 classes as follows: LDV (LDGV + LDDV), LDT1 (LDGT1), LDT2 (LDGT2 + LDDT12), LDT3 (LDGT3), LDT4 (LDGT4 + LDDT34), HDV2B (HDGV2B + HDDV2B), HDV3 (HDGV3 + HDDV3), HDV4 (HDGV4 + HDDV4), HDV5 (HDGV5 + HDDV5), HDV6 (HDGV6 + HDDV6), HDV7 (HDGV7 + HDDV7), HDV8A (HDGV8A + HDDV8A), HDV8B (HDGV8B + HDDV8B), HDBS (HDGB + HDDBS), HDBT (HDDBT), and MC (MC). This yields VMT fractions for the 16 combined vehicle types in the appropriate input format required by the MOBILE6.2 model. This procedure was applied for each year. The VMT fractions by 16 vehicle types are shown in Table 1-9. In the MOBILE6.2 model, the 16 vehicle types were split into the 28 vehicle types internally by accounting for national diesel sales fractions and annual mileage accumulation rates.

Table 1-9. The VMT Fractions by 16 Vehicle Categories for 7 Roadway Types for Montgomery County

YEAR		ROADWAY	LDV	LDT1	LDT2	LDT3	LDT4	HDV2B	HDV3	HDV4	HDV5	HDV6	HDV7	HDV8A	HDV8B	HDBS	HDBT	MC	total
2002	Rural	Interstate	0.32830	0.04981	0.16599	0.05044	0.02422	0.02701	0.00503	0.00391	0.00297	0.01114	0.01319	0.06796	0.24204	0.00254	0.00122	0.00423	1.00000
		Arterials	0.47678	0.07234	0.24107	0.07326	0.03518	0.03923	0.00377	0.00293	0.00223	0.00836	0.00989	0.00570	0.02030	0.00190	0.00092	0.00614	1.00000
		Collector & Local	0.47983	0.07280	0.24260	0.07372	0.03540	0.03948	0.00490	0.00381	0.00290	0.01086	0.01286	0.00241	0.00859	0.00247	0.00119	0.00618	1.00000
	Urban	Interstate & Ramp Fw/Expwy	0.36971	0.05610	0.18693	0.05680	0.02728	0.03042	0.00402	0.00313	0.00238	0.00891	0.01055	0.05173	0.18427	0.00203	0.00098	0.00476	1.00000
		Arterials	0.47982	0.07280	0.24260	0.07372	0.03540	0.03948	0.00364	0.00284	0.00215	0.00808	0.00956	0.00460	0.01640	0.00184	0.00089	0.00618	1.00000
		Collector & Local	0.48336	0.07334	0.24439	0.07426	0.03566	0.03977	0.00402	0.00313	0.00238	0.00891	0.01055	0.00241	0.00859	0.00203	0.00098	0.00622	1.00000
2010	Rural	Interstate	0.25102	0.06309	0.21003	0.06379	0.03069	0.02759	0.00487	0.00405	0.00305	0.01117	0.01314	0.06793	0.24207	0.00250	0.00121	0.00380	1.00000
		Areterial	0.36454	0.09162	0.30501	0.09265	0.04457	0.04007	0.00366	0.00304	0.00229	0.00838	0.00986	0.00570	0.02030	0.00188	0.00091	0.00552	1.00000
		Collector & Local	0.36686	0.09221	0.30696	0.09323	0.04486	0.04032	0.00475	0.00395	0.00298	0.01089	0.01281	0.00241	0.00859	0.00244	0.00118	0.00556	1.00000
	Urban	Interstate & Ramp Fw/Expwy	0.28268	0.07105	0.23652	0.07184	0.03456	0.03107	0.00390	0.00324	0.00244	0.00894	0.01051	0.05172	0.18428	0.00200	0.00097	0.00428	1.00000
		Arterial	0.36686	0.09221	0.30696	0.09323	0.04486	0.04032	0.00353	0.00294	0.00221	0.00810	0.00953	0.00460	0.01640	0.00181	0.00088	0.00556	1.00000
		Collector & Local	0.36957	0.09288	0.30922	0.09392	0.04519	0.04062	0.00390	0.00324	0.00244	0.00894	0.01051	0.00241	0.00859	0.00200	0.00097	0.00560	1.00000
2016	Rural	Interstate	0.21291	0.06963	0.23178	0.07039	0.03388	0.02775	0.00487	0.00411	0.00309	0.01115	0.01310	0.06798	0.24202	0.00249	0.00120	0.00365	1.00000
		Areterial	0.30922	0.10112	0.33662	0.10223	0.04920	0.04030	0.00365	0.00308	0.00231	0.00836	0.00983	0.00570	0.02030	0.00187	0.00090	0.00531	1.00000
		Collector & Local	0.31120	0.10176	0.33876	0.10288	0.04951	0.04056	0.00474	0.00400	0.00301	0.01087	0.01277	0.00241	0.00859	0.00243	0.00117	0.00534	1.00000
	Urban	Interstate & Ramp Fw/Expwy	0.23979	0.07841	0.26102	0.07927	0.03815	0.03125	0.00389	0.00329	0.00247	0.00892	0.01048	0.05175	0.18425	0.00199	0.00096	0.00411	1.00000
		Arterial	0.31118	0.10176	0.33876	0.10288	0.04951	0.04056	0.00353	0.00298	0.00224	0.00808	0.00950	0.00461	0.01639	0.00181	0.00087	0.00534	1.00000
		Collector & Local	0.31347	0.10251	0.34126	0.10364	0.04988	0.04086	0.00389	0.00329	0.00247	0.00892	0.01048	0.00241	0.00859	0.00199	0.00096	0.00538	1.00000
2020	Rural	Interstate	0.19816	0.07211	0.24006	0.07290	0.03509	0.02810	0.00487	0.00411	0.00309	0.01114	0.01309	0.06794	0.24206	0.00249	0.00121	0.00358	1.00000
		Areterial	0.28776	0.10473	0.34864	0.10588	0.05096	0.04081	0.00366	0.00308	0.00232	0.00836	0.00982	0.00570	0.02030	0.00187	0.00091	0.00520	1.00000
		Collector & Local	0.28961	0.10539	0.35085	0.10655	0.05129	0.04107	0.00475	0.00400	0.00302	0.01086	0.01276	0.00241	0.00859	0.00243	0.00118	0.00524	1.00000
	Urban	Interstate & Ramp Fw/Expwy	0.22316	0.08121	0.27035	0.08210	0.03952	0.03164	0.00390	0.00328	0.00247	0.00891	0.01047	0.05172	0.18428	0.00199	0.00097	0.00403	1.00000
		Arterial	0.28960	0.10539	0.35086	0.10655	0.05129	0.04107	0.00353	0.00298	0.00224	0.00808	0.00949	0.00460	0.01640	0.00180	0.00088	0.00524	1.00000
		Collector & Local	0.29175	0.10617	0.35344	0.10734	0.05167	0.04137	0.00390	0.00328	0.00247	0.00891	0.01047	0.00241	0.00859	0.00199	0.00097	0.00527	1.00000
2030	Rural	Interstate	0.19816	0.07211	0.24006	0.07290	0.03509	0.02810	0.00487	0.00411	0.00309	0.01114	0.01309	0.06794	0.24206	0.00249	0.00121	0.00358	1.00000
		Areterial	0.28777	0.10473	0.34863	0.10588	0.05096	0.04081	0.00366	0.00308	0.00232	0.00836	0.00982	0.00570	0.02030	0.00187	0.00091	0.00520	1.00000
		Collector & Local	0.28960	0.10539	0.35086	0.10655	0.05129	0.04107	0.00475	0.00400	0.00302	0.01086	0.01276	0.00241	0.00859	0.00243	0.00118	0.00524	1.00000
	Urban	Interstate & Ramp Fw/Expwy	0.22316	0.08121	0.27035	0.08210	0.03952	0.03164	0.00390	0.00328	0.00247	0.00891	0.01047	0.05172	0.18428	0.00199	0.00097	0.00403	1.00000
		Arterial	0.28960	0.10539	0.35086	0.10655	0.05129	0.04107	0.00353	0.00298	0.00224	0.00808	0.00949	0.00460	0.01640	0.00180	0.00088	0.00524	1.00000
		Collector & Local	0.29175	0.10617	0.35344	0.10734	0.05167	0.04137	0.00390	0.00328	0.00247	0.00891	0.01047	0.00241	0.00859	0.00199	0.00097	0.00527	1.00000

1.1 Vehicle Age Distribution

Registration distribution by age is the fraction of vehicles by age in the fleet. Area specific registration distributions for Christian County were not available. Much of the VMT on Interstate 24 is by vehicles registered in other counties both in Tennessee, Kentucky, and other states. Also, in order to be consistent with the approach used by the Tennessee Department of Transportation (TDOT) the national default registration age distribution was used for all vehicle categories for Christian County. The national default registration age distribution is shown in Table 1-10.

The default MOBILE6 values for the distribution of vehicles by age are for July of any calendar year. There are 16 values indicating 16 combined gasoline/diesel vehicle classes. The 16 vehicle classes were described in the previous section, 1.1.3. Each distribution includes 25 values, one for each year for 25 years. This represents the fraction of all vehicles in that class of that age in July. Vehicle age can be obtained by calculating calendar year minus model year plus one. The last age 25 includes all vehicles of age 25 or older.

Table 1-10. National Default Registration Age Distribution for 16 vehicle classes.

Age	LDV	LDT1	LDT2	LDT3	LDT4	HDV2B	HDV3	HDV4	HDV5	HDV6	HDV7	HDV8a	HDV8b	HDBS	HDBT	Motorcycles
1	0.0530	0.0581	0.0581	0.0594	0.0594	0.0503	0.0503	0.0388	0.0388	0.0388	0.0388	0.0388	0.0388	0.0393	0.0307	0.1440
2	0.0706	0.0774	0.0774	0.0738	0.0738	0.0916	0.0916	0.0726	0.0726	0.0726	0.0726	0.0726	0.0726	0.0734	0.0614	0.1680
3	0.0706	0.0769	0.0769	0.0688	0.0688	0.0833	0.0833	0.0679	0.0679	0.0679	0.0679	0.0679	0.0679	0.0686	0.0614	0.1350
4	0.0705	0.0760	0.0760	0.0640	0.0640	0.0758	0.0758	0.0635	0.0635	0.0635	0.0635	0.0635	0.0635	0.0641	0.0614	0.1090
5	0.0703	0.0745	0.0745	0.0597	0.0597	0.0690	0.0690	0.0594	0.0594	0.0594	0.0594	0.0594	0.0594	0.0599	0.0614	0.0880
6	0.0698	0.0723	0.0723	0.0556	0.0556	0.0627	0.0627	0.0556	0.0556	0.0556	0.0556	0.0556	0.0556	0.0559	0.0614	0.0700
7	0.0689	0.0693	0.0693	0.0518	0.0518	0.0571	0.0571	0.0520	0.0520	0.0520	0.0520	0.0520	0.0520	0.0522	0.0614	0.0560
8	0.0676	0.0656	0.0656	0.0482	0.0482	0.0519	0.0519	0.0486	0.0486	0.0486	0.0486	0.0486	0.0486	0.0488	0.0614	0.0450
9	0.0655	0.0610	0.0610	0.0449	0.0449	0.0472	0.0472	0.0455	0.0455	0.0455	0.0455	0.0455	0.0455	0.0456	0.0614	0.0360
10	0.0627	0.0557	0.0557	0.0419	0.0419	0.0430	0.0430	0.0425	0.0425	0.0425	0.0425	0.0425	0.0425	0.0426	0.0613	0.0290
11	0.0588	0.0498	0.0498	0.0390	0.0390	0.0391	0.0391	0.0398	0.0398	0.0398	0.0398	0.0398	0.0398	0.0398	0.0611	0.0230
12	0.0539	0.0436	0.0436	0.0363	0.0363	0.0356	0.0356	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372	0.0607	0.0970
13	0.0458	0.0372	0.0372	0.0338	0.0338	0.0324	0.0324	0.0348	0.0348	0.0348	0.0348	0.0348	0.0348	0.0347	0.0595	0.0000
14	0.0363	0.0309	0.0309	0.0315	0.0315	0.0294	0.0294	0.0326	0.0326	0.0326	0.0326	0.0326	0.0326	0.0324	0.0568	0.0000
15	0.0288	0.0249	0.0249	0.0294	0.0294	0.0268	0.0268	0.0304	0.0304	0.0304	0.0304	0.0304	0.0304	0.0303	0.0511	0.0000
16	0.0228	0.0195	0.0195	0.0274	0.0274	0.0244	0.0244	0.0285	0.0285	0.0285	0.0285	0.0285	0.0285	0.0283	0.0406	0.0000
17	0.0181	0.0147	0.0147	0.0255	0.0255	0.0222	0.0222	0.0266	0.0266	0.0266	0.0266	0.0266	0.0266	0.0264	0.0254	0.0000
18	0.0144	0.0107	0.0107	0.0237	0.0237	0.0202	0.0202	0.0249	0.0249	0.0249	0.0249	0.0249	0.0249	0.0247	0.0121	0.0000
19	0.0114	0.0085	0.0085	0.0221	0.0221	0.0184	0.0184	0.0233	0.0233	0.0233	0.0233	0.0233	0.0233	0.0231	0.0099	0.0000
20	0.0090	0.0081	0.0081	0.0206	0.0206	0.0167	0.0167	0.0218	0.0218	0.0218	0.0218	0.0218	0.0218	0.0216	0.0081	0.0000
21	0.0072	0.0078	0.0078	0.0192	0.0192	0.0152	0.0152	0.0204	0.0204	0.0204	0.0204	0.0204	0.0204	0.0201	0.0066	0.0000
22	0.0057	0.0075	0.0075	0.0179	0.0179	0.0138	0.0138	0.0191	0.0191	0.0191	0.0191	0.0191	0.0191	0.0188	0.0054	0.0000
23	0.0045	0.0072	0.0072	0.0167	0.0167	0.0126	0.0126	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0176	0.0044	0.0000
24	0.0036	0.0069	0.0069	0.0156	0.0156	0.0114	0.0114	0.0167	0.0167	0.0167	0.0167	0.0167	0.0167	0.0165	0.0037	0.0000
25	0.0102	0.0359	0.0359	0.0732	0.0732	0.0499	0.0499	0.0797	0.0797	0.0797	0.0797	0.0797	0.0797	0.0781	0.0114	0.0000
total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

1.3 Average Speed Values

MOBILE6.2 defines average speed as the distance traveled (in miles) divided by the time (in hours). The average speeds to be used for modeling emissions for Christian County, Kentucky are shown in Table 1.11. Representative vehicle speeds have been determined by roadway type for Christian County Kentucky. The speeds for Christian County were developed by applying the results from the University of Kentucky study "Speed Estimation for Air Quality", November, 2004 to Christian County data. Additionally, traffic studies performed by the Kentucky Transportation Cabinet (KYTC) confirmed the reasonableness of these values. These speeds should be representative of local conditions in both Christian and Montgomery Counties. Very similar speeds have been used in previous estimates of emissions in Tennessee counties.

Table 1-11. Average Speeds Used in the Model

HPMS Road Types	Speed (mph)
Rural Interstates	70.7
Rural Principal Arterials	55.0
Rural Minor Arterials	51.1
Rural Major collectors	54.1
Rural Minor Collectors	47.1
Rural Local Streets	36.1
Urban Interstates	72.0
Urban Freeway/Expressway	72.8
Urban Principal Arterials	35.7
Urban Minor Arterials	31.0
Urban Collectors	28.8
Urban Local Streets	12.9

The average speed values are required as an input to the MOBILE6.2 model for interstate and arterial roadway types. The speeds shown in Table 1-11 were input to the model using the "average speed" command. EPA technical guidance for use of

MOBILE6 requires that 34.6 mph be used for interstate ramps and suggests that 12.9 mph be used for local streets unless local data exists. The default value of 12.9 mph was used for urban local roads, but 36.1 mph was used for rural local roads based on the KYTC data.

The MOBILE6.2 model requires road type be input as either freeway, arterial, local or freeway ramp. The average speeds for principal arterial, minor arterial, major collector, minor collector, and rural local roadway types were considered as "arterial" roadways as far as the model run is concerned. For urban local roadway types, the default value was used as "local" roadway. The "freeway" roadway scenario was used for both rural and urban interstate roadway types for the model runs to estimate emissions from VMT on both interstate and interstate ramps.

The model runs were conducted for non-ramp freeways and freeway ramps using a VMT distribution of 98.5% and 1.5% respectively, for rural interstates and ramps, and 92.4% and 7.6% for urban interstates and ramps. These percentages were obtained from a 2002 KYTC study on interstate ramp VMT. The national default values used in MOBILE6.2 are 92% and 8% for interstates and ramps respectively, which is very similar to the values used in Kentucky in urban areas. Less VMT on ramps of rural interstates is to be expected. An example of the average speed command used in the model for rural interstates is:

AVERAGE SPEED : 70.7 Freeway 98.5 0.0 0.0 1.5

Here, 98.5 is the percentage of VMT the on non-ramp portion of the freeway, and 1.5 is the percentage on freeway ramps.

2.4 Temperatures, Absolute Humidity and Fuel Reid Vapor Pressure (RVP)

The MOBILE model requires inputs of minimum and maximum ambient temperature for the day, absolute humidity of the atmosphere, and fuel vapor pressure for the area. The minimum and maximum daily temperatures used in the model for Montgomery County Tennessee were 69 and 94 F, respectively. These values were calculated by Marc Corrigan of the Tennessee Division of Air Pollution Control based on the temperatures measured in Clarksville on the 10 highest 8-hour average ozone days in the area occurring during the ozone seasons for the years 2000, 2001 and 2002. Similar temperatures (67 and 94 F) were determined by the Kentucky Division of Air Pollution Control for use in Christian County. For the humidity, the MOBILE6.2 default value of 75 gr/lb was used for all runs. Fuel RVP (Reid Vapor Pressure) of 8.6 psi was used based on survey data provided by the Kentucky Division of Air Pollution Control. A fuel RVP of 9.0 psi is the maximum vapor pressure that can be delivered by gasoline marketers during July in both counties (per USEPA regulations).

2.5 Vehicle Miles of Travel

Vehicle miles of travel (VMT) were determined for the base year 2002 using the HPMS (Highway Performance Monitoring System) data from the Kentucky Transportation Cabinet (KYTC) by roadway facility. Travel Demand Modeling (TDM) was performed for the Clarksville MPO by Neel-Schaffer, Inc of Nashville TN. The TDM included the road network for all of Christian County, excluding Fort Campbell,

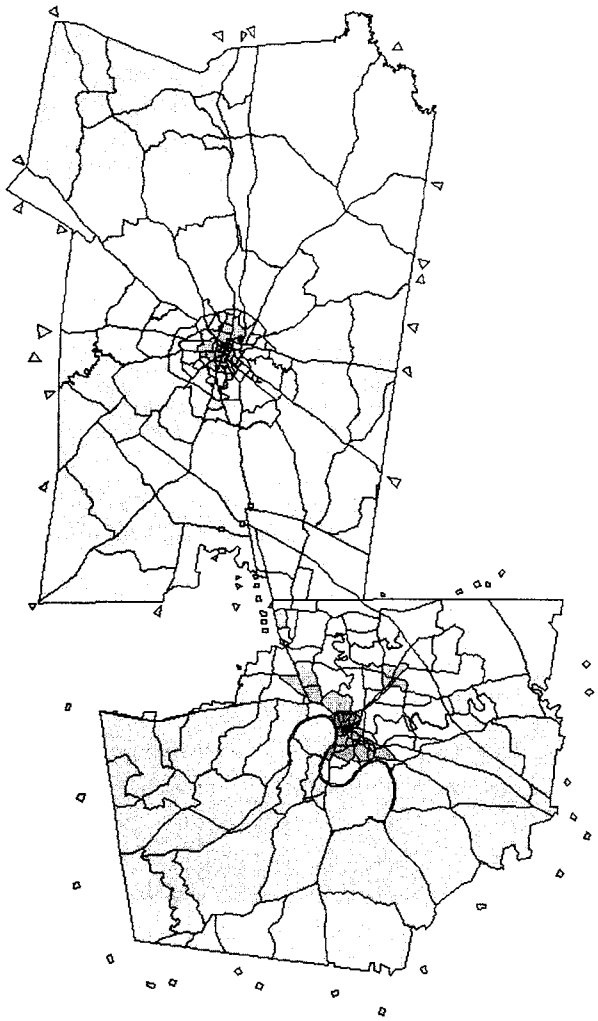
and was used to project VMT growth from the base year 2002 to future years 2010, 2016, 2020 and 2030. Please see spreadsheet provided to the Kentucky Division for Air Quality by KYTC.

2.6 Seasonal Adjustment Factors

Traffic volumes vary by day of the week, month of the year and by different road types. Adjustment factors have been developed by KYTC to account for the variability of traffic volume on Kentucky roads by day of the week, month and road type. These factors were used to adjust annual average daily VMT to average daily VMT for July, in order to more correctly estimate emission during the ozone season (primarily summer months). The adjustment factors used were the average for all days for July. The annual average VMT is divided by the adjustment factors to correct for July traffic. The adjustment factors used were: 0.92 for rural interstates, 0.95 for other rural roads, 0.96 for urban interstates, and 0.98 for all other urban roads. These adjustment factors are reported in KYTC "Traffic Forecasting Report 2004", December 2004.

CHRISTIAN COUNTY, KENTUCKY
AND
MONTGOMERY COUNTY, TENNESSEE

MODEL VALIDATION REPORT



Alliance Transportation Group, Inc.

100 East Anderson Lane ★ Suite 300 ★ Austin, Texas 78752 ★ Phone 1.866.576.0597 ★ FAX 512.821.2085

THIS REPORT PRODUCED BY

ALLIANCE TRANSPORTATION GROUP, INC.

FOR

NEEL-SCHAFFER, INC.

AND

THE CLARKSVILLE-MONTGOMERY COUNTY REGIONAL PLANNING COMMISSION IN COOPERATION WITH THE TENNESSEE DEPARTMENT OF TRANSPORTATION AND THE KENTUCKY TRANSPORTATION CABINET

ALLIANCE Transportation Group, Inc.

100 EAST ANDERSON LANE, SUITE 300

AUSTIN, TEXAS 78752

1-866-576-0597

NEEL-SCHAFFER

210 25TH AVENUE NORTH, SUITE 800

NASHVILLE, TN 37203

615-383-8420

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MODEL VALIDATION

Both Christian and Montgomery County had existing previously validated models. The goal of this contract was to expand and update the two models to a base year of 2002. No new surveys were conducted to support this model update with the exception of an OD survey for the Fort Campbell military base that was not completed in time for use. The two models were validated independently and the statistical analyses of the study areas are reported individually. However, the same study design was used, and the same steps carried out in the validation process for each area. In order to allow the reader to compare the results in the two study areas for consistency and compatibility the documentation of the validation process and the reported results were combined into this single technical memorandum.

The ability of travel demand models to forecast future year traffic and other travel behavior are predicated on their ability to estimate "known" traffic volumes and travel patterns under base year conditions for which extensive data is available. There are two components to the process of matching model results to the observed base year travel data. These components are calibration and validation.

Calibration refers to the process of estimating model variables such as trip rates, friction factors, mean trip length, and trip length frequency distributions. All variables are ideally based on surveyed or observed data. Survey data was limited for the Christian and Montgomery County models. The models relied upon the validations of the previous models and their use of local data.

Validation refers to the process of using a calibrated model to estimate travel assignments for the base year and comparing these travel assignments to observed travel data. The typical comparison, when sufficient data is available, is between highway traffic assignments and actual traffic volumes derived from traffic count data. Extensive traffic counts must be available to validate a model.

Validation of the model to counted traffic flows is important to the model effort in two areas. First, it shows if the calibration tools used in the model process and assumptions were reasonable. Second, the validation shows what level of confidence the user can have in the forecast results.

VALIDATION CRITERIA

Although the principle of comparing traffic assignments to traffic count data is intuitively straightforward, subjective review of the travel demand model results and the observed traffic counts is not adequate. The comparative analysis must be carried out in a structured manner using clearly defined benchmarks or measures of success that allow the results of the validation analysis to be tabulated, and quantitatively analyzed in a way that provides the user with a degree of confidence in the statistical foundation and structure of the model.

The model validation procedure for the Christian and Montgomery County models are similar to the procedure used by state DOTs and MPOs throughout the country. The locations of year 2002 traffic counts provided by the Kentucky Transportation Cabinet and the Tennessee Department of Transportation have been coded to the Christian and Montgomery County roadway networks. Traffic assignment results for the validation year (2002) were compared to these traffic counts to calculate a percent error value that was aggregated and tabulated across a variety of categories. These categories are listed below and discussed individually in the following sections:

- Region-wide
- Facility Type
- Area Type
- Volume range.

REGION-WIDE

The first step in the validation process is to analyze overall vehicle miles of travel (VMT) in the study area.

The two VMT estimates, HPMS and count based, are derived using different methodologies and interpret the data at slightly different scales within the study area. The result of these variations is that the two sources of "observed" data are themselves different, making it impossible to match both values.

Both data sources are, however, valuable in both validation and transportation analysis. Therefore, the proposed goal under this criteria is to match the more direct values of VMT provided by the aggregation of the link based count data, but to also check for reasonableness against the overall HPMS numbers by facility type.

As stated earlier, the main validation criterion is the match between counted and modeled VMT. The table below depicts the VMT produced by the model and by the counts and provides a statistical comparison to demonstrate the quality of the match.

Table 1: Counted vs. Modeled VMT, Christian County

Total Counted VMT On Counted Links	1,088,291
Total Modeled VMT On Counted Links	1,101,019
Root Mean Square Error	1,503
% Root Mean Square Error	25.83%
Percent Modeled VMT Of Counted VMT	101.17%

Table 2: Counted vs. Modeled VMT, Montgomery County

Total Counted VMT On Counted Links	1,503,530
Total Modeled VMT On Counted Links	1,447,435
Root Mean Square Error	3,202
% Root Mean Square Error	33.86%
Percent Modeled VMT Of Counted VMT	96.27%

Overall modeled VMT and the portion that appears on counted links are also of interest and are presented in the following table. The Christian and Montgomery County network has count coverage to represent nearly one-third of the total system VMT. This indicates that a significant number of links contain data that can be used to compare observed data to modeled data.

Table 3: Modeled VMT Summary, Christian County

Total Modeled VMT On Counted Links	1,101,019
Percent Of Modeled VMT On Counted Links	54.89%

Table 4: Modeled VMT Summary, Montgomery County

Total Modeled VMT On Counted Links	1,447,435
Percent Of Modeled VMT On Counted Links	42.50%

The following table compares modeled VMT to counted VMT and HPMS estimated VMT at the county level. Each of the counties modeled versus count based VMT fall within an acceptable range. This indicates that the model is performing well across the model areas.

It should be noted that the VMT's given in the following tables do not include trips inside of Fort Campbell military base. The base trips are treated as external trips and are therefore accounted for in the final VMT numbers. Oak Grove, KY is included in the modeled area of Montgomery County. However, VMT's from Oak Grove are only included in the air quality analysis for Christian County and are not included in the VMT's for Montgomery county.

Table 5: County Counted VMT vs. Modeled VMT

County	% of Count	HPMS VMT	Modeled VMT
Christian[1]	98.41%	2,267,714	2,231,719
Montgomery[2]	93.04%	3,437,467	3,198,331

VMT is output from the models in the following aggregations coded on each link of the networks. The table here is for 2002.

Table 6: 2002 Average Speed and Modeled VMT, Christian County

Facility Type	2002 Average Speed (MPH)	2002 Modeled VMT
RURAL INTERSTATE	66.35	430,641
RURAL LOCAL	26.15	136,158
RURAL MAJOR COLLECTOR	39.28	204,682
RURAL MINOR ARTERIAL	48.19	8,036
RURAL MINOR COLLECTOR	39.29	124,007
RURAL PRINCIPAL ARTERIAL	51.54	259,774
URBAN COLLECTOR	18.51	39,465
URBAN FREEWAY	19.49	83,913
URBAN INTERSTATE	59.07	112,237
URBAN LOCAL	25.47	163,540
URBAN MINOR ARTERIAL	39.28	187,533
URBAN PRINCIPAL ARTERIAL	44.31	481,734
Total	45.12	2,231,720

[1] Christian VMT does not include Fort Campbell.
[2] Montgomery Modeled VMT includes neither Fort Campbell nor portions of model in KY.

Table 7: 2002 Average Speed and Modeled VMT, Montgomery County

Facility Type	2002 Average Speed (MPH)	2002 Modeled VMT
KY KY[3]	38.05	425,864.00
RURAL INT RAMP[4]	0.00	0.0
RURAL INTERSTATE	62.91	254,680.00
RURAL LOCAL	24.14	171,842.00
RURAL MAJOR COLLECTOR	41.62	94,567.00
RURAL MINOR ARTERIAL	48.40	244,179.00
RURAL MINOR COLLECTOR	39.79	125,723.00
RURAL PRINCIPAL ARTERI	20.31	83,150.00
URBAN COLLECTOR	29.48	128,145.00
URBAN INT RAMP	31.51	23,583.00
URBAN INTERSTATE	62.60	348,239.00
URBAN LOCAL	24.03	285,207.00
URBAN MINOR ARTERIAL	39.62	616,844.00
URBAN PRINCIPAL ARTERI	36.67	822,172.00
Total[5]	40.45	3,198,331.00

FACILITY TYPE

Another criterion for model validation is to compare assigned traffic volumes to traffic counts aggregated by facility type. The following facility types are used in the Christian and Montgomery County models.

Table 8: Christian And Montgomery County Facility Types

FACILITY TYPE	FACILITY TYPE NUMBER
Freeway	10
Expressway	20
Principal Arterial	22
Minor Arterial	35
Collector	40
Ramp	15
Centroid Connector	99

[3] VMT in KY portion of model.
[4] No VMT in this class for base year.
[5] Does not include KY VMT

The comparison of assigned volumes to counted volumes is considered successful if the value for percent error falls within the ranges suggested by the FHWA depicted below.

Table 9: FHWA Facility Type Validation Targets

FACILITY TYPE	FHWA TARGETS
Freeway	+/- 7%
Major Arterial	10%
Minor Arterial	15%
Collector	25%

The following table shows that the model is matching counts by facility type within the FHWA Facility Type Validation Targets. The freeways and expressways facility types were combined due to the low number of counts available in each class. Also, expressway validation criteria were not available from the FHWA. Both are limited access facilities.

Table 10: Counted VMT vs. Modeled VMT by Facility Type, Christian County

FACILITY TYPE	% OF COUNT	LINKS WITH COUNT	COUNTED VMT	MODELED VMT
Freeway / Expressway	103.81%	29	584,103	606,358
Principal Arterial	92.58%	50	224,829	208,141
Minor Arterial	91.94%	30	75,525	69,436
Collector	106.50%	78	203,835	217,084

Table 11: Counted VMT vs. Modeled VMT by Facility Type, Montgomery County

FACILITY TYPE	% OF COUNT	LINKS WITH COUNT	COUNTED VMT	MODELED VMT
Freeway / Expressway	95.88%	22	773,523	741,645
Principal Arterial	92.52%	37	423,941	392,243
Minor Arterial	98.33%	36	195,231	191,962
Collector	109.70%	64	110,835	121,585

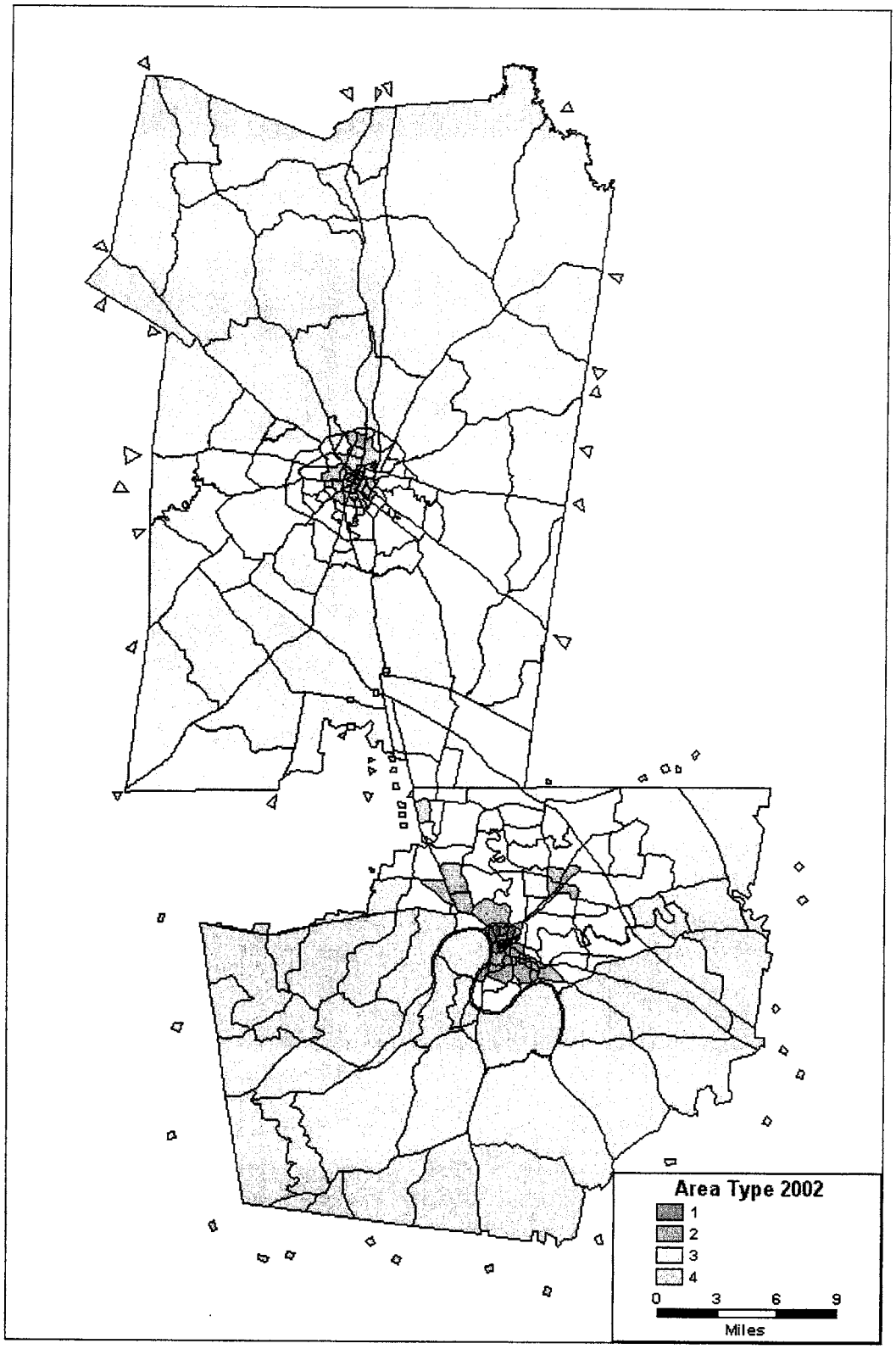
AREA TYPE

The following shows the comparison between assigned and counted volumes by area type. The target for this criterion is for the aggregate modeled volume to be within 15% of the aggregate observed volume for each area type. The following area types were used for the Christian and Montgomery County models.

Table 12: Christian And Montgomery County Area Types

Area Types	Area Type Number
CBD	1
Urban	2
Suburban	3
Rural	4

Figure 1: Christian And Montgomery County Area Type Map[6]



[6] Modeled areas do not include Fort Campbell Military Base

The comparison between counted and modeled VMT by area type is within FHWA validation criterion for all area types for both model areas.

Table 13: Counted VMT vs. Modeled VMT by Area Type, Christian County

AREA TYPE	% OF COUNT	LINKS WITH COUNT	COUNTED VMT	MODELED VMT	ROOT MEAN SQUARED	% ROOT MEAN SQUARED
CBD	86.80%	2	4,116	3,573	539	26.19%
Urban	98.15%	21	62,842	61,680	1,149	38.40%
Suburban	114.02%	30	79,911	91,117	1,053	39.55%
Rural	100.34%	134	941,423	944,650	1,641	23.36%

Table 14: Counted VMT vs. Modeled VMT by Area Type, Montgomery County

AREA TYPE	% OF COUNT	LINKS WITH COUNT	COUNTED VMT	MODELED VMT	ROOT MEAN SQUARED	% ROOT MEAN SQUARED
CBD	89.08%	6	31,217	27,809	1,850	35.56%
Urban	92.54%	14	95,096	88,003	2,931	43.15%
Suburban	95.30%	37	629,671	600,060	5,647	33.18%
Rural	97.86%	102	747,547	731,563	1,742	23.77%

VOLUME RANGE

The final validation criterion is to compare observed verses modeled volumes within acceptable volume ranges. This section documents them as meeting the suggested targets used by the Michigan Department of Transportation (MDOT) depicted below. The MDOT values were selected due to the stringency associated with the more statistically significant facilities carrying volumes above 5,000. While other approaches emphasize the importance of the lower volume facilities, the MDOT approach places a higher value on matching the statistically significant higher volume facilities.

Percent Deviation = (Base Year Assignment - Base Year Count) / Base Year Count

Table 15: MDOT Volume Range Validation Criteria

AVERAGE ANNUAL DAILY TRAFFIC	DESIRABLE PERCENT DEVIATION
< 1,000	200%
1,000 –2,500	100%
2,500-5,000	50%
5,000-10,000	25%
10,000-25,000	20%
25,000-50,000	15%
>50,000	10%

Based on FHWA 1990 "Calibration and Adjustment of System Planning Models" as documented in Model Validation and Reasonableness Checking Manual, June 2001, Travel Model Improvement Program.

The Christian and Montgomery County models validation meets the criteria for each volume range. The table below provides more detail and comparison statistics.

Table 16: Counted VMT vs. Modeled VMT by Volume Range, Christian County

AVERAGE ANNUAL DAILY TRAFFIC	PERCENT DEVIATION	LINKS WITH COUNT	COUNTED VMT	MODELED VMT	ROOT MEAN SQUARED	% ROOT MEAN SQUARED
0 to 1000	122.81%	33	39,398	48,385	1,384	115.89%
1001 to 2000	90.03%	21	43,363	39,041	888	43.00%
2001 to 3000	102.07%	18	44,936	45,867	1,257	50.34%
3001 to 5000	89.96%	36	118,127	106,265	2,099	63.95%
5001 to 7000	104.81%	19	103,470	108,450	1,202	22.08%
7001 to 10000	102.01%	33	398,765	406,784	1,478	12.23%
10001 to 15000	103.26%	17	149,911	154,797	1,798	20.39%
15001 to 20000	100.58%	10	190,320	191,430	364	1.91%

Table 17: Counted VMT vs. Modeled VMT by Volume Range, Montgomery County

AVERAGE ANNUAL DAILY TRAFFIC	PERCENT DEVIATION	LINKS WITH COUNT	COUNTED VMT	MODELED VMT	ROOT MEAN SQUARED	% ROOT MEAN SQUARED
0 to 1000	136.14%	41	25,944	35,320	1009	159.41%
1001 to 2000	132.45%	5	11,078	14,673	2571	116.06%
2001 to 3000	192.04%	4	8,657	16,625	4,343	200.68%
3001 to 5000	92.36%	24	97,635	90,175	1,956	48.09%
5001 to 7000	109.80%	9	39,215	43,060	1,556	35.70%
7001 to 10000	95.65%	13	89,704	85,806	2,135	30.93%
10001 to 15000	87.60%	18	352,397	308,702	3,261	16.66%
15001 to 20000	94.20%	24	422,047	397,551	6,166	35.06%
20001 to 25000	98.68%	7	246,442	243,192	2,809	7.98%
25001 to 50000	100.91%	14	210413	212329	3,660	15.80%

CONCLUSION

The criteria proposed for the Christian And Montgomery County travel demand model validation process are based on current FHWA and NCHRP guidance and standards and represent reasonable measures for determining the accuracy and reliability of the Christian and Montgomery County models. The validation of the Christian and Montgomery County models described in this section accomplishes two goals. First, it demonstrates that the calibration tools used in the model process and assumptions were reasonable. Second, the validation provides the local area with a high level of confidence in the accuracy and reliability of forecast results obtained from the Christian and Montgomery County travel demand models.

REFERENCE FOR VALIDATION

Model Validation and Reasonableness Checking Manual, June 2001, Travel Model Improvement Program, U.S. Department of Transportation, Federal Highway Administration.

National Cooperative Highway Research Program, Report 365, Travel Estimation Techniques for Urban Planning, 1998, Transportation Research Board (TRB).

National Cooperative Highway Research Program, Report 255, Highway Traffic data for Urbanized Area Project and Design, 1995, Transportation Research Board (TRB).

Minimum and Maximum

Summer Temperature

Data

Christian County's Temperatures Based on Top Ten 1-Hour Ozone Values (June-August 2000-2002)

County	Site	Date	ppm	Weather Station Used from UK Web Site	Chronological Unique Dates	Min T (Degrees F) Source: UK	Max T (Degrees F) Source: UK
Christian	Hopkinsville	06/23/00	0.104	Princeton, KY			
Christian	Hopkinsville	06/13/00	0.100	Princeton, KY			
Christian	Hopkinsville	08/10/02	0.099	Princeton, KY			
Christian	Hopkinsville	06/11/01	0.097	Princeton, KY			
Christian	Hopkinsville	08/02/01	0.097	Princeton, KY			
Christian	Hopkinsville	06/11/00	0.096	Princeton, KY			
Christian	Hopkinsville	08/16/00	0.096	Princeton, KY			
Christian	Hopkinsville	08/29/00	0.096	Princeton, KY			
Christian	Hopkinsville	07/08/02	0.095	Princeton, KY	06/23/00	62	91
Christian	Hopkinsville	08/21/02	0.095	Princeton, KY	06/13/00	68	95
					08/10/02	61	97
					06/11/01	61	90
					08/02/01	70	94
					06/11/00	66	92
					08/16/00	68	97
					08/29/00	76	98
					07/08/02	65	92
					08/21/02	71	96
				Average Min/Max T (Degrees F)		**67**	**94**
				Ambient T (Degrees F)		→	**85.1**
Area:	**Hopkinsville**			**Final Min/Max T For Area:**		**67**	**94**

Local climatological data from the University of Kentucky's Agricultural Weather Center Web Site were used. The station selected was Princeton, Kentucky. The temperature guidance can be found in "Procedures for Emission Inventory Preparation, Volume 4: Mobile Sources" and was last updated with the MOBILE4.1 model.

-- August 2004
Revised November 2004

Temperature

Temperature is normally calculated from the most recent three-year period for which validated ozone and/or CO monitoring data exists at the time the emission inventory is due. For 1990 inventories, the period to be used for temperature determination will be 1988-1990. The temperatures used in the 1990 inventory must also be used for all projection inventories.

Considering the three-year period as a whole, the analyst should determine the consecutive three-month period with the highest frequency of NAAQS exceedance days occurring in the inventory area. The same consecutive three-month period will apply for each year, with a total of nine months used to determine temperature. If the months containing the highest frequency of exceedances are not consecutive or if two or more sets of consecutive months have the same frequency, the analyst should use the months of June, July, and August for ozone modeling and the months of November, December, and January for carbon monoxide modeling.

The analyst should then list the 10 highest concentrations -- not necessarily exceedances -- that occurred in the inventory area during those nine months and the dates of those concentrations. Exceptions to this procedure are listed below:

- More than 10 highest concentrations may be needed to identify 10 unique dates.
- If the 10th ranked level occurs on more than one day, all of those days should be included in the temperature calculation.
- For the entire MSA monitoring network, if only two years of validated monitoring data exists for an MSA, the analyst should list the seven highest values.
- If only one year of data exists for the entire MSA monitoring network, the analyst should list the four highest values.

The ten highest ozone concentrations for each site in a county and the dates on which they occurred are contained in the Aerometric Information Retrieval System (AIRS) AMP440/Maximum Values Report. Eight-hour average CO concentrations and the dates on which they occurred can be found in the AIRS AMP350 raw data report. The AMP355/Standard Report contains the CO values that exceed the NAAQS. These reports are available from EPA's National Air Data Branch. Be sure to specify the year(s) and counties of interest and indicate that the request is for preparation of a SIP emission inventory, to avoid being charged the normal processing fee. To obtain copies of these reports, contact Tom Link at FTS 629-5456 or (919) 541-5456.

For the area being inventoried, the analyst should determine the maximum and minimum temperatures for each of the 10 days from the Local Climatological Data Monthly Summary, available from:

National Climatic Data Center
Federal Building
Asheville, NC 28801-2696

Telephone: (704) 259-0682
FTS 672-0682

Maximum and minimum daily temperatures are located in columns 2 and 3, respectively, on page 1 of the Summary .

The analyst should calculate the average maximum temperature and the average minimum temperature occurring on those 10 days, then calculate the ambient temperature using the following equation:

Ambient temp = [(2/3) x (avg max temp - avg min temp)] + (avg min temp)

If there is more than one meteorological station within the nonattainment area, the analyst should use that station which best characterizes temperatures associated with the bulk of mobile source emissions.

Ozone Monitoring Data

Used For Summer

Temperature Calculations

hop1hr00.txt

Current Date : 02/28/03
Current Time : 08:40

Maximum Hourly Averages Report - Validated DataBase
Environmental Systems Corporation

03/01/00 thru 10/31/00

Logger Id : 85
Logger Name : HOPKINSVILLE, KY, OZONE
Avg Interval: 01 hour

Parameter : O3
Units : PPB
Avg Type : Forward

Rank	Average	Date	Hour
1	104	06/23/00 ←	17
2	100	06/13/00 ←	14
3	97	05/31/00	15
4	96	06/11/00 ←	23
5	96	08/16/00 ←	13
6	96	08/29/00 ←	12
7	94	06/01/00	15
8	93	08/15/00	12
9	91	07/02/00	14
10	89	07/17/00	14
11	88	06/08/00	16
12	87	07/09/00	10
13	86	09/19/00	14
14	85	07/26/00	11
15	84	05/30/00	16
16	84	10/25/00	17
17	83	08/22/00	14
18	83	08/23/00	15
19	82	08/17/00	15
20	81	06/09/00	13
21	81	07/08/00	18
22	81	10/26/00	13
23	80	06/02/00	14
24	80	07/07/00	14
25	80	07/14/00	15

Current Date : 02/28/03
Current Time : 08:40

Maximum Hourly Averages Report - Validated DataBase
Environmental Systems Corporation

03/01/01 thru 10/31/01

Logger Id : 85
Logger Name : HOPKINSVILLE, KY, OZONE
Avg Interval: 01 hour

Parameter : O3
Units : PPB
Avg Type : Forward

Rank	Average	Date	Hour
1	97	06/11/01 ←	15
2	97	08/02/01 ←	13
3	97	09/13/01	16
4	92	06/19/01	13
5	88	05/03/01	16
6	88	08/13/01	15
7	88	08/15/01	15
8	87	04/30/01	11
9	87	06/10/01	16
10	85	06/13/01	12
11	85	07/10/01	14
12	85	07/22/01	14
13	84	08/23/01	17
14	83	06/18/01	07
15	82	05/04/01	15
16	82	08/01/01	12
17	82	08/21/01	16
18	81	06/16/01	16
19	80	05/16/01	17
20	80	06/17/01	10
21	80	08/04/01	14
22	79	06/12/01	10
23	79	06/27/01	12
24	79	07/11/01	16
25	78	05/15/01	14

hop1hr02.txt

Current Date : 02/28/03
Current Time : 08:41

Maximum Hourly Averages Report - Validated DataBase
Environmental Systems Corporation

03/01/02 thru 10/31/02

Logger Id : 85
Logger Name : HOPKINSVILLE, KY, OZONE
Avg Interval: 01 hour

Parameter : O3
Units : PPB
Avg Type : Forward

Rank	Average	Date	Hour
1	103	09/10/02	15
2	100	09/06/02	14
3	99	08/10/02 ←	10
4	99	09/07/02	14
5	97	09/04/02	16
6	95	07/08/02 ←	13
7	95	08/21/02 ←	15
8	95	09/09/02	19
9	94	07/07/02	16
10	92	06/10/02	12
11	90	06/20/02	11
12	90	07/05/02	15
13	90	08/05/02	18
14	89	09/13/02	12
15	88	06/22/02	16
16	88	07/06/02	12
17	88	07/09/02	17
18	88	08/09/02	13
19	87	06/19/02	13
20	87	07/04/02	17
21	86	08/04/02	10
22	86	09/05/02	12
23	84	09/16/02	15
24	83	06/21/02	11
25	82	05/24/02	13