Mobile Source Emissions Modeling for Catoosa and Walker Counties PM2.5 Maintenance Plan Motor Vehicle Emissions Budget

1.0 Overview

The Georgia Environmental Protection Division (EPD) worked with the Georgia Department of Transportation (GDOT) and the Chattanooga-Hamilton County-North Georgia Transportation Planning Organization to develop mobile[1] source emissions inventories for the purpose of establishing motor vehicle emissions budgets (MVEB) for the 2025 maintenance year for the Catoosa-Walker Counties PM2.5 Maintenance State Implementation Plan (SIP) revision, hereinafter called the Catoosa-Walker PM2.5 Maintenance Plan.

Walker and Catoosa counties are part of the Chattanooga PM2.5 nonattainment area which also includes Hamilton County, Tennessee (TN). For the emissions modeling for the Chattanooga Metropolitan Planning Area (MPO), different methodologies are used to develop emission inventories for different subregions within the nonattainment area, depending on whether or not the subregion is included in the MPO travel model domain. The MPO travel model currently includes all of Hamilton County, TN, all of Catoosa County, GA, and the portion of Walker County, GA, within the MPO planning area. The travel demand model is used to estimate Vehicle Miles Traveled (VMT) and congested flow speeds needed to develop emission inventories for the subregions included in the travel model. VMT estimates derived from the travel model were adjusted based on Federal Highway Administration (FHWA) Highway Performance Monitoring System (HPMS) traffic count data from Tennessee and Georgia.

Off-model, HPMS-based modeling techniques were used to calculate emissions for the “donut” portion of Walker County, Georgia, that falls outside of the MPO planning and travel modeling area. “Donut” is a term that refers to areas that fall outside of a metropolitan planning area, but inside the air quality nonattainment area.

The 2025 mobile emissions were developed consistent with the single-run, annual-average-conditions approach described in EPA's August 9, 2005, *Guidance for Creating Annual On-Road Mobile Source Emission Inventories for PM2.5 Nonattainment Areas for Use in SIPs and Conformity*.[2] Consistent with this guidance, once this budget is found adequate or approved by EPA, subsequent emissions analyses for transportation conformity will also use the same annual-average-conditions approach used to establish the MVEB. These inventories reflect the most recent planning assumptions and emission factor model available, and the use of an updated travel demand model. Output from the Chattanooga travel demand and emissions estimation modeling process was employed to estimate mobile source emission inventories to establish the MVEB for the Catoosa-Walker PM2.5 Maintenance Plan in a manner consistent with federal regulations for performing regional emissions analyses used in transportation conformity determinations. The alignment of methodologies for MVEB and transportation conformity emissions analyses reduces the possibility of spurious differences between motor vehicle emission budgets and transportation conformity analyses that must conform to those budgets.

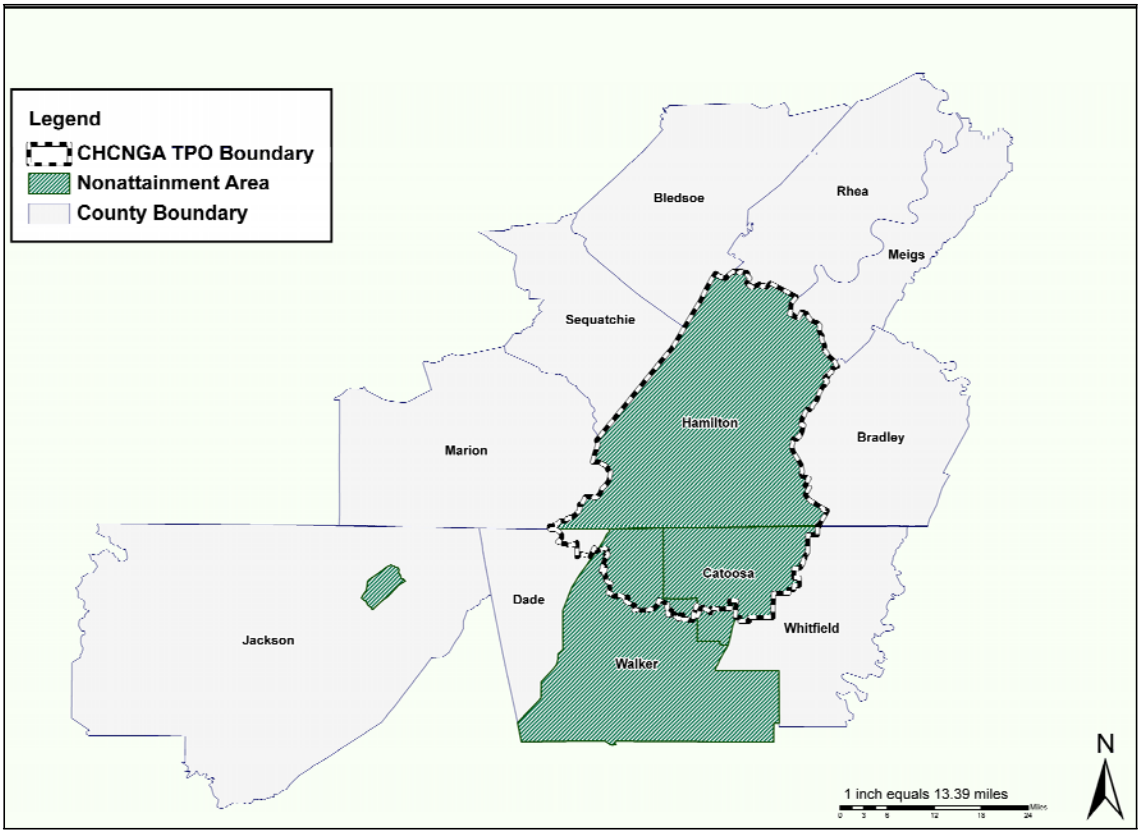
[1] The term "mobile" is used to describe emissions from on-road motor vehicles.
[2] http://epa.gov/otaq/stateresources/transconf/policy/420b05008.pdf

Effective April 5, 2005, the U.S. Environmental Protection Agency (EPA) designated the Chattanooga MPO nonattainment for the annual fine particulate (PM2.5) National Ambient Air Quality Standard which includes Walker and Catoosa counties in Georgia. The PM2.5 standard is subject to Subpart 1 of the Clean Air Act., the more general nonattainment area planning and control requirements of the Act.

1.1 Planning Boundaries

As the MPO for the Chattanooga urbanized area, the Chattanooga-Hamilton County-North Georgia Transportation Planning Organization is responsible for the continuing, cooperative, and comprehensive metropolitan planning process required by Title 23 U.S.C. 134. Based on the 2010 Census, the Chattanooga MPO defined their planning boundary as all of Hamilton County in Tennessee, and part of Dade, Walker and Catoosa Counties in Georgia. The nonattainment area was originally defined as all of Hamilton County in Tennessee, part of Jackson County in Alabama and all of Walker and Catoosa Counties in Georgia as illustrated in Figure 1.1-1. However on June 18, 2010, U.S. Environmental Protection Agency (EPA) published in the Federal Register a finding of insignificance for Jackson County, Alabama, as a result of the transportation conformity adequacy review process. As a result, conformity determination and emissions are no longer required for Jackson County, Alabama.

Figure 1.1-1
Chattanooga Nonattainment Area



1.2 Emissions Analysis – Models and Assumptions

In accordance with Section 93.105(b) of the Transportation Conformity Rule which requires interagency consultation for SIP development, a detailed listing of the procedures and planning assumptions used for the regional emissions analysis supporting development of the MVEB was distributed to the interagency consultation committee for review November, 2011. The assumptions used to develop Chattanooga's conforming Long Range Transportation Plan and Transportation Improvement Program were also used to develop the network and emissions for the Catoosa-Walker PM2.5 Maintenance Plan MVEB, which required emissions for the year 2025. The 2025 emissions prepared for the recent 2012 conformity determination are used as the emissions for the SIP. Since emissions were not available for 2007, some of the input data sets were interpolated between 2002 and 2009 and then checked for reasonableness.

The MOVES input files reflect all federal and state motor vehicle emission control programs. In addition, the input files were customized to reflect the specific weather conditions and vehicle registration data for the nonattainment area.

2.0 Travel Demand Modeling Procedures

The Chattanooga travel demand model and off-modelling procedures were used to develop the emissions for Catoosa and Walker Counties The Chattanooga travel demand model was used to estimate link-level VMT and congested flow speeds for the Georgia subregion of the nonattainment area included in the TPO travel model domain. The methodology to prepare the Catoosa-Walker emissions is listed below.

1) Modeling Methodology
   a) Georgia
      i) Within TPO travel model (Catoosa County, portion of Walker County)
         (1) Estimate link-level VMT and congested flow speeds using Chattanooga TPO travel demand model for all of Catoosa County, GA, and the portion of Walker County, GA, within the TPO travel demand model domain
         (2) Extract VMT, congested speeds, and road type distribution from travel demand model
         (3) Develop VMT and congested flow speeds for each roadway link in the area
         (4) Adjust model VMT estimates at the link level based on HPMS VMT estimates
         (5) Develop emission factors for each roadway drive cycle and speed bin using the latest U.S. EPA approved emissions model (MOVES2010a)
         (6) Apply MOVES2010a emissions factors to the HPMS-adjusted, link-level VMT estimates based on the congested speed estimates, road type and source (vehicle) type to determine emissions
      ii) Outside of TPO travel model (donut portion of Walker County) (see Exhibit 7)
         (1) Estimate VMT for remaining portion of Walker County *donut* area outside of TPO travel model domain using GA HPMS traffic count data
            (a) Base year roadway mileage and HPMS average annual traffic count data from GDOT RC/HPMS databases
            (b) Traffic count growth trends for each analysis year estimated by HPMS functional class
               (i) Growth rates extracted from TPO travel demand model for GA portion of nonattainment area within the travel model
               (ii) Growth rates applied to GA portion of nonattainment area outside of travel model
         (2) Estimate congested flow speeds for remaining portion of Walker County *donut* area using VMT-weighted speed by HPMS functional class, extrapolated from TPO travel demand model for each analysis year
         (3) Develop emission factors for each roadway drive cycle and speed bin; Note that these factors will be the same for all of Georgia portion of nonattainment area, i.e., same as those used for (1)(b)(i)
         (4) Estimate $PM_{2.5}$ and NO_x emissions from VMT and congested speeds
            (a) Emission factors applied at aggregate HPMS functional class level

2.1 Travel Demand Modeling Post-Processing Procedures

The Chattanooga regional travel demand model produces daily estimates of travel and vehicle hours traveled (VHT) and a peak hour speed for each link in the highway network. The links from the daily highway assignment contain a variety of attributes such as the number of lanes, distance, speed, capacities and daily volumes. The daily VMT is determined by multiplying the daily volume by the distance for each link. Other refinements to the network link data were performed to produce the files needed for MOVES. The procedures used in estimating emissions for the Catoosa-Walker model area are slightly different from the procedures used for emissions modeling (including conformity analyses) in the other nonattainment areas in Georgia. Emissions for the areas within the model are prepared using MOVES in rate look-up mode whereas in the other nonattainment areas in Georgia, MOVES is applied in Inventory mode.

HPMS Adjustment of VMT

Section 93.122(b)(3) of the Transportation Conformity Rule recommends that HPMS adjustment factors be developed to reconcile travel model estimates of VMT to HPMS estimates in the same base year of model calibration. HPMS adjustment factors were developed for the 2035 LRTP to reflect the new calibration base year of 2007. HPMS factors were calculated at the HPMS functional class level using the following equation:

HPMS ADJUSTMENT FACTOR $_I$ = (2007 HPMS VMT$_I$/2007

MODEL VMT$_I$) (WHERE I=HPMS FUNCTIONAL CLASS)

Separate sets of adjustment factors were estimated for Catoosa County and for the TPO portion of Walker County.

To determine "2007 HPMS VMT" for Catoosa County, average annual daily VMT for the year 2007 for each of the 12 HPMS functional classes was compiled from GDOT's 445 Report which contains county-specific mileage and VMT by HPMS functional classification. "2007 Model VMT" was calculated for Catoosa County by HPMS functional class from the 2007 travel model run completed as part of the 2035 LRTP model calibration. Table 2.1-1 shows the HPMS adjustment factors by HPMS functional class for Catoosa County, Georgia. HPMS adjustment factors were applied at the link level to travel model VMT for Catoosa County, based on each link's HPMS functional classification code, for each analysis year.

The HPMS adjustment factors for the TPO portion of Walker County were determined based on the portion of the county within the travel model and, therefore, subject to HPMS adjustment. County-level HPMS data for Walker County for each roadway functional class was derived from GDOT's 445 Report. VMT data was factored down based on the proportion of each roadway classification's mileage within the travel model area compared to the total mileage for that roadway type within Walker County. Table 2.1-2 shows the travel demand model and HPMS VMT for the TPO portion of Walker County, and HPMS adjustment factors by functional class. These factors were applied at the link level to travel model VMT for the TPO portion of Walker County, based on each roadway link's HPMS functional classification code, for each analysis year. HPMS adjustment factors were reviewed and approved by ICC.

Table 2.1-1: 2007 HPMS Adjustment Factors
Catoosa County, Georgia

Name	Functional Class(es)	Average Annual Daily 2007 Travel Model VMT	Average Annual Daily 2007 HPMS VMT	2007 HPMS Adjustment Factor
Rural Interstate	1	402,303	372,202	0.93
Rural Principal Arterial	2	30,625	18,942	0.62
Rural Minor Arterial	6	77,889	82,512	1.06
Rural Major Collector	7	86,125	133,443	1.17
Rural Minor Collector	8	28,113	133,443	1.17
Rural Local	9[a]	54,891	324,050	1.45
Urban Interstate	11	696,013	646,109	0.93
Urban Freeway	12	0	0	0.00
Urban Other Arterial	14	77,844	34,486	0.44
Urban Minor Arterial	16	393,399	549,584	1.40
Urban Collector	17	60,913	48,983	0.80
Urban Local	19[a]	167,985	324,050	1.45

[a] Most local roads (Functional Classifications (FC) 9 and 19) were not included in the TPO travel demand model. Travel on these roads in the travel demand model was approximated by travel on centroid connectors, which are coded as facility type 99 in the model. Due to their similar purposes, VMT and emissions on FCs 9 and 19 are compared to those on facility type 99 in the TPO travel demand model. Ramps also were included in the travel demand model with a facility type of 7. Ramps are not included in the HPMS data.
Source: Chattanooga-Hamilton County/North Georgia LRTP 2035, Volume 2 – Draft Conformity Determination Report, Feb 2012

Table 2.1-2: 2007 HPMS Adjustment Factors
TPO Portion of Walker County, Georgia

Name	Functional Class(es)	Average Annual Daily 2007 Travel Model VMT	Average Annual Daily 2007 HPMS VMT	2007 HPMS Adjustment Factor
Rural Interstate	1	0	0	0.00
Rural Principal Arterial	2	186,903	93,730	0.50
Rural Minor Arterial	6	1,931	2,609	1.35
Rural Major Collector	7	32,857	33,036	0.99
Rural Minor Collector	8	465	33,036	0.99
Rural Local	9[a]	33,137	232,342	2.19
Urban Interstate	11	0	0	0.00
Urban Freeway	12	0	0	0.00
Urban Other Arterial	14	100,920	175,157	1.74
Urban Minor Arterial	16	133,000	157,015	1.18
Urban Collector	17	43,926	44,308	1.01
Urban Local	19[a]	72,821	232,342	2.19

a Most local roads (Functional Classifications (FC) 9 and 19) were not included in the TPO travel demand model. Travel on these roads in the travel demand model was approximated by travel on centroid connectors, which are coded as facility type 99 in the model. Due to their similar purposes, VMT and emissions on FCs 9 and 19 are compared to those on facility type 99 in the TPO travel demand model. Ramps also were included in the travel demand model with a facility type of 7. Ramps are not included in the HPMS data.
Source: Chattanooga-Hamilton County/North Georgia LRTP 2035, Volume 2 – Draft Conformity Determination Report, Feb 2012

Roadtype Classification

The network link data was also classified by MOVES roadtype based on functional classification. The mapping of FHWA highway functional system classifications to the appropriate MOVES roadtypes used for this modeling is listed in Table 2.1-3. Interstate and freeway ramps are functionally classified as local facilities in Georgia. Since these facilities operate with restricted access, the facility type definition variable (a unique variable in the highway network that defines the highway facilities based on their operation) was used to classify ramps as either rural or urban restricted facilities. Off-network activity is calculated within the MOVES process based on the source type (vehicle) population and is not an input from the travel demand model data.

Table 2.1-3
Listing of FHWA Highway Functional Classifications
Mapped to MOVES Road Types

FHWA Highway Functional System	MOVES Road Type	MOVES Value
Rural interstate	Rural restricted access	2
Rural other principal arterial	Rural restricted access	2
Rural minor arterial	Rural unrestricted access	3
Rural major collector	Rural unrestricted access	3
Rural minor collector	Rural unrestricted access	3
Rural local	Rural unrestricted access	3
Urban interstate	Urban restricted access	4
Urban other freeways	Urban restricted access	4
Urban other principal arterial	Urban unrestricted access	5
Urban minor arterial	Urban unrestricted access	5
Urban collector	Urban unrestricted access	5
Urban local	Urban unrestricted access	5

Speed Bin Classification

The network link hourly data was also stratified by speed bin. MOVES defines 16 "speed bins" which describe the average driving speed on a roadtype or highway network link. Table 2.1-4 lists the speed bins and ranges that were assigned to the network link data by hour.

Table 2.1-4
Listing of MOVES Speed Bins

Speed Bin	Lower Range	Upper Range
1	<=	2.4
2	2.5	7.4
3	7.5	12.4
4	12.5	17.4
5	17.5	22.4
6	22.5	27.4
7	27.5	32.4
8	32.5	37.4
9	37.5	42.4
10	42.5	47.4
11	47.5	52.4
12	52.5	57.4
13	57.5	62.4
14	62.5	67.4

Speed Bin	Lower Range	Upper Range
15	67.5	72.4
16	=>	72.5

2.2 Development of MOVES Input Files

The mobile source emissions used for Walker-Catoosa analysis reflect all federal and state mobile source control rules, including federal tailpipe standards and gasoline sulfur and volatility limits.

Interagency Consultation

Section 93.110 of the Transportation Conformity Rule directs that the interagency consultation process review latest planning assumptions used as part of the conformity analysis and that key assumptions be specified and included in the draft documents and supporting materials used for the interagency consultation. A detailed listing for the procedures and planning assumptions used for the conformity analysis of the adjusted 2035 LRTP and FY '11-'14 TIP to be amended is outlined in the "Interagency Review of Planning Assumptions Used in Regional Emissions Analysis" Appendix B in the Draft Conformity Determination Report – Volume, Feb 2012. MOVES input data and assumptions were discussed as a regular agenda item during 2011 and were approved by the IAC in June 2011. These are the same assumptions that were used to produce the emissions for the SIP.

To prevent transportation conformity problems, the emissions used in preparation of emission inventories for SIP MVEB development and transportation conformity analysis must be consistent. Interagency consultation helps to assure consistency between the two procedures. The MOVES input parameters for the Catoosa-Walker PM2.5 Maintenance Plan mobile source emissions modeling were established through interagency consultation and are listed below:

1) Emission Factor Model: MOVES2010a - Database: MOVES20100830

- Pollutants to be modeled: PM2.5 and NOx.

- Analysis Years
  Attainment year (inventory): 2007 (datasets were interpolated between 2002 and 2009 since 2007 model runs were not available)
  MVEB year 2025

- Scale: County: Temporal Aggregation: Annual

- Geographic Bounds: Hamilton County and Walker and Catoosa Counties

- Vehicles/Equipment All source types, gasoline and diesel

• Road types: All road types including off-network

• General Output:grams/miles/jouls/distance traveled/population

• Source type Population:
Hamilton County: Hamilton County Vehicle Registration Data w/MOVES National Default Vehicle Type Ratios (TDEC spreadsheet) unless TN registration data becomes available. Future year growth is estimated in the source type spreadsheet based on a growth in population by county, Catoosa and Walker Counties: Vehicle Registration Data (2002) w/MOVES National Default Vehicle Type Ratios (See Exhibits 5 & 6)

• Vehicle Type VMT:

VMT:
For 2007: HPMS VMT mileage data
For 2025: TDM VMT mileage data

HPMS VTypeYear
Catoosa County VMT from TDM. Walker County VMT from TDM and HPMS. Vehicle type splits from GA statewide 2008-2010 daily VMT from Travel Demand Model and MOVES defaults to determine split of cars and light trucks (20&30) (See Exhibit 4)

• I/M program: No program

• Fuel Supply and Formulation
Tennessee: TDEC developed formulations where available.
Georgia: National defaults

• Meteorology Data: Local information obtained from NMIM for 2007
• Ramp Fraction: TDM Results (Urban 4%, Rural 2%)
• Road Type Distribution: Combination of Catoosa and Walker county MOVES Road Type Distribution from TDM and Source Type Distribution from GA HPMS Vehicle Type Splits and MOVES Default. 2007 HPMS and TDM for 2025.

• Age Distribution: MOVES National Defaults

• Average Speed Distribution: Combination of local and default data. Catoosa and Walker county Distribution from TDM with EPA Converter Tool to Convert from VMT to VHT

MOVES

MOVES20100830 is the latest database version for EPA's motor vehicle emissions model. MOVES requires a variety of input files. The MOVES input data files associated with travel behavior have been developed using the travel demand model data, Georgia vehicle

classification counts, and MOVES national defaults. Other data sources were used to develop the source type population data, meteorology data, and fuel specifications.

Methodology to Develop MOVES Input Data

The data files to run MOVES are entered via the County Data Importer. Sample input data are shown in Exhibits 1-3 for the years 2007 and 2025.

2.4 Nonattainment Area Emissions Analysis Summary

A factor was developed to annualize the weekday emissions to include weekend activity. The factor was based on the MOVES defaults for DayVMTFractions which is being used as part of the MOVES inputs. The following formula was used:

Number of weekday equivalents in a year = 365*(5/7)+365*(2/7)*MOVES Urban Weekend Adjustment Factor(.7793) = 341.9809 (rounded to 342)

This is shown in cell D34 of tab "Import HPMS AADVMT and Factors" in the EPA AADVMTCalculator Excel workbook. The daily emissions are produced in grams and are converted to tons by dividing by 907,184.74. The daily emissions in tons are then multiplied by 342 to get annual emissions. Table 2.4-1 lists the results from the regional emissions analysis produced using the travel demand model plus the emissions for Walker off-model analysis in daily grams while Table 2.4-2 lists the total emissions in annual tons.

Table 2.4-1
Summary of Mobile Source Emissions for Catoosa-Walker Nonattainment Area
(in Daily Grams)

	PM2.5	Nox
Year	Total	Total
2007	355.7340	11,783,513.0000
2025	95,378.0000	2,710,483.0000

Table 2.4-2
Summary of Mobile Source Emissions for Catoosa-Walker Nonattainment Area
(in Annual Tons)

	PM2.5	Nox
Year	Total	Total
2007	134.1082	4,442.2723
2025	35.9566	1,,021.8263

A series of sensitivity tests were performed for the future years 2025 and 2035. These tests assumed different growth scenarios in the nonattainment area and were used to develop safety margins. An alternative scenario was tested where the growth doubled between 2012 and 2025 to account for uncertainty in the future growth projections and transportation improvements.

Exhibit 1: Sample 2007 RunSpec

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		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="110" POLLUTANTNAME="Primary Exhaust PM2.5 - Total" PROCESSKEY="17" PROCESSNAME="Crankcase
Extended Idle Exhaust"/>
		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="110" POLLUTANTNAME="Primary Exhaust PM2.5 - Total" PROCESSKEY="90" PROCESSNAME="Extended
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		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="116" POLLUTANTNAME="Primary PM2.5 - Brakewear Particulate" PROCESSKEY="9"
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PROCESSNAME="Running Exhaust"/>
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		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="111" POLLUTANTNAME="Primary PM2.5 - Organic Carbon" PROCESSKEY="16"
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		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="31" POLLUTANTNAME="Sulfur Dioxide (SO2)" PROCESSKEY="2" PROCESSNAME="Start Exhaust"/>
		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="31" POLLUTANTNAME="Sulfur Dioxide (SO2)" PROCESSKEY="15" PROCESSNAME="Crankcase Running
Exhaust"/>
		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="31" POLLUTANTNAME="Sulfur Dioxide (SO2)" PROCESSKEY="16" PROCESSNAME="Crankcase Start
Exhaust"/>
		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="31" POLLUTANTNAME="Sulfur Dioxide (SO2)" PROCESSKEY="17" PROCESSNAME="Crankcase Extended
Idle Exhaust"/>
		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="31" POLLUTANTNAME="Sulfur Dioxide (SO2)" PROCESSKEY="90" PROCESSNAME="Extended Idle
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		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="91" POLLUTANTNAME="Total Energy Consumption" PROCESSKEY="1" PROCESSNAME="Running
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		<POLLUTANTPROCESSASSOCIATION POLLUTANTKEY="91" POLLUTANTNAME="Total Energy Consumption" PROCESSKEY="2" PROCESSNAME="Start
Exhaust"/>
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useParameters   No

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			<FUELTYPE SELECTED="FALSE"/>
			<EMISSIONPROCESS SELECTED="TRUE"/>
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			<ROADTYPE SELECTED="TRUE"/>
			<SOURCEUSETYPE SELECTED="FALSE"/>
			<MOVESVEHICLETYPE SELECTED="FALSE"/>
			<ONROADSCC SELECTED="FALSE"/>
			<OFFROADSCC SELECTED="FALSE"/>
			<ESTIMATEUNCERTAINTY SELECTED="FALSE" NUMBEROFITERATIONS="2" KEEPSAMPLEDDATA="FALSE" KEEPITERATIONS="FALSE"/>
			<SECTOR SELECTED="FALSE"/>
			<ENGTECHID SELECTED="FALSE"/>
			<HPCLASS SELECTED="FALSE"/>
		</OUTPUTEMISSIONSBREAKDOWNSELECTION>
		<OUTPUTDATABASE SERVERNAME="" DATABASENAME="CHATT2007_PM25_GA_INVENTORY_OUTPUT4" DESCRIPTION=""/>
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		<OUTPUTVMTDATA VALUE="TRUE"/>
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		<OUTPUTSH VALUE="FALSE"/>
		<OUTPUTSHP VALUE="FALSE"/>
		<OUTPUTSHIDLING VALUE="FALSE"/>
		<OUTPUTSTARTS VALUE="FALSE"/>
		<OUTPUTPOPULATION VALUE="TRUE"/>
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		<PMSIZE VALUE="0"/>
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			<DISTANCEFACTORS SELECTED="TRUE" UNITS="MILES"/>
			<MASSFACTORS SELECTED="TRUE" UNITS="GRAMS" ENERGYUNITS="JOULES"/>
		</OUTPUTFACTORS>
		<SAVEDATA>

		</SAVEDATA>
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        </DONOTEXECUTE>

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</RUNSPEC>
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Exhibit 2: MOVES Input Data for Catoosa-Walker Counties Emissions for PM2.5 SIP Budget – 2007

Source Type Population

yearID	sourceTypeID	sourceTypePopulation
2007	11	4,262
2007	21	65,819
2007	31	43,829
2007	32	14,643
2007	41	63
2007	42	37
2007	43	429
2007	51	45
2007	52	2,752
2007	53	310
2007	54	620
2007	61	654
2007	62	716

Ramp Fraction

roadTypeID	RampFraction
2	0.02
4	0.04

Sample Average Speed Distribution

sourceTypeid	roadTypeID	hourDayID	AvgSpeedBinID	AvgSpeedFraction
11	2	12	1	0.0000000
11	2	12	2	0.0000000
11	2	12	3	0.0000000
11	2	12	4	0.0000000
11	2	12	5	0.0000000
11	2	12	6	0.0000000
11	2	12	7	0.0209484
11	2	12	8	0.0028679
11	2	12	9	0.0000000
11	2	12	10	0.0000000
11	2	12	11	0.0000000

sourceTypeid	roadTypeID	hourDayID	AvgSpeedBinID	AvgSpeedFraction
11	2	12	12	0.0000000
11	2	12	13	0.3871103
11	2	12	14	0.0587978
11	2	12	15	0.5302755
11	2	12	16	0.0000000
11	2	15	1	0.0000000
11	2	15	2	0.0000000
11	2	15	3	0.0000000
11	2	15	4	0.0000000
11	2	15	5	0.0000000
11	2	15	6	0.0000000
11	2	15	7	0.0209484
11	2	15	8	0.0028679
11	2	15	9	0.0000000
11	2	15	10	0.0000000
11	2	15	11	0.0000000
11	2	15	12	0.0000000
11	2	15	13	0.3871103
11	2	15	14	0.0587978
11	2	15	15	0.5302755
11	2	15	16	0.0000000
11	2	12	1	0.0000000
11	2	12	2	0.0000000
11	2	12	3	0.0000000
11	2	12	4	0.0000000
11	2	12	5	0.0000000
11	2	12	6	0.0000000
11	2	12	7	0.0209484

Note: File contains 39,937 records and is available on request

Road Type Distribution

sourceTypeid	roadTypeID	RoadTypeVMTFraction
11	1	0.00000
11	2	0.15973
11	3	0.23823
11	4	0.23509
11	5	0.36695
21	1	0.00000
21	2	0.12422
21	3	0.19961

sourceTypeid	roadTypeID	RoadTypeVMTFraction
21	4	0.25998
21	5	0.41619
31	1	0.00000
31	2	0.12422
31	3	0.19961
31	4	0.25998
31	5	0.41619
32	1	0.00000
32	2	0.12422
32	3	0.19961
32	4	0.25998
32	5	0.41619
41	1	0.00000
41	2	0.20661
41	3	0.20093
41	4	0.27506
41	5	0.31740
42	1	0.00000
42	2	0.20661
42	3	0.20093
42	4	0.27506
42	5	0.31740
43	1	0.00000
43	2	0.20661
43	3	0.20093
43	4	0.27506
43	5	0.31740
51	1	0.00000
51	2	0.16544
51	3	0.24649
51	4	0.24568
51	5	0.34240
52	1	0.00000
52	2	0.16544
52	3	0.24648
52	4	0.24568
52	5	0.34240
53	1	0.00000
53	2	0.16544
53	3	0.24648

sourceTypeid	roadTypeID	RoadTypeVMTFraction
53	4	0.24568
53	5	0.34240
54	1	0.00000
54	2	0.16544
54	3	0.24649
54	4	0.24568

Source Type Population

yearID	sourceTypeID	sourceTypePopulation
2007	11	4,262
2007	21	65,819
2007	31	43,829
2007	32	14,643
2007	41	63
2007	42	37
2007	43	429
2007	51	45
2007	52	2,752
2007	53	310
2007	54	620
2007	61	654
2007	62	716

Vehicle Type VMT – HPMSVtypeYear Worksheet

HPMSVtypeID	yearID	HPMSBaseYearVMT	baseYearOffNetVMT
10	2007	4012462.16	0
20	2007	692988088.8	0
30	2007	460943431.7	0
40	2007	6902542.93	0
50	2007	43556058.17	0
60	2007	91815721.94	0

Vehicle Type VMT – Sample HourVMTFraction

sourceTypeid	roadTypeID	dayID	hourID	HourVMTFraction
11	1	5	1	0.009862
11	1	5	2	0.006272
11	1	5	3	0.005058
11	1	5	4	0.004667
11	1	5	5	0.006995
11	1	5	6	0.018494

sourceTypeid	roadTypeID	dayID	hourID	HourVMTFraction
11	1	5	7	0.045957
11	1	5	8	0.069644
11	1	5	9	0.060828
11	1	5	10	0.050286
11	1	5	11	0.049935
11	1	5	12	0.054365
11	1	5	13	0.057646
11	1	5	14	0.058032
11	1	5	15	0.062255
11	1	5	16	0.071005
11	1	5	17	0.076973
11	1	5	18	0.077432
11	1	5	19	0.059783
11	1	5	20	0.044392
11	1	5	21	0.035446
11	1	5	22	0.031824
11	1	5	23	0.024942
11	1	5	24	0.017907
11	2	5	1	0.010774
11	2	5	2	0.007644
11	2	5	3	0.006546
11	2	5	4	0.006635
11	2	5	5	0.00954
11	2	5	6	0.020055
11	2	5	7	0.04103
11	2	5	8	0.057972
11	2	5	9	0.053471
11	2	5	10	0.052548
11	2	5	11	0.055061
11	2	5	12	0.057674
11	2	5	13	0.059143
11	2	5	14	0.060802
11	2	5	15	0.065299
11	2	5	16	0.072608
11	2	5	17	0.077382
11	2	5	18	0.075482
11	2	5	19	0.058706
11	2	5	20	0.043986
11	2	5	21	0.035731
11	2	5	22	0.030743

sourceTypeid	roadTypeID	dayID	hourID	HourVMTFraction
11	2	5	23	0.023852
11	2	5	24	0.017318
11	3	5	1	0.010774
11	3	5	2	0.007644
11	3	5	3	0.006546
11	3	5	4	0.006635
11	3	5	5	0.00954
11	3	5	6	0.020055
11	3	5	7	0.04103
11	3	5	8	0.057972
11	3	5	9	0.053471
11	3	5	10	0.052548
11	3	5	11	0.055061
11	3	5	12	0.057674
11	3	5	13	0.059143
11	3	5	14	0.060802
11	3	5	15	0.065299
11	3	5	16	0.072608
11	3	5	17	0.077382
11	3	5	18	0.075482
11	3	5	19	0.058706
11	3	5	20	0.043986
11	3	5	21	0.035731
11	3	5	22	0.030743
11	3	5	23	0.023852
11	3	5	24	0.017318

Note: File contains 1,561 records and is available on request

Meteorology Data

monthID	zoneID	HourID	temperature	relHumidity
7	130470	1	53.93	73.43
7	130470	2	52.80	75.28
7	130470	3	51.71	76.85
7	130470	4	50.73	78.33
7	130470	5	49.93	79.39
7	130470	6	49.24	80.40
7	130470	7	49.00	80.68
7	130470	8	50.22	79.09
7	130470	9	53.50	73.91

monthID	zoneID	HourID	temperature	relHumidity
7	130470	10	58.03	66.56
7	130470	11	62.50	59.15
7	130470	12	66.32	53.19
7	130470	13	69.32	48.73
7	130470	14	71.45	45.62
7	130470	15	72.92	43.49
7	130470	16	73.47	42.51
7	130470	17	73.22	42.53
7	130470	18	71.82	44.20
7	130470	19	68.82	48.39
7	130470	20	65.03	54.30
7	130470	21	61.50	60.33
7	130470	22	58.93	64.98
7	130470	23	57.02	68.30
7	130470	24	55.37	71.11

Age Distribution - Sample

sourceTypeID	yearID	ageID	ageFraction
21	2007	0	0.0519
21	2007	1	0.0579
21	2007	2	0.0645
21	2007	3	0.0658
21	2007	4	0.0642
21	2007	5	0.0619
21	2007	6	0.0613
21	2007	7	0.0637
21	2007	8	0.0642
21	2007	9	0.0651
21	2007	10	0.0595
21	2007	11	0.0531
21	2007	12	0.0492
21	2007	13	0.0433
21	2007	14	0.0365
21	2007	15	0.0309
21	2007	16	0.0234
21	2007	17	0.0177
21	2007	18	0.0137
21	2007	19	0.0121
21	2007	20	0.0098
21	2007	21	0.0081
21	2007	22	0.0059
21	2007	23	0.0050

sourceTypeID	yearID	ageID	ageFraction
21	2007	24	0.0037
21	2007	25	0.0026
21	2007	26	0.0017
21	2007	27	0.0011
21	2007	28	0.0009
21	2007	29	0.0007
21	2007	30	0.0008
31	2007	0	0.0400
31	2007	1	0.0501
31	2007	2	0.0739
31	2007	3	0.0747
31	2007	4	0.0783
31	2007	5	0.0771
31	2007	6	0.0714
31	2007	7	0.0671
31	2007	8	0.0641
31	2007	9	0.0588
31	2007	10	0.0511
31	2007	11	0.0435
31	2007	12	0.0379
31	2007	13	0.0337
31	2007	14	0.0286
31	2007	15	0.0259
31	2007	16	0.0207
31	2007	17	0.0161
31	2007	18	0.0128
31	2007	19	0.0126
31	2007	20	0.0113
31	2007	21	0.0104
31	2007	22	0.0089
31	2007	23	0.0078
31	2007	24	0.0066
31	2007	25	0.0050
31	2007	26	0.0034
31	2007	27	0.0025
31	2007	28	0.0019
31	2007	29	0.0019
31	2007	30	0.0020

Note: File contains 373 records and is available on request

Exhibit 3: MOVES Input Data for Catoosa-Walker Counties Emissions for PM2.5 SIP Budget – 2025

roadTypeID	RampFraction
2	0.02
4	0.04

Sample Average Speed Distribution

sourceTypeid	roadTypeID	hourDayID	AvgSpeedBinID	AvgSpeedFraction
11	2	12	1	0.0000000
11	2	12	2	0.0000000
11	2	12	3	0.0000000
11	2	12	4	0.0000000
11	2	12	5	0.0000000
11	2	12	6	0.0000000
11	2	12	7	0.0225002
11	2	12	8	0.0033240
11	2	12	9	0.0000000
11	2	12	10	0.0000000
11	2	12	11	0.0000000
11	2	12	12	0.0000000
11	2	12	13	0.3858164
11	2	12	14	0.0579704
11	2	12	15	0.5303889
11	2	12	16	0.0000000
11	2	15	1	0.0000000
11	2	15	2	0.0000000
11	2	15	3	0.0000000
11	2	15	4	0.0000000
11	2	15	5	0.0000000
11	2	15	6	0.0000000
11	2	15	7	0.0225002
11	2	15	8	0.0033240
11	2	15	9	0.0000000
11	2	15	10	0.0000000
11	2	15	11	0.0000000
11	2	15	12	0.0000000
11	2	15	13	0.3858164
11	2	15	14	0.0579704

sourceTypeid	roadTypeID	hourDayID	AvgSpeedBinID	AvgSpeedFraction
11	2	15	15	0.5303889
11	2	15	16	0.0000000
11	2	22	1	0.0000000
11	2	22	2	0.0000000
11	2	22	3	0.0000000
11	2	22	4	0.0000000
11	2	22	5	0.0000000
11	2	22	6	0.0000000
11	2	22	7	0.0225002

Note: File contains 39,937 records and is available on request

Road Type Distribution

sourceTypeid	roadTypeID	RoadTypeVMTFraction
11	1	0.00%
11	2	15.27%
11	3	25.86%
11	4	22.96%
11	5	35.91%
21	1	0.00%
21	2	11.91%
21	3	21.74%
21	4	25.48%
21	5	40.87%
31	1	0.00%
31	2	11.91%
31	3	21.74%
31	4	25.48%
31	5	40.87%
32	1	0.00%
32	2	11.91%
32	3	21.74%
32	4	25.48%
32	5	40.87%
41	1	0.00%
41	2	19.85%
41	3	21.92%
41	4	27.00%
41	5	31.22%
42	1	0.00%
42	2	19.85%
42	3	21.92%

sourceTypeid	roadTypeID	RoadTypeVMTFraction
42	4	27.00%
42	5	31.22%
43	1	0.00%
43	2	19.85%
43	3	21.92%
43	4	27.00%
43	5	31.22%
51	1	0.00%
51	2	15.80%
51	3	26.74%
51	4	23.98%
51	5	33.48%
52	1	0.00%
52	2	15.80%
52	3	26.74%
52	4	23.98%
52	5	33.48%
53	1	0.00%
53	2	15.80%
53	3	26.74%
53	4	23.98%
53	5	33.48%
54	1	0.00%
54	2	15.80%
54	3	26.74%
54	4	23.98%
54	5	33.48%
61	1	0.00%
61	2	45.45%
61	3	22.83%
61	4	23.70%
61	5	8.03%
62	1	0.00%
62	2	45.45%
62	3	22.83%
62	4	23.70%
62	5	8.03%

Source Type Population

yearID	sourceTypeID	sourceTypePopulation
2025	11	4,537
2025	21	49,753
2025	31	26,628
2025	32	8,896
2025	41	64
2025	42	32
2025	43	427
2025	51	17
2025	52	2,521
2025	53	404
2025	54	603
2025	61	337
2025	62	494

Vehicle Type VMT – HPMSVtypeYear Worksheet

HPMSVtypeID	yearID	HPMSBaseYearVMT	baseYearOffNetVMT
10	2025	192,103.84	0.00
20	2025	43,182,163.15	0.00
30	2025	21,269,282.28	0.00
40	2025	442,422.46	0.00
50	2025	2,245,866.77	0.00
60	2025	4,764,471.61	0.00

Meteorology Data

monthID	zoneID	HourID	temperature	relHumidity
4	130470	1	53.93	73.43
4	130470	2	52.80	75.28
4	130470	3	51.71	76.85
4	130470	4	50.73	78.33
4	130470	5	49.93	79.39
4	130470	6	49.24	80.40
4	130470	7	49.00	80.68
4	130470	8	50.22	79.09
4	130470	9	53.50	73.91
4	130470	10	58.03	66.56
4	130470	11	62.50	59.15
4	130470	12	66.32	53.19
4	130470	13	69.32	48.73
4	130470	14	71.45	45.62
4	130470	15	72.92	43.49

monthID	zoneID	HourID	temperature	relHumidity
4	130470	16	73.47	42.51
4	130470	17	73.22	42.53
4	130470	18	71.82	44.20
4	130470	19	68.82	48.39
4	130470	20	65.03	54.30
4	130470	21	61.50	60.33
4	130470	22	58.93	64.98
4	130470	23	57.02	68.30
4	130470	24	55.37	71.11

Age Distribution - Sample

sourceTypeID	yearID	ageID	ageFraction
21	2025	0	0.0786
21	2025	1	0.0768
21	2025	2	0.0752
21	2025	3	0.0736
21	2025	4	0.0726
21	2025	5	0.0716
21	2025	6	0.0688
21	2025	7	0.0656
21	2025	8	0.0620
21	2025	9	0.0601
21	2025	10	0.0576
21	2025	11	0.0499
21	2025	12	0.0431
21	2025	13	0.0346
21	2025	14	0.0264
21	2025	15	0.0189
21	2025	16	0.0126
21	2025	17	0.0111
21	2025	18	0.0097
21	2025	19	0.0077
21	2025	20	0.0058
21	2025	21	0.0043
21	2025	22	0.0033
21	2025	23	0.0027
21	2025	24	0.0021
21	2025	25	0.0017
21	2025	26	0.0012
21	2025	27	0.0008
21	2025	28	0.0006
21	2025	29	0.0005
21	2025	30	0.0005

sourceTypeID	yearID	ageID	ageFraction
31	2025	0	0.0583
31	2025	1	0.0568
31	2025	2	0.0555
31	2025	3	0.0544
31	2025	4	0.0540
31	2025	5	0.0534
31	2025	6	0.0528
31	2025	7	0.0518
31	2025	8	0.0508
31	2025	9	0.0493
31	2025	10	0.0481
31	2025	11	0.0459
31	2025	12	0.0426
31	2025	13	0.0381
31	2025	14	0.0340
31	2025	15	0.0284
31	2025	16	0.0180
31	2025	17	0.0205
31	2025	18	0.0273
31	2025	19	0.0249
31	2025	20	0.0236
31	2025	21	0.0211
31	2025	22	0.0178
31	2025	23	0.0153
31	2025	24	0.0134
31	2025	25	0.0113
31	2025	26	0.0091
31	2025	27	0.0072
31	2025	28	0.0059
31	2025	29	0.0049
31	2025	30	0.0056

Note: File contains 373 records and is available on request

Exhibit 4: Vehicle Classification Counts

Weekday vehicle classification counts from GDOT were obtained for the years 2008 through 2010 for the entire state of Georgia. The counts for the 13 county nonattainment Atlanta MPO area were eliminated from the calculations. The vehicle classification counts collected were stratified based on the FHWA vehicle classifications. The counts were then summarized into the 6 HPMS vehicle type categories based the FHWA vehicle classifications. The percent by vehicle type by road type based on functional classification was calculated by year and then averaged for the three years. Table1 list the counts by year. Table 2 lists the final factors of VMT by vehicle type by road type based on the counts. These values were used to weight the VMT from the travel demand model by road type by vehicle type for input into AADVMT worksheet.

Table 1
GDOT Vehicle Classification Counts

2008 Statewide minus ARC 13 County MPO Area

			Weekday Counts				Percent by Road Type			
Code	HPMS Vehicle Type	FHWA Veh Class	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)
10	Motorcycles	Class 1	415,477	276,557	703,762	273,810	0.3%	0.4%	0.3%	0.3%
20	Passenger Cars	Class 2	78,146,859	45,813,738	134,370,835	70,721,022	55.0%	64.5%	65.4%	74.5%
30	Other 2 axle-4 tire vehicles	Class 3	23,048,320	16,181,222	37,536,241	19,040,830	16.2%	22.8%	18.3%	20.1%
40	Buses	Class 4	1,348,962	412,115	1,464,298	372,563	0.9%	0.6%	0.7%	0.4%
50	Single Unit Trucks	Class 5-7	5,177,758	3,054,596	6,643,091	2,735,728	3.6%	4.3%	3.2%	2.9%
60	Combination Trucks	Class 8-13	33,983,937	5,320,479	24,746,197	1,724,995	23.9%	7.5%	12.0%	1.8%
			142,121,313	71,058,707	205,464,424	94,868,948	100%	100%	100%	100%

2009 Statewide minus ARC 13 County MPO Area

			Weekday Counts				Percent by Road Type			
Code	HPMS Vehicle Type	FHWA Veh Class	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)
10	Motorcycles	Class 1	543,569	380,461	552,296	334,712	0.3%	0.3%	0.3%	0.3%
20	Passenger Cars	Class 2	99,860,922	74,033,369	123,617,071	92,974,090	57.6%	65.0%	66.5%	73.4%
30	Other 2 axle-4 tire vehicles	Class 3	29,013,174	25,257,242	35,153,989	26,580,997	16.7%	22.2%	18.9%	21.0%
40	Buses	Class 4	1,445,231	636,498	1,260,763	480,718	0.8%	0.6%	0.7%	0.4%
50	Single Unit Trucks	Class 5-7	5,931,816	4,577,695	5,977,298	3,774,967	3.4%	4.0%	3.2%	3.0%
60	Combination Trucks	Class 8-13	36,572,792	9,058,107	19,363,526	2,566,080	21.1%	7.9%	10.4%	2.0%
			173,367,504	113,943,372	185,924,943	126,711,564	100%	100%	100%	100%

Table 1
GDOT Vehicle Classification Counts (continued)

2010 Statewide minus ARC 13 County MPO Area

			Weekday Counts				Percent by Road Type			
Code	HPMS Vehicle Type	FHWA Veh Class	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)
10	Motorcycles	Class 1	531,781	465,637	767,240	413,477	0.3%	0.3%	0.3%	0.3%
20	Passenger Cars	Class 2	115,785,383	90,783,273	163,511,794	103,655,999	58.1%	64.4%	68.1%	73.3%
30	Other 2 axle-4 tire vehicles	Class 3	33,029,619	31,077,060	45,607,435	29,985,205	16.6%	22.1%	19.0%	21.2%
40	Buses	Class 4	1,648,242	837,435	1,403,597	520,635	0.8%	0.6%	0.6%	0.4%
50	Single Unit Trucks	Class 5-7	6,527,272	5,527,587	7,477,099	4,162,187	3.3%	3.9%	3.1%	2.9%
60	Combination Trucks	Class 8-13	41,728,831	12,222,357	21,492,738	2,746,397	20.9%	8.7%	8.9%	1.9%
	Total		199,251,128	140,913,349	240,259,903	141,483,900	100%	100%	100%	100%

2008-2010 Statewide minus ARC 13 County MPO Area Summary

			Weekday Counts				Percent by Road Type			
Code	HPMS Vehicle Type	FHWA Veh Class	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)	Rural Restricted Access (FC=1)	Rural Unrestricted Access (FC=2-7)	Urban Restricted Access (FC=11-12)	Urban Unrestricted Access (FC=14-19)
10	Motorcycles	Class 1	1,490,827	1,122,655	2,023,298	1,021,999	0.3%	0.3%	0.2%	0.2%
20	Passenger Cars	Class 2	293,793,164	210,630,380	421,499,700	267,351,111	57.7%	67.7%	73.5%	76.6%
30	Other 2 axle-4 tire vehicles	Class 3	85,091,113	72,515,524	118,297,665	75,607,032	16.7%	20.7%	16.5%	18.6%
40	Buses	Class 4	4,442,435	1,886,048	4,128,658	1,373,916	0.9%	0.6%	0.7%	0.5%
50	Single Unit Trucks	Class 5-7	17,636,846	13,159,878	20,097,488	10,672,882	3.4%	3.8%	3.0%	2.7%
60	Combination Trucks	Class 8-13	112,285,560	26,600,943	65,602,461	7,037,472	21.0%	6.9%	6.2%	1.4%
	Total		514,739,945	325,915,428	631,649,270	363,064,412	100%	100%	100%	100%

Table 2
Final Factors for VMT by Vehicle Type by Road Type

Code	HPMS Vehicle Type	FHWA Veh Class	Rural Restricted Access Factor	Rural Unrestricted Access Factor	Urban Restricted Access Factor	Urban Unrestricted Access Factor
10	Motorcycles	Class 1	0.002909	0.003512	0.003196	0.002817
20	Passenger Cars	Class 2	0.568990	0.646239	0.666475	0.737280
30	Other 2 axle-4 tire vehicles	Class 3	0.165098	0.223307	0.187197	0.207472
40	Buses	Class 4	0.008700	0.005776	0.006583	0.003800
50	Single Unit Trucks	Class 5-7	0.034469	0.040796	0.031867	0.029349
60	Combination Trucks	Class 8-13	0.219834	0.080369	0.104681	0.019282
	Total		1.000000	1.000000	1.000000	1.000000

Since the vehicle classification counts are collected using counters that do not adequately distinguish between passenger cars and SUVs, the MOVES defaults for vehicle types 20 and 30 by road type were used to redistribute the VMT. The MOVES Defaults are listed in Table 3.

Table 3
MOVES Defaults
Percent VMT by Vehicle Type

	Vehicle Type					
Year	**10**	**20**	**30**	**40**	**50**	**60**
1999	0.00390	0.58310	0.33480	0.00280	0.02610	0.04920
2000	0.00380	0.58250	0.33600	0.00280	0.02570	0.04920
2001	0.00340	0.58240	0.33740	0.00250	0.02590	0.04850
2002	0.00330	0.58110	0.33850	0.00240	0.02660	0.04820
2003	0.00330	0.57880	0.34060	0.00230	0.02690	0.04810
2004	0.00340	0.57260	0.34600	0.00220	0.02730	0.04850
2005	0.00360	0.57060	0.34770	0.00220	0.02710	0.04870
2006	0.00400	0.55990	0.35850	0.00220	0.02750	0.04780
2007	0.00450	0.55070	0.36630	0.00220	0.02790	0.04840
2008	0.00510	0.54610	0.36980	0.00230	0.02870	0.04800
2009	0.00530	0.54760	0.37480	0.00210	0.02660	0.04370
2010	0.00530	0.54360	0.37770	0.00220	0.02770	0.04350
2011	0.00530	0.53940	0.37830	0.00240	0.02970	0.04500
2012	0.00530	0.53700	0.37740	0.00250	0.03140	0.04640

	Vehicle Type					
Year	**10**	**20**	**30**	**40**	**50**	**60**
2013	0.00520	0.53640	0.37610	0.00260	0.03240	0.04730
2014	0.00520	0.53780	0.37370	0.00260	0.03310	0.04760
2015	0.00511	0.54185	0.36926	0.00266	0.03358	0.04754
2016	0.00505	0.54655	0.36414	0.00270	0.03413	0.04743
2017	0.00500	0.55148	0.35868	0.00274	0.03465	0.04744
2018	0.00495	0.55719	0.35240	0.00278	0.03509	0.04759
2019	0.00490	0.56346	0.34559	0.00281	0.03548	0.04777
2020	0.00484	0.57033	0.33840	0.00283	0.03581	0.04779
2021	0.00479	0.57743	0.33138	0.00285	0.03599	0.04755
2022	0.00475	0.58459	0.32444	0.00286	0.03613	0.04723
2023	0.00471	0.59142	0.31755	0.00288	0.03639	0.04705
2024	0.00466	0.59782	0.31089	0.00291	0.03674	0.04698
2025	0.00462	0.60374	0.30470	0.00294	0.03709	0.04692
2026	0.00458	0.60921	0.29896	0.00296	0.03745	0.04684
2027	0.00455	0.61410	0.29377	0.00300	0.03784	0.04674
2028	0.00452	0.61852	0.28903	0.00303	0.03828	0.04662
2029	0.00450	0.62265	0.28449	0.00307	0.03876	0.04652
2030	0.00448	0.62625	0.28038	0.00311	0.03930	0.04648
2031	0.00444	0.62984	0.27688	0.00313	0.03959	0.04611
2032	0.00440	0.63303	0.27380	0.00316	0.03987	0.04574
2033	0.00436	0.63573	0.27104	0.00319	0.04023	0.04545
2034	0.00432	0.63812	0.26857	0.00321	0.04058	0.04519
2035	0.00429	0.64015	0.26636	0.00324	0.04096	0.04501
2036	0.00425	0.64184	0.26447	0.00327	0.04134	0.04483
2037	0.00421	0.64323	0.26287	0.00330	0.04173	0.04465
2038	0.00418	0.64417	0.26173	0.00333	0.04211	0.04447
2039	0.00414	0.64476	0.26096	0.00336	0.04249	0.04428
2040	0.00411	0.64532	0.26017	0.00340	0.04289	0.04411
2041	0.00407	0.64586	0.25937	0.00343	0.04331	0.04396
2042	0.00404	0.64630	0.25864	0.00346	0.04374	0.04381
2043	0.00401	0.64666	0.25799	0.00350	0.04418	0.04366
2044	0.00398	0.64693	0.25741	0.00353	0.04462	0.04352
2045	0.00395	0.64711	0.25692	0.00357	0.04507	0.04338
2046	0.00392	0.64719	0.25653	0.00360	0.04552	0.04324
2047	0.00389	0.64720	0.25620	0.00364	0.04598	0.04310
2048	0.00386	0.64715	0.25593	0.00368	0.04643	0.04295
2049	0.00383	0.64704	0.25572	0.00371	0.04690	0.04281
2050	0.00380	0.64689	0.25554	0.00375	0.04736	0.04266

Exhibit 5: Vehicle Registration Data

Georgia's Revised Registration Distribution by Age

Overview

R.L. Polk & Co. (Polk) maintains databases encompassing all registered vehicles in operation by state. Polk acquires the source registration data from the states and then processes and enhances the data. Key data elements Polk used for grouping vehicle registered in Georgia by their appropriate composite (i.e., gasoline and diesel) vehicle types were: vehicle make, vehicle model, engine make, engine model, fuel type, cab type, bed length, wheel configuration, vehicle type, gross vehicle weight rating (GVWR)[3] class, model year, and registration geography (i.e., county).

Vehicle characteristic data elements used by Polk are derived from the unique 17 position vehicle identification number (VIN) assigned to every vehicle. Vehicle geography is assigned based on the registration address linked to each VIN.

In order to assign a MOBILE6 category to all registered vehicles, Polk constructed a master vehicle workfile using data from Polk's TIPNet and NVPP databases. This master vehicle workfile accounts for all registered vehicles, including: cars, vans, sport utility vehicles, trucks, buses, school buses, and motorcycles (GVWR classes 1-8 + motorcycle). The GVWR classes are:

Class 1	0 - 6,000 lbs.
Class 2	6,001 - 10,000 lbs.
Class 3	10,001 - 14,000 lbs.
Class 4	14,001 - 16,000 lbs.
Class 5	16,001 - 19,500 lbs.
Class 6	19,501 - 26,000 lbs.
Class 7	26,001 - 33,000 lbs.
Class 8	33,001 - 150,000 lbs.

The TIPNet database contains vehicles from full-size pickups/vans through class 8 (GVWR classes 1c-8), and is structured to serve the commercial vehicle market. The NVPP database contains vehicles GVWR classes 1-3 and is designed to serve the car, light truck/van, and motorcycle aftermarket.

[3] The GVWR is the maximum weight of the vehicle when it is fully loaded, as specified by the manufacturer.

Using the data elements listed above, Polk assigned one of the 16 MOBILE6 categories to each of the vehicles in the workfile. Care was taken to assure that no makes and models are duplicated between the two databases. Note that the unit volume for same make/model vehicles can be divided among two or more MOBILE6 categories due to varying vehicle types and GVWR classes within a specific make/model. TIPNet data supplies GVWR classes 1c-8 (full-size pickups/vans & heavier), while NVPP data provides passenger car, motorcycle, light truck, and light vans from GVWR class 1.

The 16 composite MOBILE6 vehicle types are listed and defined below, with examples of the types of vehicles they include.

Number **Abbreviation** **Description**

1 **LDV** **Light-Duty (LD) Vehicles (Passenger Cars)**

- Class 1 GVWR
- Include: Passenger Cars
- Fuel: All Types
- Source: R.L. Polk NVPP as of October 2002

2 **LDT1** **LD Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW[4])**

- Class 1 GVWR
- Trucks, SUVs, & Vans
- Exclude Full-Size Pickups & Vans
- Fuel: All Types
- Source: R.L. Polk NVPP as of October 2002

3 **LDT2** **LD Trucks 2 (0-6,000 lbs. GVWR, 3,751-5,750 lbs. LVW)**

- Class 1 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Include all Full-Size Pickups & Vans (e.g. 150/1500 series vehicles: F150, C/K 1500, E150, Ram 1500 etc.)
- Include Vehicle Types: Incomplete Pickup + Cab Chassis
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003 & NVPP as of October 2002

4 **LDT3** **LD Trucks 3 (6,001-8,500 lbs. GVWR, 0-5,750 lbs. ALVW[5])**

- Class 2 GVWR
- Trucks, SUVs, & Vans
- GVWR: 6,001-8,000 for Ford, Chevy, Dodge, plus all Toyota Tundra Models

[4] Loaded vehicle weight, the weight of vehicle sitting empty (curb weight) plus 300 pounds.
[5] Adjusted loaded vehicle weight, average of the gross vehicle weight and the curb weight.

- Fuel: All Types
- Exclude: Pickups with Long Bed or Vans with Extended Length (Except Tundra)
- Exclude Vehicle Types: Incomplete Pickup + Cab Chassis + Incomplete Vehicle + Straight Truck + School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003 & NVPP as of October 2002

Number	Abbreviation	Description

5 LDT4 Light-Duty Trucks 4 (6,001-8,500 lbs. GVWR, >5,750 lbs. ALVW)

- Class 2 GVWR
- Trucks, SUVs, & Vans
- GVWR: 6,001-8,000 for Ford, Chevy, & Dodge
- Exclude: all Toyota Tundra Models
- Fuel: All Types
- Include: Pickups with Long Bed or Vans with Extended Length
- Include Vehicle Types: Incomplete Pickup + Cab Chassis + Incomplete Vehicle + Straight Truck
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

6 HDV2B Class 2b Heavy-Duty Vehicles (8,501-10,000 lbs. GVWR)

- Class 2 GVWR
- Trucks, SUVs, & Vans
- GVWR: 8,001-10,000 for Ford, Chevy, & Dodge
- Exclude: All Toyota Tundra Models
- Fuel: All Types
- Include: Pickups with Long Bed or Vans with Extended Length
- Include Vehicle Types: Incomplete Pickup + Cab Chassis + Incomplete Vehicle + Straight Truck
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

7 HDV3 Class 3 Heavy-Duty Vehicles (10,001-14,000 lbs. GVWR)

- Class 3 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

Number	Abbreviation	Description

8 **HDV4** **Class 4 Heavy-Duty Vehicles (14,001-16,000 lbs. GVWR)**

- Class 4 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

9 **HDV5** **Class 5 Heavy-Duty Gasoline Vehicles (16,001-19,500 lbs. GVWR)**

- Class 5 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

10 **HDV6** **Class 6 Heavy-Duty Vehicles (19,501-26,000 lbs. GVWR)**

- Class 6 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

11 **HDV7** **Class 7 Heavy-Duty Vehicles (26,001-33,000 lbs. GVWR)**

- Class 7 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Source: R.L. Polk TIPNet as of March 2003

12 **HDV8A** **Class 8a Heavy-Duty Vehicles (33,001-60,000 lbs. GVWR)**

- Class 8 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: School Bus + Bus Non-School (Coach)
- Include Vehicle Types: 4x2 Non-Tractor Vehicles + All Tractors + Motor Home Chassis
- Source: R.L. Polk TIPNet as of March 2003

13 **HDV8B** **Class 8b Heavy-Duty Vehicles (>60,000 lbs. GVWR)**

- Class 8 GVWR
- Trucks, SUVs, & Vans
- Fuel: All Types
- Exclude Vehicle Types: All Tractors + School Bus + Bus Non-School (Coach)
- Exclude Wheels: 4x2
- Source: R.L. Polk TIPNet as of March 2003

14 **HDBS** **School Buses**

- Include Vehicle Type: School Bus
- Fuel: All Types
- Source: R.L. Polk TIPNet as of March 2003

Number	Abbreviation	Description

15 **HDBT** **Transit & Urban Buses**

- Include Vehicle Type: Bus Non-School (Coach)
- Fuel: All Types
- Source: R.L. Polk TIPNet as of March 2003

16 **MC** **Motorcycles (All)**

- Fuel: All Types
- Source: R.L. Polk NVPP as of October 2002

The data acquired from Polk was queried to determine the number of vehicles registered in the Catoosa-Walker-Floyd metropolitan statistical area by age and vehicle type. Results of this query were used to develop Registration distribution by age inputs. For each of the 16 composite vehicle types, the fraction of all vehicles of that type which are zero-to-one model year old, two model years old, three model years old, etc., up to the oldest category, 25-model-years-and-older, was determined. The resulting input data is shown on the following two pages. Note that the Polk-derived distribution for Class 8b vehicles (vehicle type 13) is commented out; in accordance with EPA guidance, defaults were used for this vehicle type.

Exhibit 6: Source Type Population Input Data Preparation

1) **Date sources**

2002-2003 Polk's data: Registration data from R. L. Polk & Co.'s National Vehicle Population Profile ® (current as of October 2002) and R. L. Polk & Co.'s TIPNet ® (current as of March 2003) are used. This database includes number of vehicles by age and 16 vehicle types in each Georgia county, and has been used to develop age distribution.

Georgia registration data (2003 and 2007): These registration data were obtained from www.georgiastats.uga.edu. This database includes number of vehicles by passenger vehicles, trucks, trailers, motorcycles, buses and others in each county as explained on the Georgia Department of Revenue website (http://motor.etax.dor.ga.gov/stats/renewalsstats.aspx). Passenger Vehicles include Ambulances, Convertibles, Coupes, Hearses, Jeeps, Limousines, Mixers, Motor Homes, Multi-Purpose Vehicles, Roadsters, Station Wagons, Touring Cars, Vans, 2 Doors, 3 Doors, and 4 Doors. Trucks include Truck Tractors, Trucks, and Wreckers.

2) **Methodology**

The Polk's data were summarized by 16 vehicles types in each county and then grown to 2007 using different growth factors by vehicle types (**Table 1**). The number of HDBS, HDBT and MC in Polk's data is comparable to Georgia registration data (**Table 2** and **Table 3**). Therefore, the numbers of HDBS and HDBT were grown to 2007 by multiplying ratios of the number of buses in Georgia motor vehicle registration data in 2007 and 2003. The number of MC was grown to 2007 by multiplying ratios of the number of motor cycles in Georgia motor vehicle registration data in 2007 and 2003. The number of the rest of vehicle types was grown to 2007 by multiplying ratios of human population in 2007 and 2002. The Georgia motor vehicle registration data were not used for these vehicle types due to the difficulty to match the vehicle type used in Georgia motor vehicle registration data to the 16 vehicle types as used in the Polk's data. Since the ratios of 2007 and 2003 passenger cars and trucks in motor vehicle registration data are comparable to the ratios of population data (**Table 4**), population data were used as the growth indicator.

Table 1. List of different growth factors used by vehicle types

Vehicle types	Growth factor
HDBS	Georgia registration data (2003 and 2007), Buses
HDBT	Georgia registration data (2003 and 2007), Buses
HDV2B	Population 2002 and 2007
HDV3	Population 2002 and 2007
HDV4	Population 2002 and 2007
HDV5	Population 2002 and 2007
HDV6	Population 2002 and 2007
HDV7	Population 2002 and 2007

HDV8A	Population 2002 and 2007
HDV8B	Population 2002 and 2007
LDT1	Population 2002 and 2007
LDT2	Population 2002 and 2007
LDT3	Population 2002 and 2007
LDT4	Population 2002 and 2007
LDV	Population 2002 and 2007
MC	Georgia registration data (2003 and 2007), Motor cycles

Table 2. Summary of 2002-2003 Polk's data by 16 mobile vehicle types in four Georgia regions

Vehicle types	ATL13	ATL7	GAGAS	GAOTHER	Total
HDBS	7,854	1,333	2,032	8,221	19,440
HDBT	1,362	102	139	540	2,143
HDV2B	56,809	11,761	15,405	49,039	133,014
HDV3	27,628	5,996	7,822	23,797	65,243
HDV4	13,623	2,262	2,850	10,351	29,086
HDV5	6,005	1,162	1,550	5,577	14,294
HDV6	19,294	4,088	5,932	21,688	51,002
HDV7	16,380	2,528	3,838	15,309	38,055
HDV8A	37,555	4,307	6,619	31,883	80,364
HDV8B	14,449	2,201	3,061	10,926	30,637
LDT1	722,044	131,873	181,393	607,189	1,642,499
LDT2	95,101	28,933	37,692	156,187	317,913
LDT3	302,139	62,530	75,409	284,851	724,929
LDT4	43,616	8,019	9,721	39,432	100,788
LDV	1,723,769	255,647	346,907	1,383,696	3,710,019
MC	50,081	10,657	13,767	41,123	115,628

Table 3. Summary of 2003 Georgia registration data by 4 mobile vehicle types

Vehicle types	ATL13	ATL7	GAGAS	GAOTHER	Total
Buses	10,676	1,559	2,434	9,797	21,237
Trucks	558,496	168,930	237,022	823,867	1,788,315
Passenger Cars	2,259,027	339,456	449,177	1,744,474	4,792,134
Motorcycles	46,836	10,203	13,124	38,561	108,724

Table 4. Comparison between different growth factors

				Ratios	
	2002	**2003**	**2007**	**2007/2002**	**2007/2003**
Motor vehicle registration					
Passenger Car		4,792,134	5,330,256		1.112
Trucks		1,788,315	1,952,470		1.092
Motor Cycle		108,724	174,617		1.606
Bus		21,237	35,124		1.654
Population in Georgia, U.S. Census					
Population	8,585,535	8,735,259	9,533,761	1.110	1.091
Total Average Annual Daily VMT in Georgia, Georgia DOT 445 report, miles					
VMT	292,562,380	296,810,994	305,327,543	1.044	1.029
MOVES national SALESGROWTH factor defaults					
Motorcycle				1.383	1.311
Passenger Car				0.940	1.001
Passenger Truck				0.972	0.948
Light Commercial Truck				0.972	0.948
Intercity Bus				1.353	1.268

Transit Bus				1.353	1.268
School Bus				1.353	1.268
Refuse Truck				1.353	1.268
Single Unit Short-haul Truck				1.353	1.268
Single Unit Long-haul Truck				1.353	1.268
Motor Home				1.353	1.268
Combination Short-haul Truck				1.464	1.405
Combination Long-haul Truck				1.464	1.405

The projected 2007 vehicle population by 16 vehicle types in each county were then converted to 32 vehicles types, which were matched with 28 vehicle types and 12 vehicle types (corresponding to 12 SCC codes) as shown in the EPA MOVES converter tool. The EPA MOVES converter tool was also used to convert vehicle population in MOVES format by each of the four reference counties. These populations are the sum of populations of all counties sharing the same reference counties.

Exhibit 7: Directions for Producing Emissions for Walker County Donut Area Using MOVES

Two sets of emissions are produced, running and non-running emissions.

Running Emissions

The Consultant for the Chattanooga-Hamilton County-North Georgia Transportation Planning Organization provides the Transcad networks as shape files.
A combination of procedures is used to estimate the running and non-running emissions. Some manipulation of the dbf file of the network is performed which is used to produce summaries of VMT, mileage and average weighted speeds. This information is then utilized to calculate the following.

- VMT by functional class by year
- Future growth factors based on growth in VMT for Walker and Catoosa counties from travel demand model
- Future VMT and emissions

Then summaries for every scenario year are prepared to produce growth rates as shown in the sample below.

Summary of Mileage and VMT by County for Chattanooga for 2002

	Route Milege				Vehicle Miles Traveled (VMT)			
HPMS Code	Catoosa	Walker	Dade	Tenn	Catoosa	Walker	Dade	Tenn
0	561.2	282.0	53.1	0.0	0	0	0	0
1	26.0	0	24.5	0	448,248.4	0	364,821.8	0
2	2.5	20.4	0	0	36,586.8	233,377.5	0	0
6	16.1	3.0	2.8	0	77,988.0	7,595.1	7,303.2	0
7	44.6	15.2	8.7	0	84,677.4	34,528.2	34,176.1	0
8	22.5	0.4	0	0	27,641.0	562.4	0	0
9	93.1	57.1	4.0	0	52,491.7	35,303.7	3,817.2	0
11	39.2	0.1	1.1	0	745,998.2	0	1,424.5	0
12	0	0	0	0	0	0	0	0
14	4.6	7.0	1.9	0	83,115.0	108,944.2	8,622.0	0
16	64.4	39.3	0.8	0	399,373.8	146,321.9	1,249.7	0
17	29.1	28.1	0	0	62,737.9	47,091.4	0	0
19	158.2	92.3	2.7	0	162,138.2	79,989.7	774.4	0
Total	1,061.3	544.8	99.5	0.0	2,180,996.6	693,714.3	422,188.7	0

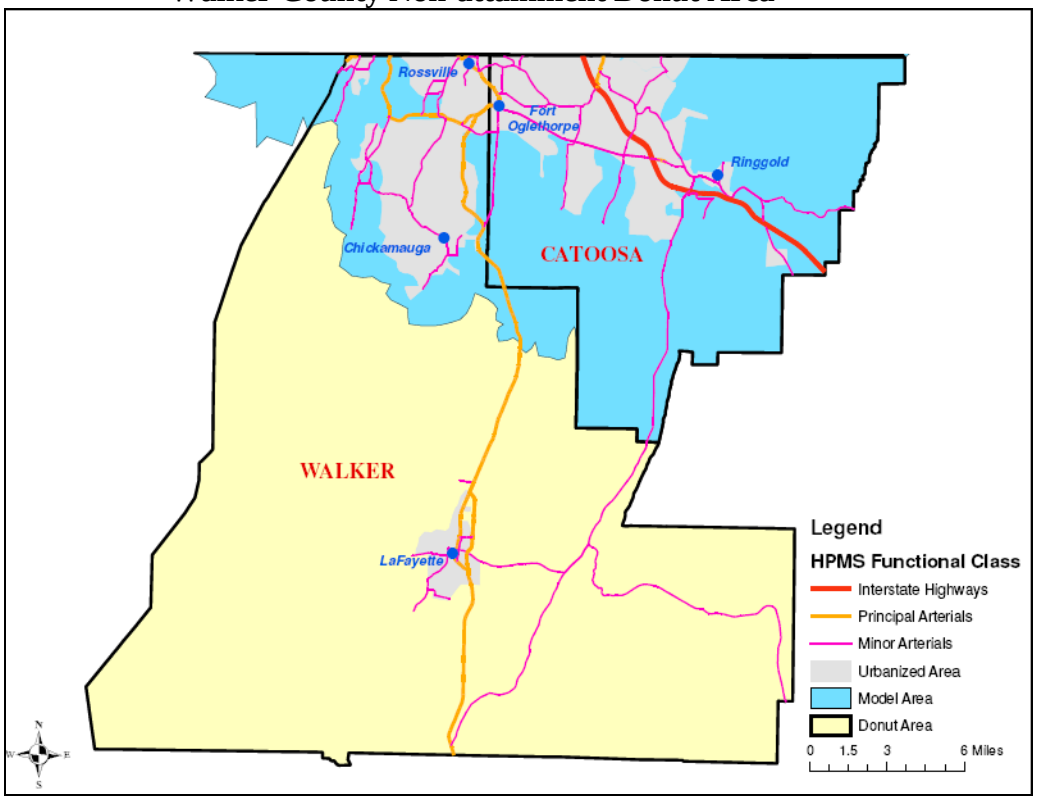
			Catoosa						
HPMS Code	2002	2009	Growth	2015	Growth	2025	Growth	2035	Growth
0	0.00	0.00		0.00	#DIV/0!	0.00		0.00	
1	448,248.00	412,538.00	0.92	439,151.00	0.98	482,950.00	1.08	526,958.00	1.18
2	36,586.80	31,564.00	0.86	33,498.00	0.92	37,223.40	1.02	41,739.00	1.14
6	77,988.00	80,783.00	1.04	86,908.00	1.11	102,907.40	1.32	114,786.00	1.47
7	84,677.00	91,445.00	1.08	104,485.00	1.23	138,785.00	1.64	164,065.00	1.94
8	27,641.00	30,627.00	1.11	37,056.00	1.34	48,012.00	1.74	60,010.00	2.17
9	52,491.70	58,165.00	1.11	67,411.00	1.28	82,810.00	1.58	99,518.00	1.90
11	745,998.00	712,232.00	0.95	768,853.00	1.03	851,923.00	1.14	933,507.00	1.25
12	0	0		0	#DIV/0!	0	#DIV/0!	0	#DIV/0!
14	83,115.00	79,828.00	0.96	83,656.00	1.01	90,710.00	1.09	93,801.00	1.13
16	399,373.80	403,662.00	1.01	445,898.00	1.12	492,844.00	1.23	546,046.00	1.37
17	62,738.00	62,789.00	1.00	61,890.00	0.99	73,862.00	1.18	83,362.00	1.33
19	162,138.20	172,941.00	1.07	189,203.00	1.17	213,447.00	1.32	238,012.00	1.47
Total	2,180,995.50	2,136,574.00	0.98	2,318,009.00	1.06	2,615,473.80	1.20	2,901,804.00	1.33

			Walker						
HPMS Code	2002	2009	Growth	2015	Growth	2025	Growth	2035	Growth
0	0.00	0.00		0.00		0.00	#DIV/0!	0.00	#DIV/0!
1	0	0		0		0	#DIV/0!	0	#DIV/0!
2	233,378.00	192,078.00	0.82	206,524.00	0.88	230,818.00	0.99	258,162.00	1.11
6	7,595.00	1,960.00	0.26	2,086.00	0.27	2,234.00	0.29	2,378.00	0.31
7	34,528.00	34,713.00	1.01	41,030.00	1.19	50,421.00	1.46	59,940.00	1.74
8	562.00	566.00	1.01	877.00	1.56	1,358.00	2.42	1,786.00	3.18
9	35,303.00	34,544.00	0.98	38,141.00	1.08	45,021.00	1.28	49,402.00	1.40
11	0	0	#DIV/0!	0		0	#DIV/0!	0	#DIV/0!
12	0	0	#DIV/0!	0		0	#DIV/0!	0	#DIV/0!
14	108,944.00	103,625.00	0.95	109,616.00	1.01	119,827.00	1.10	130,447.00	1.20
16	146,322.00	136,165.00	0.93	144,703.00	0.99	160,418.00	1.10	183,650.00	1.26
17	47,091.00	44,454.00	0.94	46,793.00	0.99	51,418.00	1.09	51,077.00	1.08
19	79,990.00	74,755.00	0.93	80,294.00	1.00	89,057.00	1.11	98,060.00	1.23
Total	693,713.00	622,860.00	0.90	670,064.00	0.97	750,572.00	1.08	834,902.00	1.20

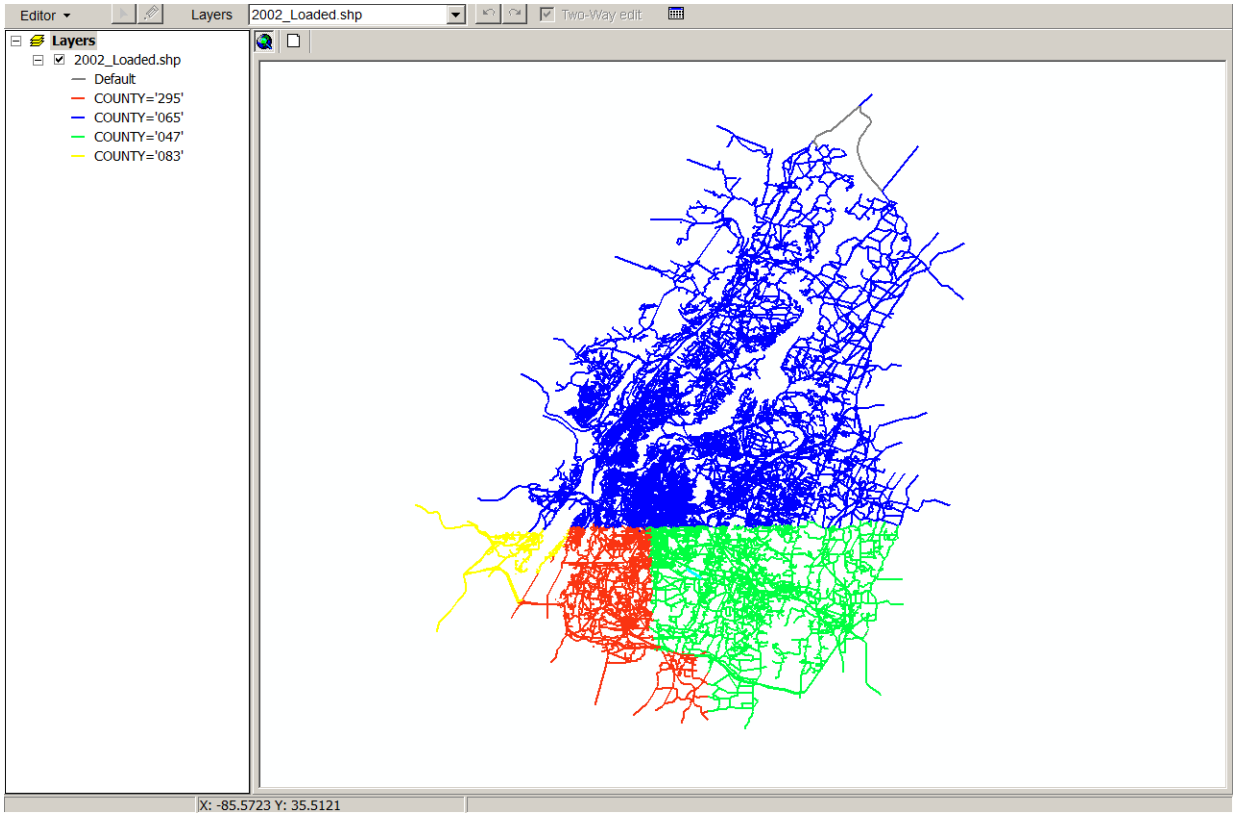
1990 Code			Total Georgia for Walker and Catoosa						
HPMS Code	2002	2009	Growth	2015	Growth	2025	Growth	2035	Growth
0	0.00	0.00		0.00		0.00		0.00	#DIV/0!
1	448,248.00	412,538.00	0.92	439,151.00	0.98	482,950.00	1.08	526,958.00	1.18
2	269,964.80	223,642.00	0.83	240,022.00	0.89	268,041.40	0.99	299,901.00	1.11
6	85,583.00	82,743.00	0.97	88,994.00	1.04	105,141.40	1.23	117,164.00	1.37
7	119,205.00	126,158.00	1.06	145,515.00	1.22	189,206.00	1.59	224,005.00	1.88
8	28,203.00	31,193.00	1.11	37,933.00	1.34	49,370.00	1.75	61,796.00	2.19
9	87,794.70	92,709.00	1.06	105,552.00	1.20	127,831.00	1.46	148,920.00	1.70
11	745,998.00	712,232.00	0.95	768,853.00	1.03	851,923.00	1.14	933,507.00	1.25
12	0.00	0.00		0.00		0.00		0.00	#DIV/0!
14	192,059.00	183,453.00	0.96	193,272.00	1.01	210,537.00	1.10	224,248.00	1.17
16	545,695.80	539,827.00	0.99	590,601.00	1.08	653,262.00	1.20	729,696.00	1.34
17	109,829.00	107,243.00	0.98	108,683.00	0.99	125,280.00	1.14	134,439.00	1.22
19	242,128.20	247,696.00	1.02	269,497.00	1.11	302,504.00	1.25	336,072.00	1.39
Total	2,874,708.50	2,759,434.00	0.96	2,988,073.00	1.04	3,366,045.80	1.17	3,736,706.00	1.30

Then estimate the base year VMT for the donut area by functional class. The comparison of Model VMT to HPMS Mileage is reviewed to pro-rate the amount of VMT needed. Normally, it is expected that the mileage in the model summary will be less than the mileage in the total county. In a couple of cases, functional class 2 and 16, the Model mileage and VMT exceed HPMS values, so it is assumed that all of these facilities are in the model network and do not need to be accounted for in the donut area. The following figure is the nonattainment area and the next figure is the base network color-coded by county.

Walker County Non-attainment Donut Area



Base Year Network


Editor
Layers
2002_Loaded.shp
Two-Way edit
Layers
2002_Loaded.shp
Default
COUNTY='295'
COUNTY='065'
COUNTY='047'
COUNTY='083'
X: -85.5723 Y: 35.5121

Summarize Route Mileage to use to Pro-rate VMT for Walker County to estimate HPMS Adj Factors for the Walker Model Area for 2002

Compare Model Mileage to HPMS Total Mileage

HPMS Code	Model Mileage	Model VMT	RC_File	Total HPMS Mileage for County	Pro-rate Mileage Factor	Total County HPMS VMT	Pro-rate VMT based on route mileage for Model area	HPMS Adj Factor for Model Area
0	282.00	0	0	0	0	0	0	
1	0.00		0.00	0	1.00	0	0	
2	20.40	233,378	7.00	19.57	1.04	191,985	191,985	0.82
6	3.00	7,595	0.37	30.3	0.10	101,862	10,085	1.33
7	15.20	34,528	19.44	131.65	0.12	222,679	25,710	0.74
8	0.40	562	0.44	28.65	0.01	50,506	705	1.25
9	57.10	35,304	54.74	370.32	0.15	282,006	43,483	1.23
11	0.00	0		0	0.00	0	0	
12	0.00			0	0.00	0	0	
14	7.00	108,944	7.13	21.32	0.33	248,347	81,540	0.75
16	39.30	146,322	20.59	35.22	0.90	168,651	168,651	1.15
17	28.00	47,091	17.98	41.68	0.67	72,282	48,558	1.03
19	92.30	79,990	65.77	230.97	0.40	219,488	87,712	1.10
Total	544.70	693,714	193.46	909.68	0.60	1,557,806	658,429	0.95
				0.21		331,296		

Off_model Area

HPMS Code	2002 Mileage	2002 VMT
0	0	0
1		
2	-0.83	0
6	27.30	91,777
7	116.45	196,969
8	28.25	49,801
9	313.22	238,523
11	0.00	0
12	0.00	0
14	14.32	166,807
16	-4.08	0
17	13.68	23,724
19	138.67	131,776
Total	646.98	899,378

Estimate the VMT in the Walker County Donut Area

2002 Walker County HPMS Data					2002 Travel Model VMT By HPMS Functional Class			
Average Annual Daily VMT					Oct 2007, Travel Model Run			
GDOT Office of Transportation Data 445 Report								
Excluded VMT for External Links								
Functional Class Name	**Functional Class No.**	**County Total**	**Pro-Rated VMT**		**Functional Class Name**	**Functional Class No.**	**Grand Total**	**Subtract Model from HPMS - Used for Off-Model**
Rural Interstate	1	0	0		Rural Interstate	1	0	0
Rural Prin. Arterial	2	191,985	191,985		Rural Prin. Arterial	2	233,378	0
Rural Min. Arterial	6	101,862	10,085		Rural Min. Arterial	6	7,595	91,777
Rural Major Collector	7	222,679	25,710		Rural Major Collector	7	34,528	196,969
Rural Minor Collector	8	50,506	705		Rural Minor Collector	8	562	49,801
Rural Local	9	282,006	43,483		Rural Local	9	35,304	238,523
Urb. Interstate	11	0	0		Urb. Interstate	11	0	0
Urb. Other Fwy	12	0	0		Urb. Other Fwy	12		0
Urb. Prin. Arterial	14	248,347	81,540		Urb. Prin. Arterial	14	108,944	166,807
Urb. Min. Arterial	16	168,651	168,651		Urb. Min. Arterial	16	146,322	0
Urbanized Collector	17	72,282	48,558		Urbanized Collector	17	47,091	23,724
Urbanized Local	19	219,488	87,712		Urbanized Local	19	79,990	131,776
			658,429				693,714	899,378
	Grand Total	1,557,806	658,429			**Grand Total**	693,714	899,378

Calculate the average weighted speeds for Walker and Catoosa counties for each scenario year.

Chattanooga 2002 for Walker and Catoosa Counties
Average Weighted Speed by Functional Class

Functional Class	Total VMT	Total Weighted VMT	Weighted Avg Spd
1	448,248.4	29,999,516.7	66.93
2	269,964.3	15,109,135.9	55.97
6	85,583.1	3,604,719.0	42.12
7	119,425.5	4,686,027.5	39.24
8	28,203.5	1,032,492.0	36.61
9	88,160.6	2,876,663.1	32.63
11	745,998.2	46,219,903.8	61.96
12	0	0	0
14	192,059.2	9,065,007.2	47.20
16	545,695.7	20,938,015.0	38.37
17	109,829.3	3,777,929.7	39.24
19	242,127.9	4,929,459.4	20.36
Grand Total	2,875,295.8	142,238,869.1	49.47

The following calculations are produced

- Estimates Emissions
  - Estimates future VMT based on growth factors entered
  - Assigns MOVES speed bin based on average weighted speeds entered for each functional class
  - Estimates running emission
- Speed Bin
  - Ranges for MOVES speed bins – used to assign speed bin
- Road Type VMT
  - MOVES road types by functional class
- Summary – Summarizes running and non-running emissions

Sample Worksheet that Estimates Emissions

				2002 VMT Estimates				Emissions			
Functional Class	MOVES Roadway Type	Total County HPMS VMT	Off-Model 2002 VMT			Avg VMT Weighted Speed	MOVES Speed Bin	PM2.5 Emission Factor	NOx Emission Factor	PM2.5 Emissions (grams)	NOx Emissions (grams)
2	2	191,985	0			56	12	0.2107	6.7223	0.0	0.0
6	3	101,862	91,777			42	9	0.1236	3.6717	11,344.8	336,979.0
7	3	222,679	196,969			39	9	0.1236	3.6717	24,347.8	723,214.0
8	3	50,506	49,801			37	8	0.1319	3.7137	6,570.2	184,947.0
9	3	282,006	238,523			33	8	0.1319	3.7137	31,468.1	885,807.7
14	5	248,347	166,807			47	10	0.0501	2.1712	8,362.3	362,169.8
16	5	168,651	0			38	9	0.0531	2.1939	0.0	0.0
17	5	72,282	23,724			39	9	0.0531	2.1939	1,260.6	52,048.5
19	5	219,488	131,776			20	5	0.0847	2.7938	11,155.5	368,156.1
Total		1,557,806	899,377							94,509.2	2,913,322.2

				2009 VMT Estimates				Emissions			
Functional Class	MOVES Roadway Type	Total County HPMS VMT	Off-Model 2002 VMT	2009 Growth Factor from 2002	2009 VMT using Growth Factors from Model	Avg VMT Weighted Speed	MOVES Speed Bin	PM2.5 Emission Factor	NOx Emission Factor	PM2.5 Emissions (grams)	NOx Emissions (grams)
2	2	191,985	0	0.83	0	56	12	0.1370	3.5811	0.0	0.0
6	3	101,862	91,777	0.97	89,024	43	10	0.0718	1.9331	6,387.8	172,087.3
7	3	222,679	196,969	1.06	208,787	39	9	0.0769	1.9638	16,045.5	410,023.9
8	3	50,506	49,801	1.11	55,279	36	8	0.0834	2.0032	4,610.1	110,736.2
9	3	282,006	238,523	1.06	252,834	32	7	0.1063	2.2099	26,888.8	558,738.9
14	5	248,347	166,807	0.96	160,135	47	10	0.0319	1.1623	5,115.2	186,119.4
16	5	168,651	0	0.99	0	38	9	0.0345	1.1800	0.0	0.0
17	5	72,282	23,724	0.98	23,250	39	9	0.0345	1.1800	803.1	27,435.1
19	5	219,488	131,776	1.02	134,412	21	5	0.0587	1.5403	7,887.2	207,028.2
Total		1,557,806	899,377	0.96	923,720					67,737.8	1,672,168.9

				2015 VMT Estimates				Emissions			
Functional Class	MOVES Roadway Type	Total County HPMS VMT	Off-Model 2002 VMT	2015 Growth Factor from 2002	2015 VMT using Growth Factors from Model	Avg VMT Weighted Speed	MOVES Speed Bin	PM2.5 Emission Factor	NOx Emission Factor	PM2.5 Emissions (grams)	NOx Emissions (grams)
2	2	191,985	0	0.89	0	56	12	0.0642	1.6826	0.0	0.0
6	3	101,862	91,777	1.04	95,448	43	10	0.0359	0.9582	3,429.0	91,455.1
7	3	222,679	196,969	1.22	240,302	39	9	0.0391	0.9713	9,393.3	233,408.7
8	3	50,506	49,801	1.34	66,733	32	7	0.0545	1.0809	3,634.5	72,134.9
9	3	282,006	238,523	1.20	286,228	24	6	0.0598	1.1488	17,104.2	328,819.5
14	5	248,347	166,807	1.01	168,475	47	10	0.0188	0.6106	3,165.5	102,877.6
16	5	168,651	0	1.08	0	38	9	0.0208	0.6173	0.0	0.0
17	5	72,282	23,724	0.99	23,487	39	9	0.0208	0.6173	487.6	14,499.1
19	5	219,488	131,776	1.11	146,271	20	5	0.0374	0.7899	5,467.6	115,532.9
Total		1,557,806	899,377	1.04	935,352					42,681.8	958,727.8

				2025 VMT Estimates				Emissions			
Functional Class	MOVES Roadway Type	Total County HPMS VMT	Off-Model 2002 VMT	2025 Growth Factor from 2002	2025 VMT using Growth Factors from Model	Avg VMT Weighted Speed	MOVES Speed Bin	PM2.5 Emission Factor	NOx Emission Factor	PM2.5 Emissions (grams)	NOx Emissions (grams)
2	2	191,985	0	1.00	0	56	12	0.0196	0.6092	0.0	0.0
6	3	101,862	91,777	1.23	112,886	44	10	0.0152	0.3783	1,719.3	42,710.1
7	3	222,679	196,969	1.59	313,181	40	9	0.0172	0.3820	5,379.8	119,639.9
8	3	50,506	49,801	1.75	87,152	36	8	0.0197	0.3868	1,715.6	33,708.2
9	3	282,006	238,523	1.46	348,244	32	7	0.0242	0.4181	8,443.3	145,603.6
14	5	248,347	166,807	1.10	183,488	47	10	0.0106	0.2511	1,946.5	46,081.1
16	5	168,651	0	1.20	0	39	9	0.0121	0.2517	0.0	0.0
17	5	72,282	23,724	1.14	27,045	39	9	0.0121	0.2517	327.1	6,806.7
19	5	219,488	131,776	1.25	164,720	21	5	0.0234	0.3089	3,859.2	50,888.2
Total		1,557,806	899,377	1.17	1,052,271					23,390.7	445,437.8

				2035 VMT Estimates				Emissions			
Functional Class	MOVES Roadway Type	Total County HPMS VMT	Off-Model 2002 VMT	2035 Growth Factor from 2002	2035 VMT using Growth Factors from Model	Avg VMT Weighted Speed	MOVES Speed Bin	PM2.5 Emission Factor	NOx Emission Factor	PM2.5 Emissions (grams)	NOx Emissions (grams)
2	2	191,985	0	1.11	0	56	12	0.0131	0.4345	0.0	0.0
6	3	101,862	91,777	1.37	125,734	43	10	0.0116	0.2790	1,459.3	35,080.4
7	3	222,679	196,969	1.88	370,302	40	9	0.0133	0.2810	4,928.5	104,072.7
8	3	50,506	49,801	2.19	109,064	36	8	0.0155	0.2837	1,690.9	30,944.1
9	3	282,006	238,523	1.70	405,489	31	7	0.0189	0.3049	7,653.2	123,624.4
14	5	248,347	166,807	1.17	195,164	47	10	0.0090	0.1879	1,764.4	36,668.9
16	5	168,651	0	1.34	0	39	9	0.0104	0.1875	0.0	0.0
17	5	72,282	23,724	1.22	28,943	40	9	0.0104	0.1875	301.1	5,425.9
19	5	219,488	131,776	1.39	183,169	21	5	0.0206	0.2257	3,775.4	41,350.0
Total		1,557,806	899,377	1.30	1,169,190					21,572.9	377,166.4

Non-Running Emissions

Uses two sets of inputs, one from a MOVES Inventory run to produce the raterpervehicle csv files by year provided by the Consultant for Chattanooga-Hamilton County-North Georgia Transportation Planning Organization and the source vehicle population for Walker donut area only, also provided by the Consultant for Chattanooga-Hamilton County-North Georgia Transportation Planning Organization.

Emissions by pollutant by process by source type

MOVESSce	MOVESRu	yearID	monthID	dayID	hourID	zoneID	pollutantID	processID	sourceTyp	SCC	fuelTypeID	modelYea	temperatu	ratePerVeh
chatt-2002	1	2002	4	5	1	130470	1	2	11		0	0	53.925	0.004429
chatt-2002	1	2002	4	5	1	130470	1	2	21		0	0	53.925	0.077338
chatt-2002	1	2002	4	5	1	130470	1	2	31		0	0	53.925	0.094661
chatt-2002	1	2002	4	5	1	130470	1	2	32		0	0	53.925	0.094518
chatt-2002	1	2002	4	5	1	130470	1	2	41		0	0	53.925	0.055112
chatt-2002	1	2002	4	5	1	130470	1	2	51		0	0	53.925	0.014367
chatt-2002	1	2002	4	5	1	130470	1	2	53		0	0	53.925	0.473858
chatt-2002	1	2002	4	5	1	130470	1	2	54		0	0	53.925	0.048803
chatt-2002	1	2002	4	5	1	130470	1	2	61		0	0	53.925	0.017771
chatt-2002	1	2002	4	5	1	130470	1	2	62		0	0	53.925	0.066364
chatt-2002	1	2002	4	5	1	130470	1	90	62		0	0	53.925	13.6234
chatt-2002	1	2002	4	5	1	130470	3	2	11		0	0	53.925	0.001118
chatt-2002	1	2002	4	5	1	130470	3	2	21		0	0	53.925	0.059741
chatt-2002	1	2002	4	5	1	130470	3	2	31		0	0	53.925	0.085073
chatt-2002	1	2002	4	5	1	130470	3	2	32		0	0	53.925	0.097011
chatt-2002	1	2002	4	5	1	130470	3	2	41		0	0	53.925	0.074074
chatt-2002	1	2002	4	5	1	130470	3	2	51		0	0	53.925	0.012731
chatt-2002	1	2002	4	5	1	130470	3	2	53		0	0	53.925	0.373121
chatt-2002	1	2002	4	5	1	130470	3	2	54		0	0	53.925	0.020388
chatt-2002	1	2002	4	5	1	130470	3	2	61		0	0	53.925	0.017416
chatt-2002	1	2002	4	5	1	130470	3	2	62		0	0	53.925	0.134946
chatt-2002	1	2002	4	5	1	130470	3	16	11		0	0	53.925	0
chatt-2002	1	2002	4	5	1	130470	3	16	21		0	0	53.925	1.29E-06
chatt-2002	1	2002	4	5	1	130470	3	16	31		0	0	53.925	2.50E-06
chatt-2002	1	2002	4	5	1	130470	3	16	32		0	0	53.925	7.48E-06
chatt-2002	1	2002	4	5	1	130470	3	16	41		0	0	53.925	3.70E-05
chatt-2002	1	2002	4	5	1	130470	3	16	51		0	0	53.925	4.73E-06
chatt-2002	1	2002	4	5	1	130470	3	16	53		0	0	53.925	4.91E-05
chatt-2002	1	2002	4	5	1	130470	3	16	54		0	0	53.925	6.41E-07
chatt-2002	1	2002	4	5	1	130470	3	16	61		0	0	53.925	7.61E-06
chatt-2002	1	2002	4	5	1	130470	3	16	62		0	0	53.925	6.75E-05
chatt-2002	1	2002	4	5	1	130470	3	17	62		0	0	53.925	0.030323
chatt-2002	1	2002	4	5	1	130470	3	90	62		0	0	53.925	60.6463

The data is entered into a spreadsheet where pivot tables summarizes the rate per vehicle by vehicle type and pollutant and multiplies that times the number of source vehicles by type as shown in the example below.

pollutantID	3			
NOX		**Source Population**		**Final Nonrunning emissions**
Row Labels	**Sum of ratePerVehicle**	**Year**	**2002**	
11	0.141028711	11	596	84.0379
21	11.60972385	21	14,471	168,002.5270
31	17.23329229	31	7,759	133,721.4368
32	18.66399529	32	2,592	48,382.8146
41	2.218254813	41	11	23.5606
42	2.442557225	42	7	16.3655
43	9.31284846	43	74	688.7517
51	3.30049217	51	10	32.7373
52	16.94345616	52	519	8,795.2186
53	9.557973602	53	41	395.2339
54	3.258886501	54	110	359.0870
61	4.00518698	61	130	520.4790
62	961.1476361	62	116	111,658.5057
Grand Total	**1059.835332**	Total	26,436	472,680.7556

pollutantID	110			
PM2.5		**Source Population**		**Final Nonrunning emissions**
Row Labels	**Sum of ratePerVehicle**	**Year**	**2002**	
11	0.001876008	11	596	1.1179
21	0.167654394	21	14,471	2,426.1009
31	0.20641898	31	7,759	1,601.7045
32	0.264015466	32	2,592	684.4093
41	0.08582073	41	11	0.9115
42	0.127094204	42	7	0.8515
43	0.261304708	43	74	19.3254
51	0.080872484	51	10	0.8022
52	0.393625963	52	519	204.3282
53	0.116289582	53	41	4.8087
54	0.050002052	54	110	5.5096
61	0.105179485	61	130	13.6682
62	17.80950013	62	116	2,068.9664
Grand Total	**19.66965419**	Total	26,436	7,032.5044

The total non-running and running emissions are then summarized.

Running Emissions

		2002		2009		2015		2025		2035	
	MOVES	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily
Functional	Roadway	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx
Class	Type	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)
2	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3	11,344.8	336,979.0	6,387.8	172,087.3	3,429.0	91,455.1	1,719.3	42,710.1	1,459.3	35,080.4
7	3	24,347.8	723,214.0	16,045.5	410,023.9	9,393.3	233,408.7	5,379.8	119,639.9	4,928.5	104,072.7
8	3	6,570.2	184,947.0	4,610.1	110,736.2	3,634.5	72,134.9	1,715.6	33,708.2	1,690.9	30,944.1
9	3	31,468.1	885,807.7	26,888.8	558,738.9	17,104.2	328,819.5	8,443.3	145,603.6	7,653.2	123,624.4
14	5	8,362.3	362,169.8	5,115.2	186,119.4	3,165.5	102,877.6	1,946.5	46,081.1	1,764.4	36,668.9
16	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	5	1,260.6	52,048.5	803.1	27,435.1	487.6	14,499.1	327.1	6,806.7	301.1	5,425.9
19	5	11,155.5	368,156.1	7,887.2	207,028.2	5,467.6	115,532.9	3,859.2	50,888.2	3,775.4	41,350.0
Total		94,509.2	2,913,322.2	67,737.8	1,672,168.9	42,681.8	958,727.8	23,390.7	445,437.8	21,572.9	377,166.4

Non-Running Emissions

2002		2009		2015		2025		2035	
Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily
$PM_{2.5}$	NOx	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx
(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)
7,032.5	472,680.8	4,580.1	387,223.5	3,423.4	347,767.6	2,517.4	265,735.7	2,573.2	269,657.2

Annualization Factor =342 - Running Emissions

		2002		2009		2015		2025		2035	
	MOVES	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Annual
Functional	Roadway	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx	$PM_{2.5}$	NOx
Class	Type	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)	(Grams)
2	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3	3,879,908.4	115,246,809.5	2,184,615.0	58,853,841.0	1,172,730.3	31,277,661.2	588,006.5	14,606,854.7	499,095.4	11,997,500.7
7	3	8,326,941.2	247,339,189.9	5,487,573.0	140,228,159.2	3,212,513.7	79,825,759.2	1,839,893.5	40,916,856.7	1,685,538.4	35,592,871.1
8	3	2,247,005.3	63,251,869.1	1,576,639.0	37,871,779.0	1,242,996.5	24,670,136.1	586,743.1	11,528,192.8	578,295.2	10,582,873.0
9	3	10,762,082.2	302,946,237.3	9,195,980.0	191,088,715.4	5,849,647.2	112,456,261.6	2,887,598.5	49,796,419.4	2,617,392.8	42,279,535.3
14	5	2,859,920.8	123,862,087.8	1,749,414.2	63,652,827.3	1,082,596.4	35,184,150.6	665,690.5	15,759,736.7	603,430.3	12,540,765.8
16	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	5	431,115.0	17,800,595.4	274,663.1	9,382,804.2	166,772.1	4,958,701.3	111,854.2	2,327,894.8	102,988.8	1,855,661.1
19	5	3,815,177.0	125,909,390.8	2,697,439.2	70,803,641.7	1,869,926.6	39,512,239.8	1,319,847.9	17,403,775.8	1,291,191.5	14,141,695.5
Total		32,322,150.0	996,356,179.7	23,166,323.4	571,881,767.9	14,597,182.7	327,884,909.8	7,999,634.2	152,339,731.0	7,377,932.4	128,990,902.5
Total in tons		35.6291	1,098.2947	25.5365	630.3917	16.0906	361.4312	8.8181	167.9258	8.1328	142.1881
Non-Running Emissions		2,405,116.5	161,656,818.4	1,566,397.0	132,430,421.7	1,170,789.6	118,936,529.3	860,943.4	90,881,625.0	880,030.7	92,222,775.2
Total in tons		2.6512	178.1961	1.7267	145.9796	1.2906	131.1051	0.9490	100.1798	0.9701	101.6582
Grand Total in tons		38.2803	1,276.4908	27.2632	776.3713	17.3812	492.5363	9.7671	268.1057	9.1028	243.8463