



Volume II Conformity Determination Report



**Technical Analysis
Update
March 2015**

The contents of this report reflect the views of the persons preparing the document and those individuals are responsible for the facts and the accuracy of the data presented herein. The contents of this report do not necessarily reflect the official views or policies of the Department of Transportation of the State of Georgia. This report does not constitute a standard, specification, or regulations.

Introduction

This report serves as the second addendum to the 2014 PLAN 2040 RTP/FY 2014-2019 TIP Conformity Determination Report. This document is being updated to reflect changes to emissions as a result of two actions: 1) updates associated with the Gainesville-Hall County Regional Transportation Plan: 2015 Update and 2) updates to MARTA bus routes to reflect new service in Clayton County. This conformity determination is not associated with an update to the ARC RTP/TIP.

Appropriate sections have been updated to reflect the latest planning assumptions and project information for the Gainesville-Hall County Metropolitan Planning Organization (GHMPO) RTP and 2016-2019 TIP. For the full body of text, see the PLAN 2040 RTP (March 2014 Update) documentation available on ARC's website at <http://www.atlantaregional.com/environment/air/air-quality-planning>.

Statement of Conformity

An updated transportation conformity analysis is required under the 2008 eight-hour ozone standard and the 1997 annual PM_{2.5} standard for the PLAN 2040 RTP (March 2014 Update) and TIP as a result of changes to regionally significant projects.

For the eight-hour ozone conformity analysis the Motor Vehicle Emission Budget (MVEB) test is required to demonstrate conformity. The latest approved MVEBs applicable to conformity under the eight-hour ozone standard were established by Georgia EPD as part of the Atlanta Reasonable Further Progress (RFP) SIP and the Atlanta Ozone Maintenance Plan.

Due to a recent court ruling¹ on December 23, 2014, conformity for the previous 1997 eight-hour ozone standard will be upheld until such time as EPA completely revokes the standard. By maintaining the 20-county MVEBs and demonstrating conformity for the entire 1997 eight hour ozone nonattainment area, this CDR addendum fulfills the requirements of the court ruling for the five counties (Barrow, Carroll, Hall, Spalding and Walton) not a part of the 2008 eight-hour ozone standard, but previously part of the 1997 area.

For the PM_{2.5} conformity analysis, a No Greater Than Base Year emissions test is used to demonstrate conformity.² This test, selected through interagency consultation, is used as an interim emissions testing requirement until MVEBs are found adequate as part of the Atlanta PM_{2.5} Maintenance Plan. Georgia EPD submitted the PM_{2.5} Maintenance SIP, and associated MVEBs, to EPA on August 30, 2012. EPA has not yet found the submitted MVEBs adequate/approved; therefore the region continues to use the No Greater Than Base Year test, with 2002 as the required base year for conformity purposes.

The conclusion of the conformity analyses, documented below, indicates that the ARC & GHMPO TIP and RTP support the broad intentions of the Clean Air Act for achieving and maintaining the National Ambient Air Quality Standards for ozone and fine particulate matter.

¹ Natural Resource Defense Council v EPA. US Court of Appeals for the District of Columbia. 23 Dec. 2014.

² 40 CFR Part 93.119(e)(2), 71 FR 12468, March 10, 2006

Interagency Consultation

The draft PLAN 2040 FY 2014-2019 TIP/RTP Technical Analysis Update documents were made available to ARC planning partners through the TCC and the TAQC committees in March, 2015, to allow for time to comment prior to formal adoption or publication, in accordance with 93.105(b)(2)(iii) of the Transportation Conformity Rule. Documentation was provided to interagency consultation group ahead via email ahead of the initiation of public comment on March 2, 2015. Final PLAN 2040 FY 2014-2019 TIP/RTP Technical Analysis Update documents are anticipated to be provided on April 9, 2015, upon approval of the update, fulfilling the requirements of 40 CFR 93.105(c)(7).

Public Involvement

The official public comment period for the PLAN 2040 FY 2014-2019 TIP/RTP Technical Analysis Update was held in March 2015. Following completion of the public comment period, ARC prepared a Public Comment Report, which summarizes all stakeholder and public outreach and comments.

ARC's public involvement process as detailed in the Regional Community Engagement Plan for TIP amendments includes specific outreach strategies to share project information with the public:

- *30-Day Public Comment Period:* A public review and comment period ran from March 2, 2015 through midnight March 31, 2015. ARC must receive comments during this timeframe in order to be considered in the official record of comments. A summary of all comments received during the period and responses to the comments was presented to ARC's technical and policy committees and the ARC Board for their consideration before taking action on the amendment.
- *Project Summary:* A project summary was prepared to provide the public with a user friendly explanation of the most important elements of the project and is accessible on the ARC website.
- ARC staff was available for questions, comments and speaking engagements by contacting 404-463-3272 or transportation@atlantaregional.com
- *Public Comments and Responses were updated and posted on the TIP Amendment #1 webpage*

Latest Planning Assumptions

ARC updates planning assumptions including (but not limited to) population, employment, socioeconomic variables, and vehicle miles traveled (VMT) on a recurring basis. A detailed listing of the planning assumptions for this conformity analysis of the PLAN 2040 RTP and FY 2014-2019 TIP (March 2015 Technical Analysis Update) is outlined in Exhibit 1. These documents were submitted to the interagency consultation group in accordance with Section 93.105(c)(1)(i) of the Transportation Conformity Rule which requires interagency review of the model(s) and associated methods and assumptions used in the regional emissions analysis. Final interagency approval was granted on January 27, 2015.

Transit Service Level Changes

Since the adoption of the PLAN 2040 Update (March 2014) Amendment #1, only a few service changes have occurred. New MARTA bus routes were added to Clayton County to reflect the recent expansion of the MARTA service area into that county. Six routes were added to the model year 2015 with 2 routes added in model year 2020. In addition, transit service changes were made to reflect headway and routing adjustments to nine current MARTA routes and five Emory shuttles. There were no other service modifications by the other transit providers in the region that required changes in modeling.

Quantitative Analysis

The regional emissions analysis used to demonstrate conformity to both the eight-hour ozone standard and the annual PM_{2.5} standard relies on a methodology which utilizes ARC's 20-county regional travel demand model. Updated travel model networks were created for each analysis year (2015, 2020, 2024, 2030, and 2040) to reflect amended GHMPO and MARTA projects.

Eight-Hour Ozone Standard

Results of Analysis - Eight-Hour Ozone Standard

The results of the emissions analysis for the PLAN 2040 RTP FY 2014-2019 TIP (March 2015 Technical Analysis Update) and the Gainesville-Hall County Regional Transportation Plan: 2015 Update for all analysis years for the eight-hour ozone nonattainment area demonstrate adherence to the level of emissions necessary to meet the motor vehicle emissions budgets contained in the Atlanta RFP SIP and the Ozone Maintenance Plan. Table 1 and Figure 1 document the VOC and NO_x emissions for each analysis year, as compared to the applicable MVEBs.

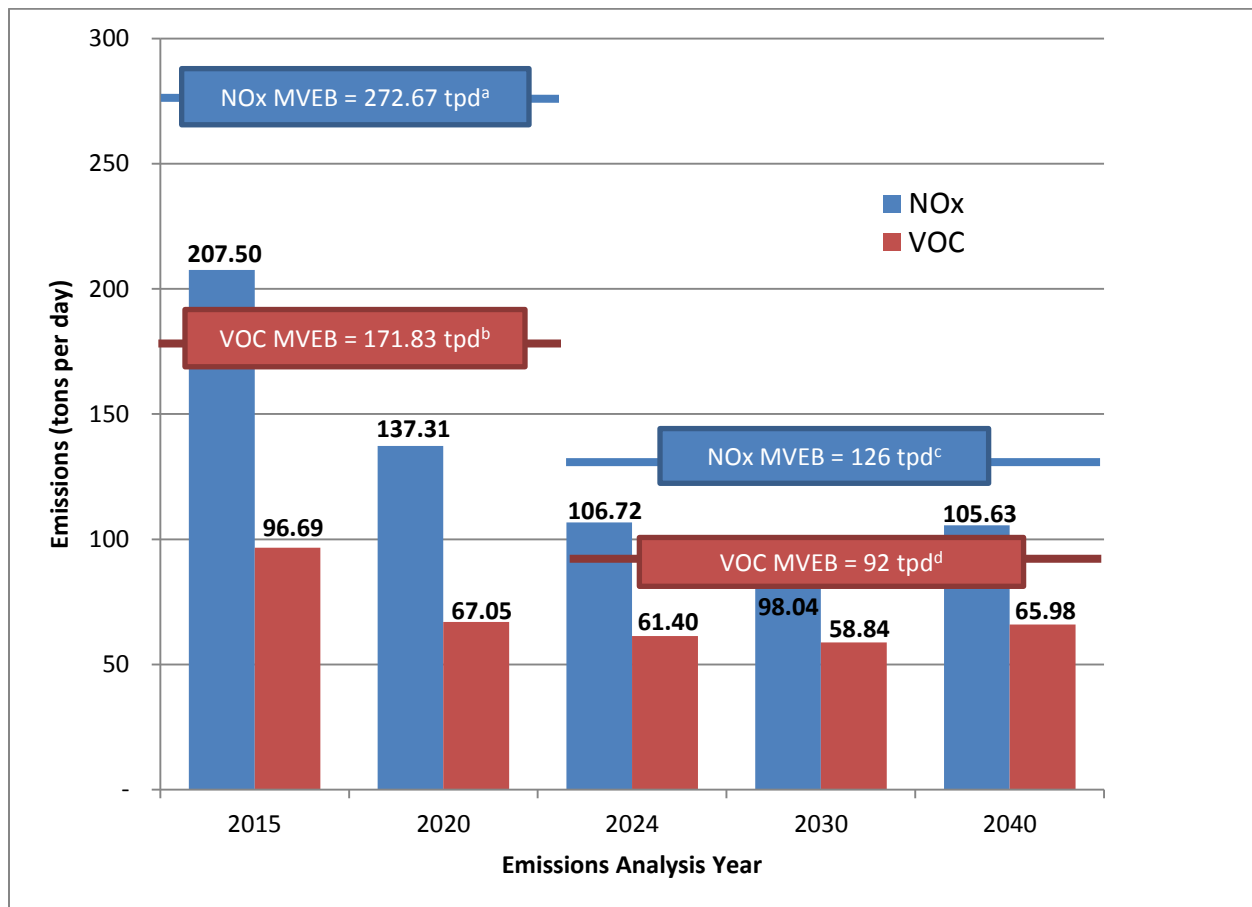
Note: To maintain consistency between procedures used to estimate the motor vehicle emission budgets included in the ozone attainment SIP and the conformity analysis, ARC, in full consultation with Georgia EPD, applies an off-model adjustment to emission results (for the 13-county area only) to reflect an emissions debit resulting from a program to exempt senior citizens from the I/M program. This program was initiated by the Georgia General Assembly in 1996 (O.C.G.A Section 12-9). It exempts from emission testing vehicles ten years old or older driven fewer than 5,000 miles per year and owned by persons 65 years old or older.

It was estimated that this senior I/M exemption increased VOC and NO_x emissions by 0.05 and 0.03 tons per day (these amounts are included in Table 1). This off-model adjustment is conservatively high and was applied to the emission results for VOC and NO_x to produce final emission results for each analysis year in the 13-county area where the I/M program is in place. The same credit loss is assumed for each analysis year.

Table 1: 20-County Motor Vehicle Emissions Budget Test: Eight-Hour Ozone Standard

Conformity Year / MVEB Plan	NO _x (tpd)	VOC (tpd)
2008 Atlanta RFP SIP Budgets	272.67	171.83
2015 Total	207.50	96.69
2020 Total	137.31	67.05
2024 Atlanta Maintenance SIP Budgets	126	92
2024 Total	106.72	61.40
2030 Total	98.04	58.84
2040 Total	105.63	65.98

Figure 1: 20-County Motor Vehicle Emissions Budget Test: Eight-Hour Ozone Standard



a – 2008 Reasonable Further Progress (RFP) SIP NO_x Budget

b – 2008 Reasonable Further Progress SIP VOC Budget

c – 2024 Ozone Maintenance Plan SIP NO_x Budget

d – 2024 Ozone Maintenance Plan SIP VOC Budget

PM_{2.5} Standard

Results of Analysis – PM_{2.5} Standard

The results of the emissions analysis for the PLAN 2040 RTP FY 2014-2019 TIP (March 2015 Technical Analysis Update) and the Gainesville-Hall County Regional Transportation Plan: 2015 Update for all analysis years for the Atlanta PM_{2.5} nonattainment area demonstrate adherence to the level of emissions necessary to meet the No Greater Than Base Year Test. Results are aggregated over the 13-county, 7-county and Putnam County portions of the PM_{2.5} nonattainment area. Table 2 and Figures 2 and 3 document the average annual PM_{2.5} and average annual NO_x emissions for each analysis year, as compared to the applicable 2002 base year emissions.

Note: ARC, in full consultation with Georgia EPD, applies an off-model adjustment to emission results (for the 13-county area only) to reflect an emissions debit resulting from a program to exempt senior citizens from the I/M program. This program was initiated by the Georgia General Assembly in 1996 (O.C.G.A. Section 12-9). It exempts from emission testing vehicles ten years old or older driven fewer than 5,000 miles per year and owned by persons 65 years old or older.

It was estimated that this senior I/M exemption increased NO_x emissions by 0.03 tons per day (this amount is reflected in Table 2) in 2002. This off-model adjustment is applied to the emission results for NO_x, as a precursor to PM_{2.5}, to produce final emission results for each analysis year in the 13-county area where the I/M program is in place. The same credit loss is assumed for each analysis year.

Table 2: Regional Emissions Analysis: Annual PM_{2.5} Standard (Direct PM_{2.5} & NO_x Precursor)

	PM_{2.5} Direct (tons/year)	NO_x Precursor (tons/year)
2002 Base Year Test	6,405	194,050
2015 Total	2,695	69,606
2020 Total	2,058	46,421
2024 Total	1,854	38,186
2030 Total	1,847	35,158
2040 Total	2,158	37,795

Figure 2: Regional Emissions Analysis: Direct PM_{2.5} Emissions

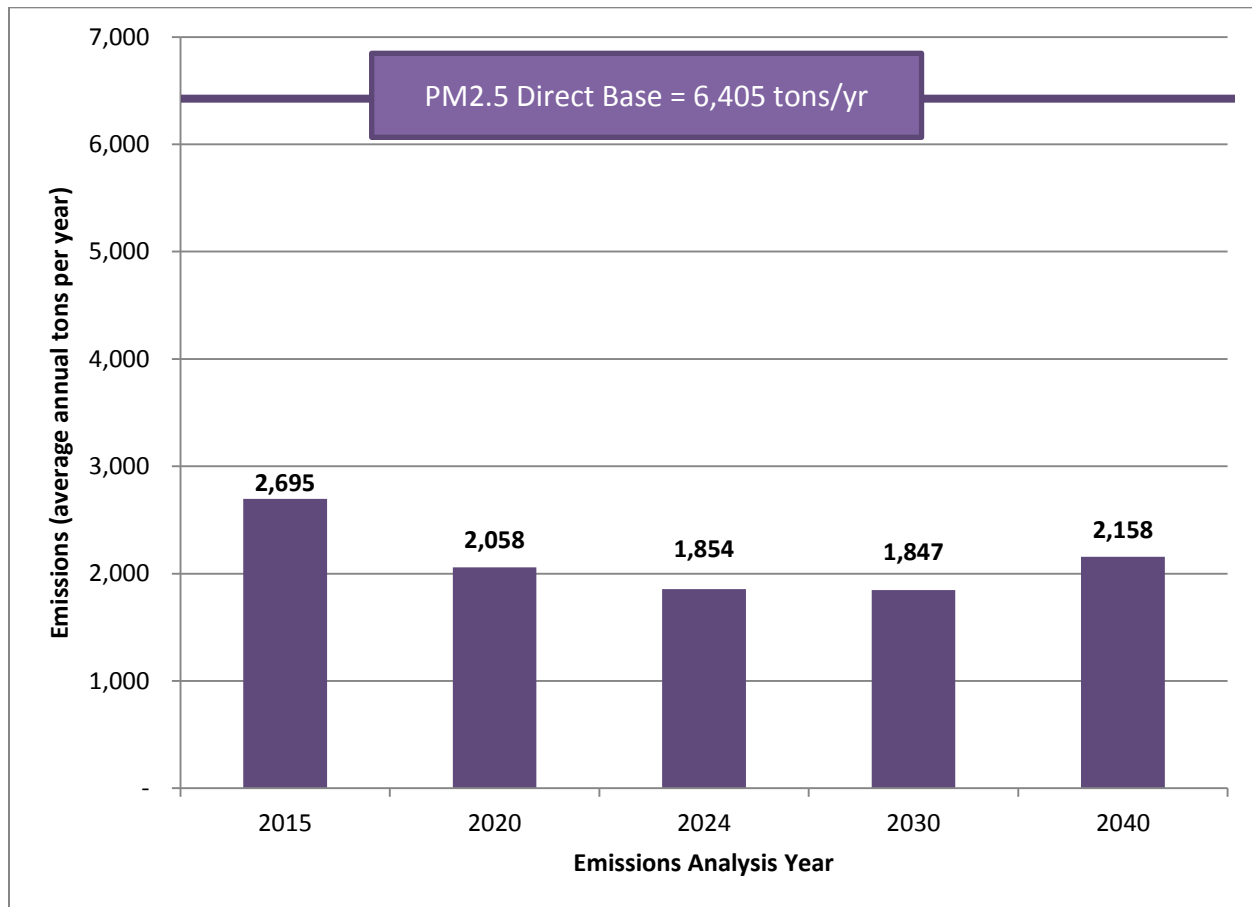


Figure 3: Regional Emissions Analysis, NO_x Precursor Emissions

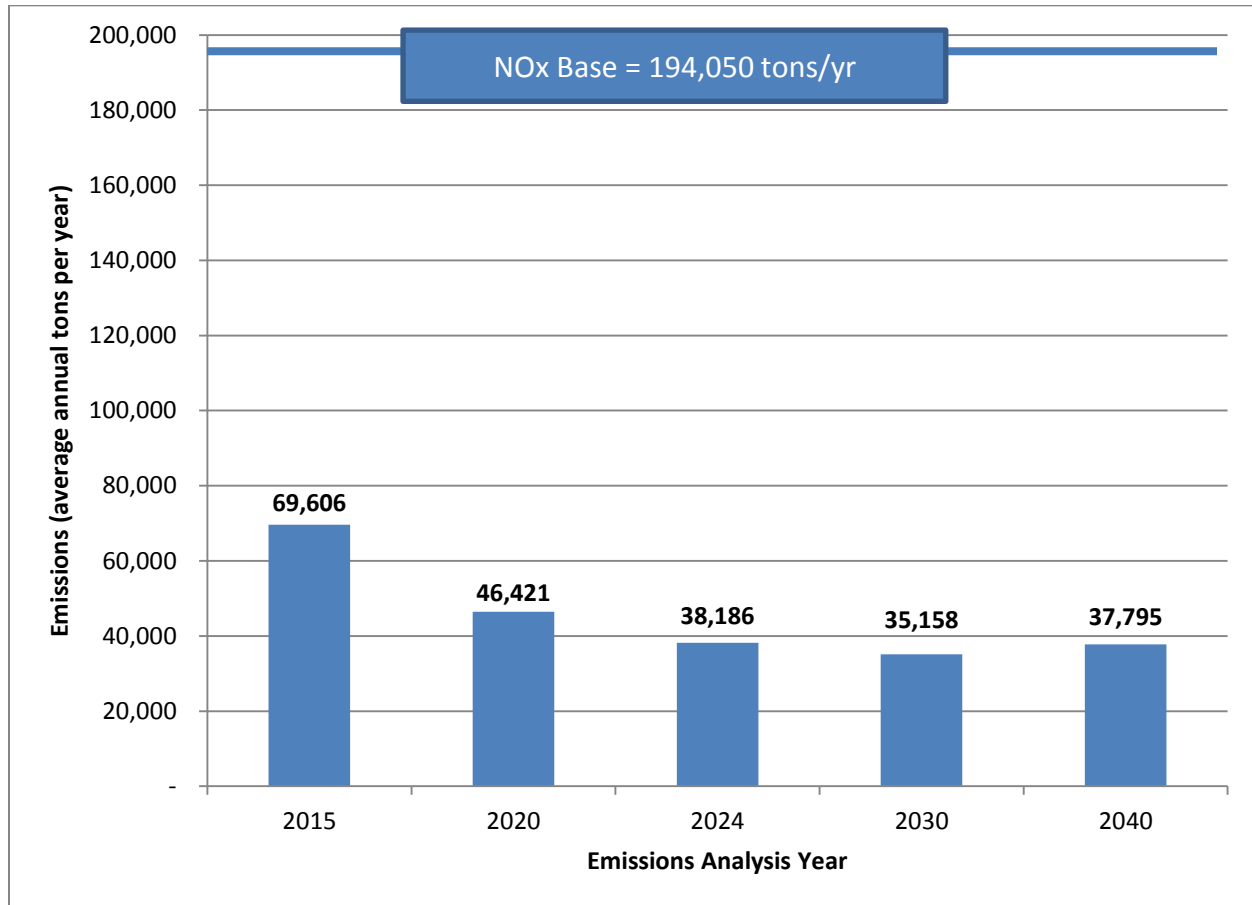


EXHIBIT 1

Interagency Review of Planning Assumptions and Modeling Inputs Used in Regional Emissions Analysis For Atlanta Eight-Hour Ozone Nonattainment Area & Annual PM2.5 Nonattainment Area

Interagency Consultation Meeting

Atlanta Regional Commission

The ARC will be conducting a conformity analysis under the 2008 eight-hour ozone standard and the 1997 annual PM2.5 standard as part of the conformity determination for the PLAN 2040 RTP/2014-2019 TIP Technical Analysis Update/GHMPO 2040 RTP FY 2016-2019 TIP for the respective nonattainment areas. Below is a detailed listing of the procedures and planning assumptions for the upcoming conformity analysis. Interagency concurrence on these planning assumptions was received on January 27, 2015.

2008 EIGHT HOUR OZONE STANDARD PLANNING ASSUMPTIONS & MODELING INPUTS

General Methods and Assumptions

- 1) Modeling Methodology: Use the MOVES model in inventory mode to determine the total NO_x and VOC emissions in the entire former 20-county nonattainment area. This test serves to meet the criteria established via Interagency consultation to test the 15-county ozone nonattainment area.
- 2) Analysis Years: 2015, 2020, 2024, 2030, 2040
- 3) Conformity Test
 - a. Motor Vehicle Emission Budget (MVEB) Test
 - i. For years prior to 2024¹
 1. NO_x: 272.67 tpd
 2. VOC: 171.83 tpd
 - ii. For years 2024 and later²
 1. NO_x: 126 tpd
 2. VOC: 92 tpd
- 4) Modeling Start Date: February 2015. This start date is defined by the ARC as the initiation of the first model run for plan amendment/update.

Travel Demand Modeling Assumptions

- 1) Calibration Year: 2000 (with some 2005 interim validations and benchmarking thereafter)
 - a. Model validated to the year 2010 using a comparison between estimated volumes and observed counts (See Appendix A)
- 2) Social/Economic Data: Updated for this model run (See Appendix B)
- 3) All other modeling assumptions consistent with those approved in the PLAN 2040 documentation (see Appendix C)

Emissions Modeling Assumptions

- 1) Emissions Model: MOVES2010b – Database: movesdb20121030
 - a. Emissions Process – use MOVES in inventory mode for a July day
 - i. For the years 2015, 2020, 2024, 2030 and 2040 modeled travel data is used to calculate emissions
 - b. Run separately for the 13-county and 7-county portions of the nonattainment area³

¹ MVEB established as part of the Atlanta Reasonable Further Progress State Implementation Plan of 2009.

² MVEB established as part of the Atlanta Ozone Maintenance Plan of 2012.

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- i. 13-county area activity, vehicle population and other inputs area assigned to Fulton County while running MOVES
 - ii. 7-county area activity, vehicle population and other inputs are assigned to Bartow County while running MOVES

2) MOVES Inputs

- a. Road Type Distribution – Processed from the travel demand model, GDOT HPMS counts and MOVES defaults. Summarizes VMT fraction by road type and source type for the 13 and 7 counties separately.
- b. Source Type Population
 - i. Started with 2002 R.L. Polk & Co. registration data for the Atlanta nonattainment counties, as well as the Georgia Department of Revenue’s registration data for 2003 and 2007.
 - ii. Vehicles by type were grown from 2002 to 2007 using different growth factors by vehicle type based on either Census person population estimates or on Georgia 2007 registration data. Methodology developed by EPD for inputs to the SMOKE-MOVES Integration Tool.
 - iii. Future analysis year data is grown from 2007 based on the ratio of MPO population estimates
 - iv. Since the population of vehicle type 62 (combination long-haul trucks) can easily be underrepresented in areas with lots of through traffic, the vehicle population for MOVES source type 62 was revised using MOVES default VMT/VPOP ratios and VMT for HPMS type 60 data
- c. Vehicle Type VMT
 - i. HPMS VTypeYear - Processed from the travel demand model, GDOT HPMS Counts, and an EPA daily to annual VMT converter. Assigns total annual VMT by HPMS vehicle type.
 - ii. Month VMT Fraction: MOVES defaults
 - iii. Day VMT Fraction: MOVES defaults
 - iv. Hour VMT Fraction: Derived from the travel demand model by source and road type. The fractions are determined separately for the 13 and 7 county areas.
- d. I/M Programs and Stage II Refueling Vapor Recovery – Applied to the 13-county area only (See Appendix D)
- e. Age Distribution – MOBILE6 age distributions converted to MOVES format using the EPA converter. MOBILE6 distributions were derived from 2002 R.L. Polk & Co. registration

³ For the eight-hour ozone standard there are two sets of MOVES input files, one for the 13 counties that make up the former one-hour ozone nonattainment area in which a specific set of emission control measures is in place, and one for the seven ring counties.

data for the 13 and 7 county areas separately for all vehicle types, except for HDV8B where MOBILE6 defaults were used.

- f. Average Speed Distribution – Processed from the travel demand model with HPMS VMT Adjustment factors applied. Calculates VHT by hour by speed bin by source. The distribution is determined separately for the 13 and 7 county areas.
 - g. Ramp Fraction – Processed from the travel demand model. Calculates VMT by freeway and ramps by area type. The fraction is determined separately for the 13 and 7 county areas.
 - h. Fuel – MOVES defaults for a July weekday for Fulton (13-county) and Bartow (7-county)
 - i. Meteorology – Meteorological data from the 2009 Reasonable Further Progress (RFP) SIP were used to represent the ozone season for all analyses before the year 2024. The RFP SIP meteorological input file was developed using 2000-2002 data. Meteorological conditions from the ten worst ozone days were averaged to produce the final input. For all analyses representing the year 2024 or later, 2008 summer meteorological data was used from the 2012 Ozone Maintenance Plan.
- 3) VMT HPMS Adjustment Factors
- a. Calculated for the year 2010 (See Appendix E)
 - b. HPMS adjustment in base year of calibration in accordance with Section 93.122(b)(3) of the Transportation Conformity Rule which recommends that HPMS adjustment factors be developed to reconcile travel model estimates of VMT in base year of validation to HPMS estimates for the same period
 - c. Summer (seasonal) adjustment to convert from average annual VMT to summer-season VMT⁴
 - d. Factors applied to VMT estimates generated by ARC travel demand model for 13-county portion and 7-county portion of 20-county modeling domain, separately
 - a. Factors aggregated up to MOVES road types from base HPMS functional classifications
- 4) Off-Model Calculations
- a. Senior I/M Exemption (emissions debit)
 - i. The Senior I/M Exemption calculated for year 2002 is conservatively high and will be added to the regional emission inventories for each analysis year
- 5) TCMs
- a. No additional credit is taken in the emissions modeling process for SIP TCMs

⁴ *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources*, Section 3.4.2.6, EPA420-R-92-009, USEPA Office of Air and Radiation, Office of Mobile Sources, 1992.

1997 ANNUAL PM_{2.5} STANDARD PLANNING ASSUMPTIONS & MODELING INPUTS

General Methods and Assumptions

- 1) Modeling Methodology
 - a. 20-County Portion – Use the MOVES model in inventory mode to determine the total NO_x and PM_{2.5} emissions
 - b. Putnam Partial County Portion – Use an off-travel model technique to determine emissions in MOVES
- 2) Conformity Test
 - a. No Greater than Base Year interim emissions test
 - i. 2002 base year
 - ii. Base year emissions to be developed as part of the conformity analysis provided in preamble to the eight-hour ozone and PM_{2.5} Transportation Conformity Rule⁵. Base year emissions will be established using the same modeling methodology presented above.
- 3) Conformity Analysis Years: 2015, 2020, 2024, 2030, 2040
- 4) Modeling Start Date: February 2015. This start date is defined by the ARC as the initiation of the first model run for plan amendment/update.

Travel Demand Modeling Assumptions

- 1) Calibration Year: 2000 (with some 2005 interim validations and benchmarking thereafter)
 - a. Model validated to the year 2010 using a comparison between estimated volumes and observed counts (See Appendix A)
- 2) Social/Economic Data: Produced as part of PLAN 2040 (see Appendix B)
- 3) All other modeling assumptions consistent with those approved in the PLAN 2040 documentation (see Appendix C)

Emissions Modeling Assumptions

- 1) Emissions Model: MOVES2010b – Database: movesdb20121030
 - a. Emissions Process – using MOVES in Inventory mode
 - i. For the years 2015, 2020, 2024, 2030 and 2040 modeled travel data is used to calculate emissions

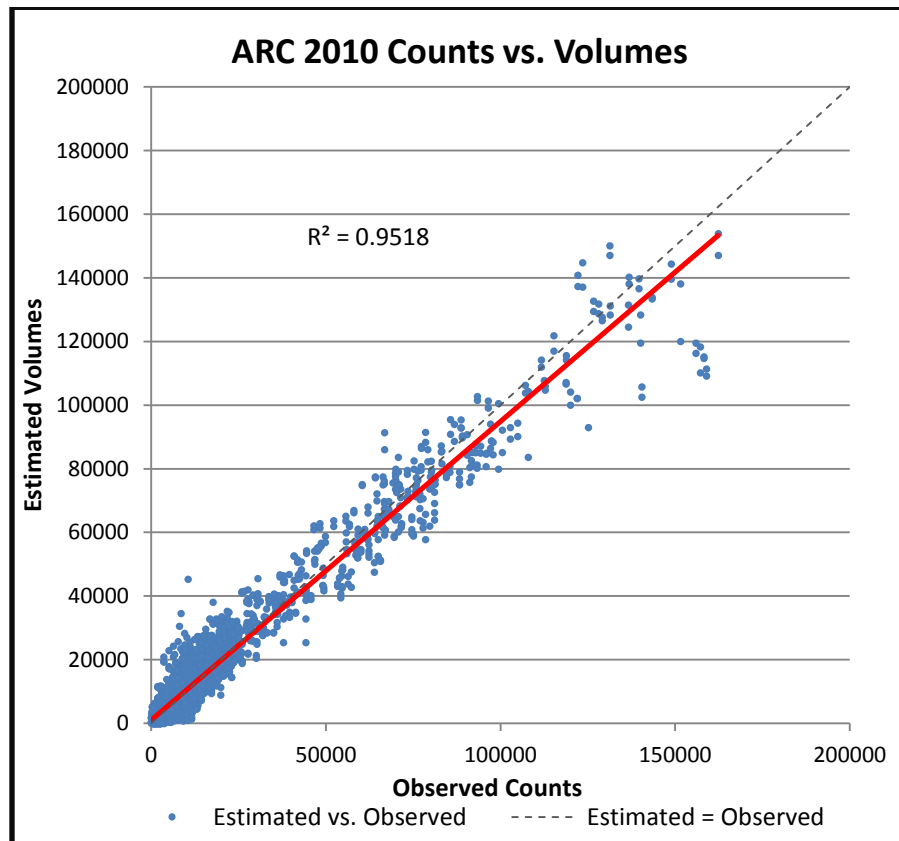
⁵ Federal Register, Vol. 69, No.126, July 1, 2004, p. 40015, first column.

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- b. Run separately for the 13-county and 7-county portions of the nonattainment area⁶
 - i. 13-county area activity, vehicle population, and other inputs are assigned to Fulton County while running MOVES
 - ii. 7-county area activity, vehicle population, and other inputs are assigned to Bartow County while running MOVES
- 2) MOVES Inputs
- a. Road Type Distribution – Processed from the travel demand model, GDOT HPMS counts and MOVES defaults. Summarizes VMT fraction by road type and source type for the 13 and 7 counties separately.
 - b. Source Type Population
 - i. Started with 2002 R.L. Polk & Co. registration data for the Atlanta nonattainment counties, as well as the Georgia Department of Revenue’s registration data for 2003 and 2007
 - ii. Vehicles by type were grown from 2002 to 2007 using different growth factors by vehicle type based on either Census person population estimates or on Georgia 2007 registration data. Methodology developed by EPD for inputs to the SMOKE-MOVES Integration Tool
 - iii. Future analysis year data is grown from 2007 based on the ratio of MPO population estimates
 - iv. Since the population of vehicle type 62 (combination long-haul trucks) can easily be underrepresented in areas with lots of through traffic, the vehicle population for MOVES source type 62 was revised using MOVES default VMT/VPOP ratios and VMT for HPMS type 60 data
 - v. Putnam County data grown from 2007 based on the ratio of Georgia Office of Planning and Budget future people population estimates
 - c. Vehicle Type VMT
 - i. HPMS VTypeYear - Processed from the travel demand model, GDOT HPMS Counts, and an EPA daily to annual VMT converter. Assigns total annual VMT by HPMS vehicle type
 - ii. Month VMT Fraction: MOVES defaults
 - iii. Day VMT Fraction: MOVES defaults
 - iv. Hour VMT Fraction: Derived from the travel demand model by source and road type. Determined separately for the 13 and 7 county areas.

⁶ For the annual PM_{2.5} standard there are two sets of MOVES input files, one for the 13 counties that make up the former one-hour ozone nonattainment area in which a specific set of emission control measures is in place and one for the seven “ring” counties.

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- d. I/M Programs and Stage II Refueling Vapor Recovery – Applied to 13 county area only (See Appendix D)
 - e. Age Distribution – MOBILE6 age distributions converted to MOVES format using EPA converter. MOBILE6 distributions were derived from 2002 R.L. Polk & Co. registration data for the 13 and 7 county areas separately for all vehicle types, except for HDV8B where MOBILE6 defaults were used.
 - f. Average Speed Distribution – Processed from the travel demand model with HPMS VMT Adjustment factors applied. Calculates VHT by hour by speed bin by source. Determined separately for the 13 and 7 county areas.
 - g. Ramp Fraction – Processed from the travel demand model. Calculates VMT by freeway and ramps by area type. Determined separately for the 13 and 7 county areas.
 - h. Fuel – Annualized MOVES defaults for Fulton (13-county) and Bartow (7-county)
 - i. Meteorology – Annual averages of the hourly average temperature and relative humidity for each hour of each month for the years 2000 – 2002
- 3) VMT HPMS Adjustment Factors
- a. Calculated for the year 2010 (See Appendix E)
 - b. HPMS adjustment in base year of calibration in accordance with Section 93.122(b)(3) of the Transportation Conformity Rule which recommends that HPMS adjustment factors be developed to reconcile travel model estimates of VMT in base year of validation to HPMS estimates for the same period
 - c. Factors applied to VMT estimates generated by ARC travel demand model for 13-county portion and 7-county portion of 20-county modeling domain, separately.
 - d. Factors aggregated up to MOVES road types from base HPMS functional classifications
- 4) Off-Model Calculations
- a. Senior I/M Exemption (emissions debit)
 - i. The Senior I/M Exemption calculated for year 2002 is conservatively high and will be added to the regional emission inventories for each analysis year.
 - b. Putnam Partial Nonattainment Area
 - i. Total MOVES inventory-mode derived emissions in Putnam County were scaled down to the nonattainment area's contribution based on the ratio of human population in the nonattainment area to the entire county.
 - ii. VMT in Putnam County is estimated using historical VMT estimates from GDOT's 445 Reports
 - iii. Congested flow speeds for Putnam County are taken from the 7-county portion of the ARC travel demand model for each analysis year
- 5) TCMs
- a. No additional credit is taken in the emissions modeling process for SIP TCMs

Appendix A – Model Validation



Appendix B – Socioeconomic Data for the Travel Model

ARC periodically revises its population and employment forecasts based on best available current information. Each revision is a two-step process. First, new region-level forecasts are produced. These then become region-level controls for census tract and traffic analysis zone (TAZ) forecasts.

The most current region-level control forecasts (PLAN 2040 Update for Plan2040 Amendment 1) were completed in late spring of 2013. The accompanying charts summarize the new updated population and employment controls for the 20-county study area.

ARC staff was assisted in the development of these regional forecasts by a Technical Advisory Committee (TAC) of nationally known, local experts on the Atlanta Regional Economy. The committee met three times and advised both on REMI model calibration, policy variable development, and related iterative revisions to model runs. The group then recommended the final regional forecasts for use in the Plan2040 Update in late spring of 2013.

The second step in the Plan2040 update process was development of county-level control totals. Regression analysis and third-party datasets were core resources in arriving at these control totals. The REMI model's regional forecast was then recalibrated to mirror/reflect the county control totals. The county level controls will be finalized in late Fall, 2013.

The third and final step in the forecasting process uses mathematical models to disaggregate the region-level/county-level control population and employment forecasts to "small areas": the superdistrict, census tract and traffic analysis zone (TAZ) level. TAZs are nested within census tracts. Census tracts nest within superdistricts. The mathematical models underlying the region-level controls have evolved and become more complex, but ARC's basic approach is the same today as in 1975.

The TAZ Disaggregator (TAZ-D) model will be used in the Plan2040 Update to disaggregate the regional and county controls to small areas. This model runs annually and iteratively (unlike the five-year iterative sequence of the previous model small area model, DRAM/EMPAL). The process is integrated with the ARC travel demand model, as impedances (travel costs) from the travel model are a significant influence layer for small-area spatial allocation of population and job growth.

Population and job levels from each successive single-year forecast become the base for forecasts in the next model year. First, the Cube/TP+ (TDM) model analyzes base year traffic patterns and produces accessibility measures (impedances or travel costs) within the 20-county forecasted area. Then, the TAZ-D model uses: the composite impedances from the TDM; Superdistrict-level distribution of base-year population, employment and land use; and other spatial influence layers (e.g. like land use, interchange locations, major arterials, transit stations, etc.) to develop grid-level forecasts one year into the future. The size of the grid areas in the TAZ-D model vary by geographic area of the region, as do the weights assigned to various spatial influence factors for growth. The Unified Growth Policy Map (UGPM) was used by the TAZ-D as the baseline source to generate household and job density and/or intensity levels to allocate future growth. The grid-level forecasts are then aggregated back up to the TAZ, tract, and

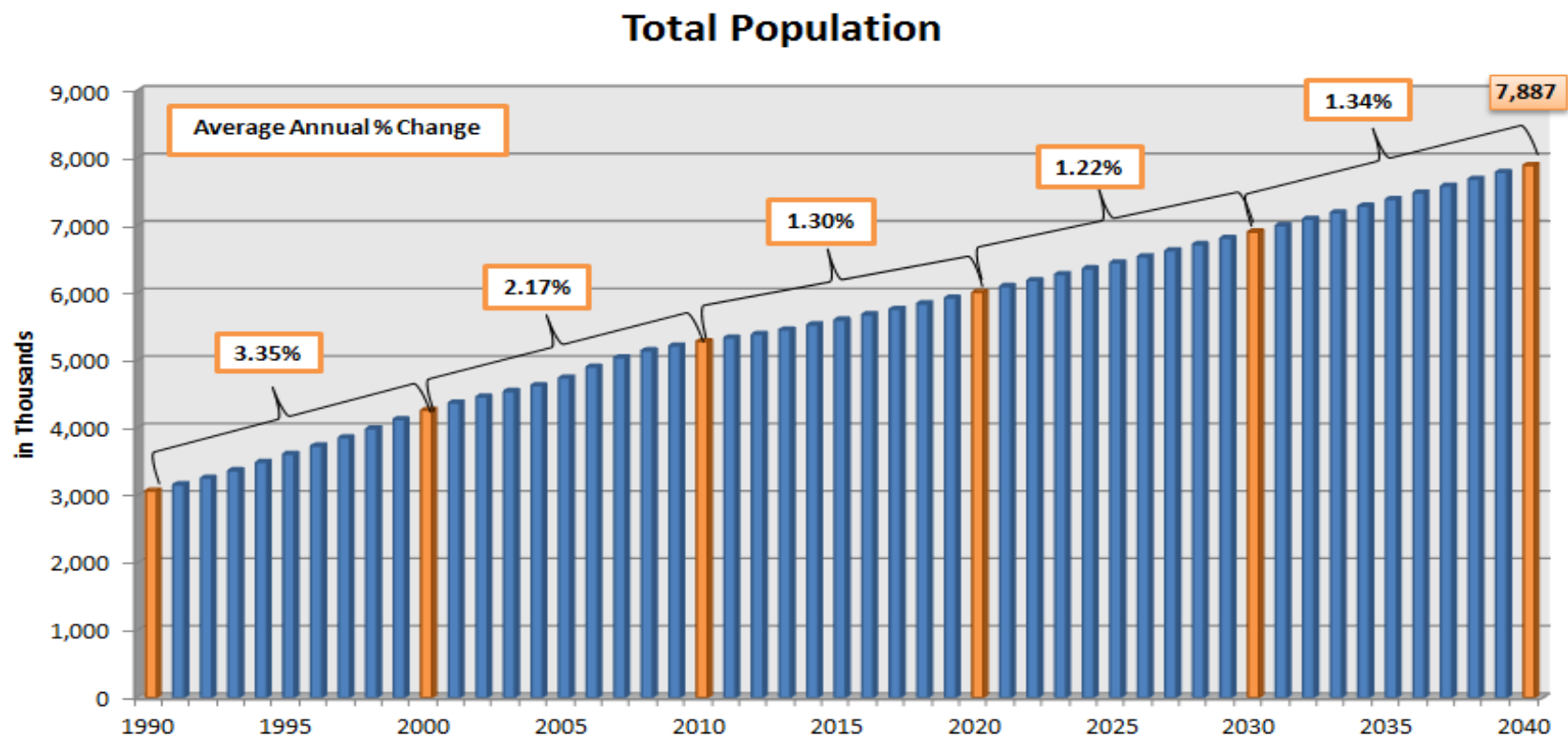
superdistrict levels. The TAZ-level forecasts then become the input used by the TDM to produce the impedance(s) measure that drives the next iteration of the integrated model run.

All these models are carefully calibrated based on the best and most current data available. Data used in the current effort include 2010 United States Census results, ARC annual major jurisdiction estimates of population (using a hybrid method involving building permit information, birth and death data, and American Community Survey data), and ARC semi-annual estimates of employment by industry for counties, superdistricts, tracts and TAZs/blockgroups from the state of Georgia unemployment insurance base file. National forecasts of employment and population were derived from the REMI TranSight model. The results of ARC travel surveys included the SMARTRAQ household travel survey, transit on-board survey, Hartsfield air passenger survey, travel time studies, speed studies, and others. Highway projects and the schedule for their completion (primary inputs to the Cube/TP+ model) are developed as part of an extensive discussion between ARC staff, local planners, Georgia Department of Transportation and various federal agencies.

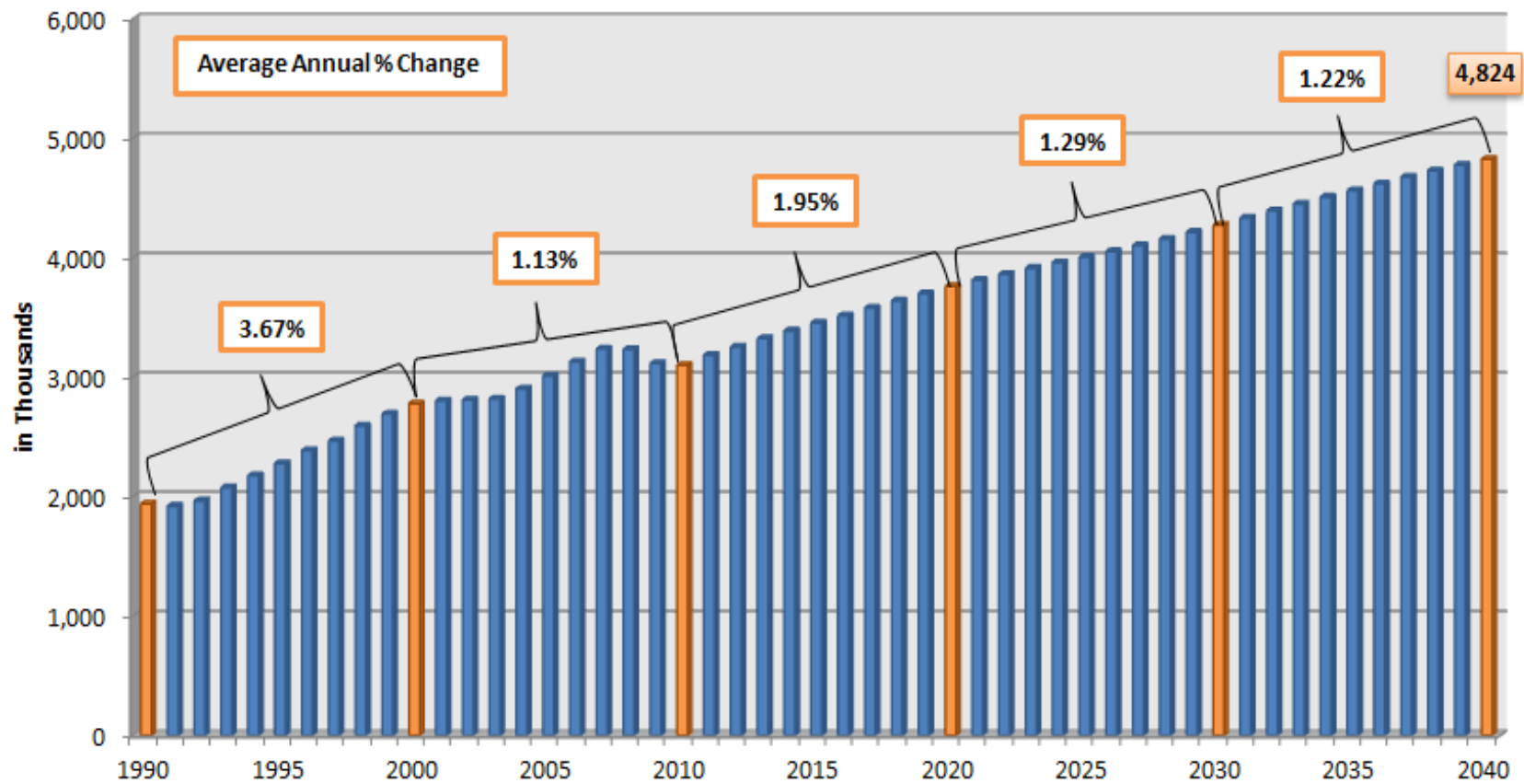
The area modeled by ARC for transportation/air quality purposes expanded from ten (10) to twenty (20) counties over the last 15 years. To meet current and future data needs, ARC produced employment estimates by county and census block group for the state of Georgia beginning in 2008, and continues to produce these estimates on a semi-annual basis. The county coverage by land-use data produced in the LandPro program expands as needed. ARC's population estimates' program area will be expanded as required, from the current 20 counties, using the 2010 Census and intercensal estimates as data baselines.

Post-processing adjustments are made to the ARC forecasts to account for expected large scale changes and policy priorities that would not be reflected in historical data. Events such as expected construction of a new highway or policy input restricting development within the region are accounted for directly in the models with the spatial influence layers or density limitations. Factors such as expected job and household growth from the completion of "known" major development projects (e.g. Atlantic Station) or transit-oriented development are incorporated as post processing adjustments to the model output.

The forecasts will be used as part of Plan2040 Amendment 1 scheduled for adoption in early 2014. The forecast set will also be used for the Needs Assessment portion of work contributing to the next full RTP/RDP scheduled for completion in early 2016.



Total Employment



Appendix C – Transportation Model Inputs

- 1) Calibration Year: 2000 (with some 2005 interim validations and benchmarking thereafter)
- 2) Project Listing: Project listings will be provided in electronic format to Interagency Consultation Group for review in January 205 and include:
 - a. Regionally Significant and Federally Funded
 - b. Regionally Significant and Non-Federally Funded
- 3) Demographic Data: Provided as separate attachment
- 4) Speed Data: Free-flow Speed by Area Type and Facility Type⁷

	Facility Type	Area Type							Metered Ramps
		Urban Very High Density	Urban High Density	Urban Medium Density	Urban Low Density	Suburban	Exurban	Rural	
0	Zone Centroid Connectors	7	11	11	11	11	14	14	
1	Interstate / Freeway Free Flow	55	58	58	61	61	63	65	
2	Parkway	50	50	55	55	57	60	60	
3	HOV Buffer Separated	55	58	58	61	61	63	65	
4	HOV Barrier Separated	55	58	58	61	61	63	65	
5	High Speed Ramp / CD Road	50	50	55	55	57	60	60	15
6	Medium Speed Ramp	50	50	50	50	50	50	50	10
7	Low Speed Ramp	40	40	40	40	40	40	40	10
8	Loop Ramp	30	30	30	30	30	30	30	10
9	Off Ramp w/ Intersection	25	25	25	25	25	25	25	
10	On Ramp w/ Intersection	40	40	40	40	40	40	40	5
11	Expressway	40	42	45	48	52	55	60	
12	Principal Arterial - Class I	26	30	33	36	42	46	55	
13	Principal Arterial - Class II	24	27	30	34	40	44	48	
14	Minor Arterial - Class I	22	25	28	31	38	42	45	
15	Minor Arterial - Class II	20	23	26	29	34	38	42	
16	HOV - Arterial (all classes)	20	27	30	33	36	39	42	
17	Major Collector	18	22	25	28	31	34	38	
18	Minor Collector	15	18	21	24	27	30	35	
19	Planned Ramps w/ Intersections	30	30	30	30	30	30	30	5
20	Planned Directional Ramps	45	45	45	45	45	45	45	10

⁷ Within the ARC travel demand and emission modeling process, free flow speeds are adjusted to reflect the increase in delay and travel time on a roadway segment as traffic volumes build and congestion levels increase. Link-level congested flow speeds are used to estimate NOx and VOC emissions as required by Sections 93.122(b)(i)(iv) and 93.122(b)(2) of the Transportation Conformity Rule.

5) Transit Modeling

- a. Model recalibrated to 2000 transit ridership estimates, provided by transit operators
- b. Reflects results from the 2001-2002 Transit On Board Survey, with preliminary adjustments from the 2009 Transit On Board Survey
- c. Routes updated to reflect current operating plans
- d. Transit mode split is estimated using the mode choice model
 - i. Estimates individual modal trips from the person trip movements developed in the trip distribution model
 - ii. Composed of three nested logit models:
 - 1. Home based work trips, which includes home based university trips;
 - 2. Home based other trips, which include home based other, home based shopping and home based grade school; and
 - 3. Non-home based trips
 - iii. The mode choice models is organized in terms of seven characteristics:
 - 1. Mathematical structure;
 - 2. Trip purposes and choice sets;
 - 3. Limitations on choice sets;
 - 4. Analysis of transit access;
 - 5. Treatment of HOV lanes;
 - 6. Stratification by income groups; and
 - 7. Analysis of alternative transit paths.
- e. Transit Fare Modeling
 - i. Fare structure and operating plans supplied by the local transit operators
 - 1. Fares remain constant over time, across all network years
 - 2. Fares reflect current transit operating plans
 - ii. Transit fare structure uses a fare matrix on a zone to zone level with a universal fare structure (flat fare) for all bus and rail lines
 - 1. Changes to the existing fare structure and service frequency are coded directly into the model
 - 2. Current fare values in the model are weighted according to the percentage of riders using a discounted fare pass; changes to these assumptions can be incorporated directly into the model
 - 3. Peak and off-peak fares are equivalent
- f. 2009 Transit On Board Survey interim adjustments
 - i. Update of regional transit travel targets based on a preliminary expansion of the raw on-board survey data
 - 1. Modifications to express bus and BRT transfer constants
 - 2. Modifications to travel demand model estimates of zero-car transit work trips
 - 3. Modifications to travel demand model estimates of kiss-and-ride passenger access and use of transit system
 - 4. Overall evaluation of all modal constants
 - 5. Refinement to park-and-ride lot assumptions
 - 6. Updated walk connector and percent walk procedures

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- ii. Modified transit skimming procedures
 - iii. Re-calibrated air passenger model
 - iv. Assessment of travel demand model understanding of market segments and travel patterns relative to the on-board survey records

Appendix D – I/M Program

- 1) Exhaust and Evaporative (OBD and gas cap pressure test) for 1996 and newer vehicles
 - a. Began in 1982
 - b. Annual inspection required
 - c. Computerized test and repair OBD – Exhaust
 - d. Computerized test and repair OBD & GC - Evaporative
 - e. Applies to all LDG vehicle types
 - f. Three year grace period
 - g. 3% waiver rate for all vehicles – Exhaust test
 - h. 0% waiver rate for all vehicles – Evaporative test
 - i. 97% compliance rate
- 2) Exhaust and Evaporative test for 1975 – 1995 vehicles
 - a. Began in 1982
 - b. Annual inspection required
 - c. Computerized test and repair ASM 2525/5015 Phase-in – Exhaust
 - d. Computerized test and repair GC – Evaporative
 - e. Applies to all LDG vehicle types
 - f. 3% waiver rate for all vehicles – Exhaust
 - g. 0% waiver rate for all vehicles – Evaporative
 - h. 97% compliance rate
 - i. 25 year and older model years are exempt
- 3) Stage II Refueling and Vapor Recovery
 - a. Started in 1992
 - b. Three phase in years
 - c. 81% efficiency

Appendix E – VMT Adjustment Factors

Ozone VMT Adjustment Factors

Functional Class Name	Functional Classifications	Factor for 13 County Area	Factor for 7 County Area
Interstates / Freeways	1, 11, 12	0.96	0.84
Arterials	2, 14	0.75	0.98
Collectors	6, 7, 8, 16, 17	1.00	1.03
Local	9, 19	1.41	1.55

PM_{2.5} VMT Adjustment Factors

Functional Class Name	Functional Classifications	Factor for 13 County Area	Factor for 7 County Area
Interstates / Freeways	1, 11, 12	0.98	0.89
Arterials	2, 14	0.75	1.01
Collectors	6, 7, 8, 16, 17	1.01	1.04
Local	9, 19	1.41	1.58

Exhibit 2 – Summary of Interagency Consultation Group Meetings¹

August 26, 2014

ARC provided committee members with updates on the PLAN 2040 RTP and future amendments. Staff is planning on a project solicitation in the end of 2014 and a future amendment to the RTP/TIP to account for any project changes or new projects in 2015. ARC staff also anticipates a conformity update after the Clayton county MARTA vote in November. A third TIP amendment was proposed to accommodate the GHMPO plan update in 2014.

October 28, 2014

On September 4 the governor approved the new Atlanta metropolitan planning area boundary. The new ARC MPO boundary includes all or parts of 19 counties. Bartow County will now be its own MPO and parts of Dawson and Pike counties were pulled into the ARC area. Carroll County is challenging the Census Bureau's findings and ARC will await a decision before incorporating Carroll into the planning process.

ARC staff updated the committee on planned TIP Amendments 2 and 3 to account for a project solicitation, MARTA referendum results and the GHMPO RTP/TIP update. GHMPO explained their TIP/RTP was on schedule for adoption in summer 2015.

December 16, 2014

EPA announced a new Ozone standard was in the works, to be set likely between 65-70 ppb in October 2015. Meanwhile, parts of the Atlanta PM_{2.5} nonattainment area were deferred from classification in the 2012 PM_{2.5} annual standard due to data quality issues.

ARC staff changed the plan for TIP amendments due to some changes to the project solicitation timeline. Staff plan on preparing a non-amendment CDR update with the new MARTA bus routes and the changes to GHMPO projects in their 2015 RTP/TIP update in March. Later in 2015, likely summer, staff will prepare amendment #2 to reflect project solicitation and normal updates to the RTP/TIP. In the end of 2015, ARC staff will prepare a new conformity determination for the 2016 Region's Plan (the new RTP).

January 27, 2015

ARC sought concurrence with planning assumptions for the March Technical Analysis Update to account for GHMPO's RTP/TIP update and new MARTA routes in Clayton County. ARC staff explained that another amendment would occur in the summer and a new CDR would be prepared for the plan update at the end of the year.

¹ These documents are representative of Interagency Consultation meeting summaries. Actual meeting summaries are available upon request.

In addition, GDOT initiated a conversation redefining the threshold for a regionally significant project that triggers a conformity determination. Historically, the region has used a ¼ mile modification to a roadway project as the trigger that requires ARC to capture the change in a conformity update. GDOT staff believes that this short threshold has constrained small project modifications and has been responsible for holding up projects, impacting project deliverability. The result of their review was that at between 1 to 1.5 miles project changes began to impact emissions. GDOT is recommending that 1 mile be used for the new threshold to trigger conformity for roadway projects. The Interagency committee reviewed the data and agreed to the modification in standard practice.