

Air Quality Conformity Determination Statement for the Poughkeepsie Ozone Non-attainment Area

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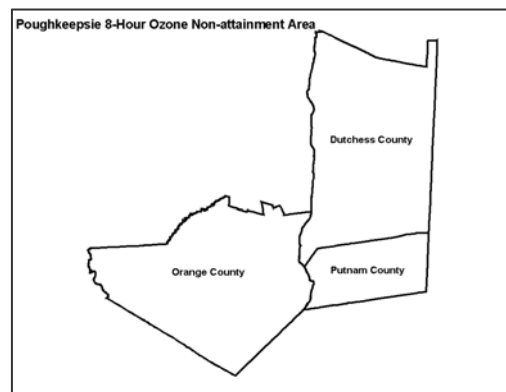
Statement of Conformity with SIP 31

1. INTRODUCTION. The New York Metropolitan Transportation Council (NYMTC), the Orange County Transportation Council (OCTC), and the Poughkeepsie-Dutchess County Transportation Council (PDCTC), have completed this Draft Air Quality Conformity Determination in conjunction with the completion of new long range Metropolitan Transportation Plans by the OCTC for Orange County and the PDCTC for Dutchess County. This Draft Conformity Determination also covers the NYMTC, OCTC, and PDCTC 2011-2015 Transportation Improvement Programs (TIPs) and the current NYMTC Metropolitan Transportation Plan.

2. OVERVIEW

2.1. Background. In recognition of the close relationship between air quality and transportation, Federal legislation – the Clean Air Act Amendments of 1990 (CAAA) and the Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA) – require that transportation activities conform to State air quality implementation plans before receiving federal transportation funding. Specifically, the CAAA establishes air quality standards through the designation of National Ambient Air Quality Standards (NAAQS). These standards set limits on the levels of air pollution (e.g. ozone, Particulate Matter, Carbon Monoxide, and Nitrogen Dioxide) that can exist in a region. In regions where these standards are not met (i.e. in non-attainment), it must be demonstrated that all future transportation plans and projects do not produce new air quality violations, worsen existing conditions, or delay timely attainment of the NAAQS. The CAAA further requires that a conformity determination must be less than four years old in non-attainment areas. If a conformity determination does expire, the region goes into a conformity lapse and restrictions are placed on the use of federal transportation funds; exceptions to this rule include funding for safety, mass transit, and air quality improvement projects that are exempt. The lapse would occur one year after the previous determination expires.

Three separate MPOs serve the Mid-Hudson Valley: NYMTC, OCTC, and PDCTC. Federal regulations require that all Urbanized Areas, metropolitan areas with over 50,000 people, be represented by a MPO – which is responsible for ensuring that Federal transportation dollars (highway and transit) are committed through a locally driven, comprehensive planning process. To guide this transportation planning process, each MPO must regularly develop three critical documents: a Metropolitan Transportation Plan (MTP) (usually a twenty-five year plan), a Transportation Improvement Program (TIP), and a Unified Planning Work Program (UPWP).



2.2. Attainment/Non-Attainment History and Status. In 1991 Dutchess County, Putnam County, and Upper Orange County were classified as a Moderate Non-attainment Area

under the 1-hour ozone standard, while in attainment for all other Clean Air Act criteria pollutants. The Lower Orange County Metropolitan Area (LOCMA), consisting of the Towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, and Woodbury were classified as a Severe Ozone Non-attainment Area, falling within the New York Metropolitan Ozone Non-attainment Area.

On July 16, 1997, the U.S. Environmental Protection Agency (USEPA) concluded that the 1-hour standard did not adequately protect the public from the adverse health effects of ground level ozone. In establishing a new "concentration based" 8-hour standard, the USEPA set the standard at 0.08 parts per million (ppm). Specifically, the design value for 8-hour ozone is the 3-year average of the annual 4th-highest daily maximum 8-hour ozone concentrations. An area attains the standard when the 3-year average of the annual 4th-highest daily maximum 8-hour concentrations is less than or equal to 0.08 ppm.

Effective June 15, 2004, the USEPA designated Dutchess, Orange, and Putnam County to be a Non-attainment Area under the 8-hour ozone standard. Based on 2001-2003 data, the 8-hour ozone design value for the Poughkeepsie Ozone Non-attainment Area was 0.094 ppm, and Dutchess, Orange and Putnam County were classified as a Moderate Ozone Non-attainment Area under the 8-hour ozone standard. The current ozone design value for the area based on 2008-2010 monitoring data is 0.076 ppm as monitored at both the Mt. Ninham monitor in Putnam County and Millbrook monitor in Dutchess County. The Valley Central Monitor in Orange County has a 2008-2010 design value of 0.073 ppm. On March 12, 2008, EPA once again strengthened the 8-hour ozone NAAQS to a level of 0.075 ppm. It is likely that the Poughkeepsie, NY area will be classified non-attainment under the new standard. However, USEPA has not made final area designations for the new ozone standard and the conformity requirements for the new standard do not yet apply.

- 2.3. Process.** To complete the conformity determination, interagency consultation is required. The Interagency Consultation Group (ICG) includes representatives from the USDOT (Federal Highway and Transit Administrations), USEPA – Region 2, NYS Department of Environmental Conservation (NYSDEC) – Main Office, NYSDOT Environmental Science Bureau (ESB), and the Metropolitan Planning Organizations (MPOs). The group provides multi-agency concurrence on the assumptions and methodologies used in the NYMTC, OCTC and the PDCTC Travel Demand Models; the results of which formed the basis of the regional emissions analysis. In general terms, the model outputs are used to forecast the amount of air pollution created when the projects in the MTPs and TIPs are expected to be operational.

This statement details the conformity determination process that the NYMTC, OCTC and the PDCTC undertook for their respective MTPs and TIPs, by addressing each of the regulatory criteria stipulated in the federal transportation conformity regulation, 40 CFR Part 93, as amended April 23, 2010, which forms the basis of this determination

statement. The State requirements under 6 NYCRR Part 240, especially 240.6 consultation process have been met as well.

3. FORMAT. The USEPA requires that the following information or conditions be submitted or met in a conformity determination statement:

- ✓ Latest Planning Assumptions
- ✓ Latest Emissions Model
- ✓ Consistency with each Metropolitan Transportation Plan
- ✓ Identification of Exempt/Non-Exempt & Regionally Significant Projects
- ✓ Timely Implementation of Transportation Control Measures (TCMs)
- ✓ Documentation of Interagency Consultation Requirements
- ✓ Public Involvement
- ✓ Results of Emissions Analysis
- ✓ Evidence of MPO resolutions
- ✓ Statement of Conformity with SIP

4. LATEST PLANNING ASSUMPTIONS. Federal and State regulations require that a conformity determination be based on the latest planning assumptions available at the time.

Specifically, information on five general areas must be provided: demographic data, transit operating policies, transit service levels, transportation control measures, and key assumptions. The importance of providing this information relates to the fact that Travel Demand Modeling depends on such data to accurately forecast future amounts of Vehicle Miles of Travel (VMT). The forecasted VMT calculations for Dutchess, Orange, and Putnam Counties, as calculated by each MPOs travel demand model, formed the basis of the regional emissions analysis.

<p><u>Vehicle Miles of Travel:</u> Unit of measure for vehicle travel made by a private vehicle (car, van, pickup truck, or motorcycle) Each mile traveled is counted as one vehicle mile, regardless of the number of persons in the vehicle.</p>

4.1. Demographic Data. In order to accurately forecast future VMT, the Travel Demand Models rely on demographic data – related to population, employment, housing, and vehicles – to measure how the transportation systems envisioned by the MTPs and TIPs will be used. Simply put, the models do this by first replicating the key components of the existing transportation system into the software: road networks, functional classifications, turning lanes, vehicle speeds, and traffic control devices. Then, the models incorporate the required demographic data to simulate current and forecasted travel patterns, recognizing that certain population characteristics impact the transportation network in different ways. (Table 1 shows forecast data for Dutchess, Orange, and Putnam Counties).

Most demographic data are based on Census Block, Block Group, Tract, or Minor Civil Division (MCD) geographies, but the analysis units of travel demand models are Traffic Analysis Zones (TAZs). In order to provide the travel demand model a way to relate the

transportation system with available demographic data, it is important to identify and create TAZs within each county. A TAZ is a geographical area, often based on U.S. Census geographies that represent a land use pattern with significant or unique travel characteristics. More information on the TAZs can be found in section 5.3.

Table 1. Demographic Forecasts for Dutchess, Orange, and Putnam Counties

Dutchess	2010	2014	2020	2030	2035	2040	% Annual Growth	% Total Growth
Population	297,488	303,790	313,344	329,267	337,228	345,190	0.5%	16%
Employment	110,531	112,300	114,995	119,641	122,033	124,474	0.4%	13%
Housing Units	118,638	121,108	124,892	131,460	134,744	138,344	0.6%	17%
Households	107,965	110,303	113,877	120,064	123,157	126,157	0.6%	17%
Vehicles	192,605	195,958	200,987	209,369	213,559	217,749	0.4%	13%

Orange	2010	2014	2020	2030	2035	2040	% Annual Growth	% Total Growth
Population ¹	372,813	390,300	408,606	449,126	470,192	492,247	1.1%	32%
Employment ²	139,728	146,166	154,212	170,305	178,351	186,379	1.1%	33%
Housing Units	137,025	144,565	152,600	167,860	175,490	183,120	1.1%	34%
Households	125,925	133,000	140,000	154,000	161,000	168,000	1.1%	33%

Putnam	2010	2014	2020	2030	2035	2040	% Annual Growth	% Total Growth
Population	102,838	104,971	110,571	120,699	125,019	130,394	0.8%	27%
Employment	40,668	42,644	45,270	48,758	50,293	51,926	0.8%	28%
Households	36,011	37,256	39,919	43,530	44,798	46,543	0.9%	29%

¹ Total population excludes group quarters (e.g. colleges, correctional facilities).

² Employment for people working in Orange County.

4.1.1. Population

4.1.1.1. Dutchess County. Source: Census 2010, Summary File 1. The PDCTC Model uses 2010 Census data as the benchmark for future population estimates. The Model uses data on Average Household Size or Persons per Household (PPH) for each TAZ, which are used to generate Trip Productions in TransCAD. Population forecasts were obtained by conducting a 50-year County-wide build-out analysis: where the number of possible new housing units was identified for every parcel in the County (this analysis covered over 7,200 individual parcels). The 50-year build-out analysis used data on local zoning and subdivision bulk regulations (for all 30 municipalities) to determine the number of housing units each parcel could legally support. This gross build-out was then constrained based on environmental features such as floodplains, watersheds, steep slopes, protected lands, and agricultural lands that would limit the number of housing units on each parcel. This analysis produced a net total of potential housing units by parcel, which was adjusted by the presence of any existing housing units, to produce a net total of potential units. The parcel data was applied to the TAZ

geographies and used to produce the total number of housing units by TAZ, adjusted for the 2040 planning horizon (prorated for 30 years). The number of future households (occupied housing units) was calculated by applying occupancy rates to the number of housing units in each TAZ. The occupancy rates were based on average vacancy rates from the 1980-2010 Census by municipality. Future population was determined by multiplying the number of occupied housing units (i.e. households) by the average number of persons per household. This total was added to 2010 Census population data for each TAZ.

The population estimate shows that the County's population could grow by 16 percent over the next 30 years: an annual growth rate of 0.5 percent. This is lower than previous forecasts, which relied on data from the 2000 Census.

- 4.1.1.2. Orange County.** Source: Census 2010, Summary File 1. Population and housing information from the 2010 Census together with building permit data and population growth trends over the past 20 years were used as the basis for determining the population and housing forecasts in the OC Travel Demand Model for future analysis years.
- 4.1.1.3. Putnam County.** Source: Census 2005 Population Estimates. Population data from the 2005 Census Population Estimates along with [Socioeconomic and Demographic \(SED\)](#) forecasts from the NYMTC 2035 Forecasts adopted by NYMTC's Program Finance and Administration Committee (PFAC) in February 2009 were used in the NYMTC Best Practice Model. Group Quarters Population was also derived from Census 2005 Population Estimates. Population in households was derived by subtracting the group quarter population estimate from the total population estimate for all areas.

4.1.2. Employment

- 4.1.2.1. Dutchess County.** Source: Bureau of Labor Statistics. Employment by TAZ serves as an important travel attraction component in the Model. To account for variations in travel patterns, the PDCTC categorized employment as either being retail or non-retail based. Employment forecasts were obtained by using employment data from the Bureau of Labor Statistics to establish baseline employment for 2010, which was then forecasted to 2040 based on a previous review by the Dutchess County Department of Planning and Development. The Department analyzed the employment data for each TAZ, ensuring the data accurately reflected expected land use conditions. The employment forecast shows that employment will grow at a slightly slower rate than the population, increasing by 13 percent overall and 0.4 percent annually.

- 4.1.2.2. Orange County.** Source: NYS Department of Labor. Employment information indicating the type, location and employment levels of all businesses in OC was updated from the NYS Department of Labor. This information was separated into six categories (retail, mall, non-retail, office, school and institutional) and aggregated by type and location to determine peak hour trips for each TAZ in the OCTC Travel Demand Model. Employment projections were based upon expected employment from approved development projects since the year 2009, as well as average growth rates in commerce throughout OC. The basic underlying premise is that future employment levels will be directly related to the influx of new people and increased demand for products and services created by the future growth in population.
- 4.1.2.3. Putnam County.** Source: Source: 1. Census Transportation Planning Package 2000 (CTPP 2000), Part 2: Data by Place of Work. 2. Department of Labor's ES-202 data 2000-2005. 2000 CTPP Employment estimates were used as the basis for 2005 employment estimates by applying yearly growth rates from the Department of Labor's ES-202 data for year 2000-2005. Employment estimates for 2005 along with the SED forecasts from the NYMTC 2040 Extrapolated Forecasts adopted by NYMTC's Program Finance and Administration Committee (September 2010) were used in the NYMTC Best Practice Model.
- 4.1.3. Housing Units**
- 4.1.3.1. Dutchess County.** The PDCTC Model uses 2010 Census data as the benchmark for future housing unit estimates. Housing unit forecasts were obtained by conducting a 50-year County-wide build-out analysis: where the number of possible new housing units was identified for every parcel in the County. The build-out analysis used data on local zoning and subdivision bulk regulations (for all 30 municipalities) to determine the number of housing units each parcel could legally support. This gross build-out was then constrained based on environmental features such as floodplains, watersheds, steep slopes, protected lands, and agricultural lands that would limit the number of housing units on each parcel. This analysis produced a net total of potential housing units by parcel, which was adjusted by the presence of any existing housing units, to produce a net total of new units. The parcel data was applied to the TAZ geographies to produce the total number of housing units by TAZ for 2040. Housing units are expected to grow 17 percent overall and 0.6 percent annually.
- 4.1.3.2. Orange County.** Source: NYS Office for Real Property Services (RPS). Land use information for each parcel in OC was obtained for the year 2010 and

aggregated by type and location to determine peak hour trips generated for both single-family and multifamily housing in each TAZ of the OC Travel Demand Model. Future single-family and multifamily housing units were projected based upon: proposed residential projects yet to be constructed in each TAZ, average growth rates in housing by municipality and the availability of sewer and water facilities.

- 4.1.3.3. Putnam County.** NYMTC forecasts the number of occupied housing units, defined as households. The Best Practice Model is person based micro simulation model. Trip generation in BPM is a choice model instead of traditional regression or cross classification method.

4.1.4. Households

- 4.1.4.1. Dutchess County.** Source: Census 2010, Summary File 1. The PDCTC Model uses 2010 Census data as the benchmark for future population estimates. The Model uses data on Average Household Size or Persons per Household (PPH) for each TAZ, which are used to generate Trip Productions in TransCAD. Population forecasts were obtained by conducting a 50-year County-wide build-out analysis: where the number of possible new housing units was identified for every parcel in the County. The build-out analysis used data on local zoning and subdivision bulk regulations (for all 30 municipalities) to determine the number of housing units each parcel could legally support. This gross build-out was then constrained based on environmental features such as floodplains, watersheds, steep slopes, protected lands, and agricultural lands that would limit the number of housing units on each parcel. This analysis produced a net total of potential housing units by parcel, which was adjusted by the presence of any existing housing units, to produce a net total of units. The parcel data was applied to the TAZ geographies to produce the total number of housing units by TAZ for 2040. The number of future households (occupied housing units) was calculated by applying occupancy rates to the number of housing units in each TAZ. The occupancy rates were based on average vacancy rates from the 1980-2010 Census by municipality. Households are expected to grow 17 percent overall and 0.6 percent annually.

- 4.1.4.2. Orange County.** Source: Census 2010, Summary File 3. Household information from the 2010 Census was used as a means of checking and verifying the housing data and occupancy information from the NYS Office of Real Property.

- 4.1.4.3. Putnam County.** Source: 2005 American Community Survey New York's census tract households were distributed from the 2005 American Community Survey county totals using the 2000 decennial census tract to

county proportion of total households. Connecticut's total number of households by county subdivision was gathered from 2005 town profiles prepared by the State of Connecticut. In view of the fact that no such data were available for New Jersey, that state's total number of households was determined by dividing population in households by the average household size.

4.1.5. Vehicles Available

- 4.1.5.1. Dutchess County.** Source: Census 2005-2009 American Community Survey (ACS) 5 year Estimates. The forecast of the number of vehicles available for each TAZ represents another important component of the Travel Demand Model. The PDCTC calculated the number of vehicles by applying the average number of vehicles per household by municipality, based on the 5-year ACS estimates, to the number of households in each TAZ.
- 4.1.5.2. Orange County.** Source: Census 2005-2009 American Community Survey (ACS) 5 year Estimates. Information from the 2000 Census indicating the average number of vehicles available per housing unit was used to further refine the number of trips generated in each TAZ. This was done for TAZs primarily in urban areas, where high numbers of housing units exist without a corresponding high number of vehicular trips generated, because people there tend to rely more on mass transit for travel than in other areas of Orange County.
- 4.1.5.3. Putnam County.** The NYMTC Best Practice Model has a sub model which forecasts vehicle ownership.

4.2. Transit Operating Policies

- 4.2.1.1. Dutchess County.** Three mass transit providers serve Dutchess County: the Dutchess County Mass Transit (LOOP) bus system, the City of Poughkeepsie bus system, and Metro-North Railroad and among the three, the Dutchess County Mass Transit (LOOP) and Metro-North Railroad have not made substantial changes in their operating policies, fares, service levels, and ridership since the previous conformity determination statement completed in Summer 2011. According to the 2005-2009 ACS 5-year Estimate for Dutchess County, mass transit accounts for 4-5 percent of all commuter trips taken by Dutchess County workers; this is unchanged from 2000. Given this low rate transit service is not modeled given the low rate of utilization in the County
- 4.2.1.2. Orange County.** Coach USA, MTA-Metro North Railroad, the Newburgh-Beacon Bus Company, Middletown Transit, the Monroe Bus Company, and Kiryas Joel Transit provide the majority of mass transit services in

Orange County, along with nine local dial-a-bus operators. According to Census 2000 Journey-to-Work information, only 4.7% of work related travel had a mass transit component, with a majority of this travel involving vehicular trips to park-and-rides throughout Orange County. Although park-and-rides are included as traffic generators in the OCTC Travel Demand Model, transit service is not modeled given the low rate of utilization in the county.

- 4.2.1.3. Putnam County.** Putnam Area Rapid Transit (PART), MTA-Metro North Railroad, and a number of private operators provide the majority of mass transit services in Putnam County. According to Census 2000 Journey-to-Work information, 7.2 % of work related travel by Putnam County workers had a mass transit component. The NYMTC Best Practice Model includes a mode split component for mass transit travel. The Transit fares for Metro North Railroad were updated as part of this analysis.

4.2.2. Transit Service Levels

- 4.2.2.1. Dutchess County.** In 2010 Dutchess County implemented a schedule change to the LOOP bus system. Renaming several routes and implementing recommendation from the PDCTC Transit Development Plan. These changes focused on serving the areas of greatest usage and provide more consistent reliable service on 9 routes.
- 4.2.2.2. Orange County.** OCTC does not anticipate significant changes in future transit service within Orange County. This position may change as economic or environmental conditions unexpectedly influence travel behavior and patterns. Though at a minimum, projected transit funding is expected to allow the transit systems to expand to meet increases in future demand.
- 4.2.2.3. Putnam County.** NYMTC does not anticipate significant changes in future transit service within Putnam County. This position may change as economic or environmental conditions unexpectedly influence travel behavior and patterns. Though at a minimum, projected transit funding is expected to allow the transit systems to expand to meet increases in future demand.

- 4.2.3. Transportation Control Measures.** No transportation control measures (TCMs) are identified for Dutchess, Orange, and Putnam Counties as part of the applicable State Implementation Plan. Therefore, the TCM implementation conformity criterion does not apply to these MPOs. Nothing in the NYMTC, OCTC, and PDCTC 2011-2015 TIPs and MTPs will interfere with the timely implementation of TCMs in other areas.

4.3. Key Assumptions

4.3.1. Demographics. All three models assume that Dutchess, Orange, and Putnam counties will experience some level of growth over the next 24-years. However, the rate of population and employment growth is slower than assumed in previous forecasts. This is due in part to new data from the 2010 Census, which showed a slow down in population growth from 2000, and BLS employment data, which showed employment unchanged between 2000-2010. In Dutchess County, employment in 2010 was actually lower than 2000; this is reflective of recent development patterns in the three counties and the continued impacts of the 2008-2010 economic recession. It should be noted that the amount of developable land is slowly evaporating, which will also impact the rate of population growth.

4.3.2. Transportation System. The three models further assume that the regional transportation network will retain its ability to adjust to changes in travel patterns, specifically with regard to vehicle traffic. This naturally assumes that future transportation funding rates will maintain current apportionment levels, as adjusted for inflation. This assumption is also aided by the ever-expanding use of technology in transportation, as evidenced by the proliferation of Intelligent Transportation Systems (ITS) in the Mid- and Lower-Hudson Valley. It seems reasonable to expect that advances in ITS will improve upon the efficiency of the network.

4.3.3. Planning Assumptions “Lock-in” Date. The Clean Air Act requires that transportation investments be based on the most recent information that is available in order to protect public health over the long-term. Therefore, conformity determinations must be based upon the most recent planning assumptions in force at the time the conformity analysis begins. The NYMTC began the regional emissions analysis for its amended TIP and MTP on May 16, 2011, the OCTC began the regional emissions analysis for its proposed MTP on August 24, 2011, and the PDCTC began the regional emissions analysis for its proposed MTP on September 12, 2011.

5. LATEST EMISSIONS MODEL. As stated earlier, the goal of the conformity process is to ensure that the transportation system envisioned by the NYMTC, OCTC, and PDCTC do not create new air quality violations or worsen existing violations. Modeling provides a quantifiable method of proving that and requires the use of two programs: a Travel Demand Model (e.g. TransCAD, Visum) to calculate future Vehicle Miles of Travel (VMT) and average speeds, and a second model (MOBILE6.2) to conduct the actual emissions analysis. Determining VMT and Average Speeds represent the most important products of a Travel Demand Model, because forecasted VMT and speeds, combined with pollution rates per mile traveled, provide an estimate of the total amount of vehicle pollution in a given time period.

5.1. Travel Demand Models

5.1.1. Dutchess County. To determine the impact of future transportation projects, the PDCTC uses a three-step gravity model without the mode split component. The PDCTC uses TransCAD software for its travel demand model. The model requires replicating the existing and proposed transportation networks through spatially accurate digital mapping - GIS (Geographic Information Systems). This is also done to replicate current and predicted land use conditions. The base network then incorporates demographic data, along with trip generation, trip distribution, and trip assignment data to simulate travel patterns.

5.1.2. Orange County. The traditional gravity modeling process incorporated within VISUM software by PTV of America was utilized to forecast future travel demand and the impact of transportation projects in the OCTC TIP and MTP on air quality. The OC Travel Demand Model incorporates housing, employment, highway, along with trip generation and Journey-to-Work information to replicate existing travel patterns in OC. Trips are distributed and assigned to the least time travel paths between traffic analysis zones based primarily on the methodology recommended in [National Cooperative Highway Research Program Report 365 \(NCHRP 365\)](#), Travel Estimation Techniques for Urban Planning. Using the trip generation and trip length parameters of the calibrated base year (2002) model, future travel conditions, vehicle miles traveled (VMT) and vehicular emissions were forecast using projected increases in housing, employment and vehicle trips in OC for each analysis year being evaluated. Transit was not modeled given that transit service does not comprise a significant portion of travel in OC.

The four time period approach was utilized to calculate vehicle miles traveled (VMT) for each analysis year being evaluated. With this approach, VMT for the morning, midday and nighttime hours is estimated as a proportion of that occurring during the PM peak hour and then factored into VMT by time period based upon the VMT percentages used in the OC portion of NY SIP to determine emissions budgets. This methodology differs from previous conformity determinations in that VMT was calculated using hourly percentages determined from traffic counts taken in OC. In June 2007, the ICG concurred that this change in methodology is a more accurate means to estimate VMT.

5.1.3. Putnam County. To determine the impact of future transportation projects, NYMTC uses the third generation of travel demand models which are commonly referred to as activity based models. This model, known as the New York Best Practice Model (NYBPM), attempts to predict and simulate detailed travel patterns for every individual residing inside the study area over a 24-hour period. The model uses journeys (travel between two primary locations including stops) as a unit of travel rather than just home-to-work trips. The model also looks at the daily activity agenda of each household member and intra-household interactions between them, and other constraints that affect the choice of travel

with respect to time and space. The model requires replicating the existing and proposed transportation networks through spatially accurate digital mapping - GIS (Geographic Information Systems). The model uses the digitized networks and demographic data, along with journey generation, destination and mode choice, time of day travel, and trip assignment data to simulate travel patterns. For more information on the NYBPM please visit:
http://www.nymtc.org/project/BPM/model/bpm_finalrpt.pdf.

5.2. Road Network. The simulated road network consists of two components: links, which represent roads, and nodes, which represent intersections. Each of these components is characterized by relevant data concerning the number of lanes, traffic control devices, turning lanes, and speed limits; these characteristics help determine the vehicle capacity of each link and node. Furthermore, the models assign a functional classification to all roads; in accordance with the National Highway Classification System (see Appendix A).

5.2.1. Dutchess County. The highway network in the PDCTC Travel Demand Model includes all roadways that have a functional classification of Collector or above. Local roads that act as essential connectors have been included where appropriate; especially in places such as the City of Poughkeepsie, where local roads carry a significant amount of traffic. The 2002 base street network is based upon the NYS Data Product GIS Street Centerline files from New York Cyber Security and Critical Infrastructure Coordination (NYCSCIC). PDCTC staff also used aerial imagery from 2009 to verify intersection configurations (turning lanes, signalization). Link capacities are shown in Appendix B.

5.2.2. Orange County. The highway network in the OCTC Travel Demand Model includes all roadways that have a functional classification of interstate, arterial or collector. Not every local road is included, however, only those that facilitate the through movement of vehicles and feed and augment collectors, arterials and interstates in OC. For example, roads to regional shopping malls, office parks and major residential developments are included because they are important locations where traffic enters and leaves OC's primary road network. Information concerning intersection signalization and number of turning lanes was collected in the field and from aerial imagery to determine capacity. Link capacities are shown in Appendix B.

The functional classification of roads in the OC Travel Demand Model was updated, reflecting changes in area (urban/rural) and function of roads as depicted on the functional classification maps approved by the Federal Highway Administration on June 26, 2006. The urban/rural split of roads under the old classification was 38% urban and 62% rural. With the new classification, 30% of the roads in OC are classified as rural while 70% are classified as urban.

5.2.3. Putnam County. The NYBPM highway network is maintained and applied with

TransCAD, which features a GIS (Geographic Information Systems) framework that provides a realistic representation of highway route system. The highway network has more than 53,000 links and includes most minor arterial and above roadway facilities. The database includes information on number of lanes, functional class, speed, parking restriction, and truck usage.

5.3. Land Use Patterns. Traffic Analysis Zones (TAZs) act as the basis for replicating land use patterns in the Model. These zones represent areas with significant or unique travel characteristics and are often based on U.S. Census geographies (tracts, block groups, and blocks).

5.3.1. Dutchess County. The PDCTC model incorporates a total of 190 TAZ's: 156 TAZs within Dutchess County (internal), 20 outside the county (external), and 14 special generators. A special generator refers to a distinctive land use, such as a college or regional shopping mall, with atypical travel characteristics.

5.3.2. Orange County. Traffic Analysis Zones (TAZs) divide OC geographically into areas describing different land use types and intensities. Centroids are the points within TAZs where trips commence and terminate based upon the land use activities therein. To accurately replicate base year traffic conditions, it is necessary to accurately describe the location of land use activities relative to where traffic actually enters and leaves the highway network. Not every driveway need be represented, however, only the significant local and collector roads channeling traffic to roads and intersections being analyzed. The OCTC model incorporates a total of 550 TAZs, 515 internal zones and 35 external zones connecting OC with surrounding counties. The 515 internal TAZs were created by first delineating limited access highways, rail and power line rights-of-way, federal, state and county preserves and parklands, as well as natural features such as rivers and mountains which serve to restrict directional traffic flow. These districts were then further subdivided into TAZs bounding residential neighborhoods and activity centers such as malls, major residential neighborhoods and central business districts where vehicular trips commence and terminate.

5.3.3. Putnam County. The NYBPM Transportation Analysis Zone (TAZs) system is the underlying data structure for the socioeconomic and demographic inputs to the BPM zonal files for its transportation networks and trip tables, and for the framework of reporting model results on a geographic basis. Supporting a fully multi-modal integrated regional modeling system, the BPM system of TAZs is common to both the Highway and Transit networks.

The total number of zones used for regional modeling should not be excessive, given the many large matrices used in the model and the computational resources needed to run it (disk storage and processing time) increases exponentially with the number of zones. For the 28-county modeling area 3,583

zones were created. These zones were based on Census tracts and varied from 1 census tract per zone to several tracts per zone. In Putnam County there are 14 zones with an average of 1.39 tracts per zone. In 1996, a land use data collection was undertaken for model development. For Putnam County 86 % floor space was found to be occupied by residential buildings and 14 % by non residential buildings.

5.4. Analysis Years. Consistent with 40 CFR Part 93, vehicle miles traveled (VMT) and vehicular speeds were forecast by functional classification for the years 2014, 2020, 2030, 2035 and 2040, complying with the federal transportation conformity regulations that: the first analysis year be no more than five years from the year a conformity determination is made (2014), consecutive analysis years be no more than ten years apart (2020, 2030, and 2035), and that the horizon year (2040) of each MPO's Metropolitan Transportation Plan (MTP) be analyzed. Effective August 17, 2010, the EPA found the motor vehicle emissions estimates for volatile organic compounds (VOC) and nitrogen oxides (NO_x) in the submitted state implementation plan for the Poughkeepsie, NY 8-hour ozone nonattainment area to be adequate for transportation conformity purposes. As a result of this adequacy finding, OCTC, PDCTC, and NYMTC (Putnam County only) must compare emissions in the future conformity analysis years to the emission level of VOC and NO_x in the submitted 2009 8-hour ozone "budgets" for VOC and NO_x.

5.5. Trip Generation. The goal of trip generation is to predict the number of trips that are generated by and attracted to each TAZ. In trip generation, methods are applied to predict productions and attractions. The zone that contains the home end of home-based trips or the origin end of non-home-based trips is considered to have produced the trip, while the destination zone where an out-of-home activity will be undertaken is considered to have attracted the trip.

5.5.1. Dutchess County. The PDCTC uses traditional trip production and attraction rates as explained in sections 5.6.1 and 5.7.1.

5.5.2. Orange County. Trip generation is the means of quantifying the number and type of trips in a model based upon the amount and type of land uses in each TAZ. The overall purpose is to quantify the number of trips made for a specific time period such as a day or peak hour. Trip generation rates from the [Institute of Transportation Engineers, Trip Generation Guide, 7th Edition](#) were used to estimate trips for commercial, office and industrial land uses. For residential land uses, trip generation rates were derived from traffic counts taken at the driveways of residential developments throughout OC.

5.5.3. Putnam County. The NYMTC Best Practice Model does this through a special Household, Auto-Ownership and Journey-Frequency (HAJ) Model.

5.6. Trip Production

5.6.1. **Dutchess County.** Trip Production rates for the PDCTC were obtained from the New York Metropolitan Transportation Council [1997/1998 Regional Travel - Household Interview Survey \(RT-HIS\)](#). Those rates were compared with those from the [2009 National Household Travel Survey](#) and found to still be consistent with regional travel patterns. PDCTC is cooperating with NYMTC to supplement their upcoming Household Travel Survey with additional surveys in Dutchess County to update our trip production rates; the survey will be completed in 2012. The Model uses the Cross-classification method, where the population is separated into demographically homogenous groups, to determine the number of person trips produced. Average trip production rates per household are then estimated for each classification, which creates forecasted trip productions (Table 2).

Table 2 Dutchess County Trip Production Rates

Number of Vehicles	Household Size				Total
	1 Person	2 Person	3 Person	4+ Person	
Zero Vehicles	2.9	4.7	8.5	9.6	4.2
1 Vehicle	3.9	6.9	7.5	11.3	6.1
2 Vehicle	4.4	7.1	10.6	14.4	10.5
3 Vehicle	3.4	5.7	13.2	13.1	11.8
4+Vehicles	4.0	9.9	8.7	14.2	13.8
Total	3.5	6.9	10.3	14.2	

5.6.2. **Orange County.** Trip production rates were obtained from the Institute of Transportation Engineers, Trip Generation Guide, 7th Edition for commercial, office and industrial land uses while origin rates for residential land uses were calculated from traffic counts taken at the entrances to major residential development throughout OC. Trip productions in the OC Model were then separated by purpose to account for variable trip length characteristics of drivers as documented in NCHRP 365, Travel Estimation Techniques for Urban Planning. Trip length is important because it influences traffic volumes, vehicle miles traveled and vehicular emissions.

Table 3. Orange County Trip Production Rates

Type	Origins	Destinations	Total Trips
Single-Family	0.30	0.55	0.85
Multi-Family	0.21	0.39	0.60
Retail	1.38	1.25	2.63
Mall	1.22	1.10	2.32
Non-Retail	0.54	0.07	0.61
Office	0.50	0.07	0.57
School	0.35	0.33	0.68
Institutional	0.13	0.05	0.18

5.6.3. Putnam County. The NYBPM generates trips by applying a set of models called the Household, Auto-Ownership and Journey-Frequency (HAJ) Model that simulates total journeys for every household for all travel purposes over a 24-hour period. A journey is defined as travel between two primary locations, where one end is always home and the other end is work, school or other primary location. Market segmentation is used to group households by income, auto availability, household-size, and type of person (children, workers, and non working adults). A multinomial logit model, combined with Monte Carlo technique is used to generate discrete journeys for individual member of the households after evaluating interaction between household members in combination with time and space constraints that each person experiences in view of multiple-journey daily activity pattern.

This HAJ model comprises of a set of sub-models applied in sequence: 1) household-synthesizing model, 2) auto-ownership model, and 3) journey production (frequency) model.

- a. Household Model. This model forecasts the number and distribution of households in each zone. Using Census data, the model calculates probability for each possible combination of the household characteristics, including income, size, number of workers, non-working adults, and number of children. These probabilities are then used in combination with the aggregate demographic forecasts in order to produce a number of households of each category, for each zone, for target years.
- b. Auto-Ownership Model. This model determines the number of automobiles available in each household. The model considers the influence of household income and composition, vehicle-maintenance cost, parking availability, transit and highway accessibility and density as well as residential area type.
- c. Journey-Frequency Model. This model determines the daily number of paired journeys (outbound and inbound) each person in each household makes for each purpose. Each person is categorized as a worker, non-working adult, or a child. This model evaluates intra-household interrelationships among

different household members, transit accessibility, and auto availability to come up with journey frequency for each person. Linkage of journey-frequency models across different household members allows for forecasting a realistic set of journeys made by each household.

5.7. Trip Attraction

5.7.1. Dutchess County. Trip Attraction rates were generated from *National Cooperative Highway Research Program (NCHRP) Report 187*. For attractions, the Models use a regression equation that estimates the number of person-trips attracted to a zone based on employment (retail and non-retail) and households in the zone.

5.7.2. Orange County. Trip attraction rates were obtained from the Institute of Transportation Engineers, *Trip Generation Guide, 7th Edition* for commercial, office and industrial land uses while origin rates for residential land uses were calculated from traffic counts taken at the entrances to major residential development throughout OC. Trip attractions in the OC Model were then separated by purpose to account for variable trip length characteristics of drivers as documented in NCHRP 365, *Travel Estimation Techniques for Urban Planning*. Trip length is important because it influences traffic volumes, vehicle miles traveled and vehicular emissions.

5.7.3. Putnam County. The journey attraction model for NYBPM uses linear regression equations with contributing land use variables such as population, households, total employment, retail employment, office employment, school enrollment, and university enrollment. The attraction model is segmented by land use type for six travel purposes resulting in a set of journey attraction rates that are used for destination choice model.

5.8. External Trips The Models use external loading links to account for traffic that enters from an area outside of each county. These links represent the first link of an existing road where the external traffic can enter into the area. External trips include those that start in the model area but leave it (Internal-External trips), start outside the model but end in it (External-Internal trips), or pass through on their way between two external points (External-External trips).

5.9. Trip Distribution. Trip distribution is the process where trip origins are apportioned throughout the study area, based on the number of trip destinations in each TAZ and the distance/travel time impedance involved. In the gravity model, the assumption is that people tend to interact more when the travel time between them is less – the shorter the travel time, then the higher the frequency of interactions.

5.9.1. Dutchess County. Accordingly, TransCAD routes vehicles on the fastest, shortest routes first, and then onto other routes as congestion makes those paths less desirable.

5.9.2. Orange County. Accordingly, Visum routes vehicles on the fastest, shortest routes first, and then onto other routes as congestion makes those paths less desirable.

5.9.3. Putnam County. In NYBPM, the Mode, Destination and Stop Choice (MDSC) model replaces the traditional trip distribution and mode choice model. The two steps are combined together as most choices regarding destination and mode are co-dependent. The travel purposes forecasted are work (low, medium, high income), school, university, maintenance, discretionary, and at work journeys.

This model comprises pre-mode choice, destination and mode choice, intermediate stop frequency and location choices modeled in sequence. In addition to combining the destination and the mode choice model this step also introduces the concept of intermediate stops in a journey. Explicitly modeling the number and location of the stops on a journey enables for a realistic representation of the interrelated decisions made by the traveler regarding all destinations (primary and secondary) and modes.

- a. Pre-Mode Choice Model. This model distinguishes between motorized and non-motorized travel based on the person and household characteristics and land-use densities around the journey origin.
- b. Destination Choice Model. Different destination-choice models are applied to motorized and non-motorized subsets of journeys. They take into account available attractions for each zone in retail, office and other employment categories along with school and university enrollments and then distribute journeys to the destination zones.
- c. Motorized Mode Choice Model. The motorized mode-choice model predicts traveler decisions based on various time and cost factors as well as person and household characteristics. This model includes nine modes: drive alone; shared ride - 2 (driver and passenger); shared ride - 3 (driver and two passengers); shared ride - 4+ (driver and three or more passengers); walk to transit (including bus, subway and ferry); drive to transit; walk to commuter rail; drive to commuter rail; and taxi.
- d. Stop-Frequency Choice Model. The stop-frequency model considers four combinations: direct journeys without stops, stop on the inbound journey only, stop on the outbound journey only, and stops on both inbound and outbound journeys.
- e. Stop-Location Choice Model. The stop-location choice model predicts a location zone for each modeled stop based on the density of potential

attractions along the journey route from origin to destination and the deviation (relative additional impedance) from the base journey route that is associated with visiting the stop zone.

The choice models are either multinomial or nested logit constructs. Multinomial logit models are applied for journey frequency, pre-mode, and destination choices. They are based on the assumption that all choice alternatives are equally similar and thus choice can be made according to their utility functions. Nested logit models are applied for mode and car-ownership choice where choice alternatives have a differential degree of similarity and should be grouped by characteristics in the choice modeling procedure (for example transit modes are grouped together while drive alone and shared ride choices form a separate group).

5.10. Calibration

5.10.1. Dutchess County. To test the validity of the models, the PDCTC calibrated its model through an analysis of the road network, land-use data, and gravity model factors. This effort included a reasonableness test, to ascertain whether the models accurately represented known traffic flows; in this case, the known data came from 2002 Average Daily Traffic directional counts from Dutchess County and NYSDOT. Specifically, two calibration tests were used: a screen line analysis and a scatter gram analysis. For the former, PDCTC staff verified that the simulated traffic flowed in generally plausible directions, using screen lines to measure the flow of traffic from North to South and West to East.

5.10.2. Orange County. The travel parameters of OC Model were adjusted to reflect traffic counts and travel characteristics of drivers in OC for the 2002 base year. Traffic volumes assigned by the OC Model were compared to actual traffic counts through regression analysis. The differences between traffic counts and traffic volumes were used as the basis to modify trip generation rates, trip length exponents and, in some instances, land use quantities where errors were evident. One or two variables were modified followed by a model run to determine the effect of such modifications. This was repeated, iteratively, until volumes assigned by the model meet acceptable error deviation levels as defined in National Cooperative Highway Research Report 255, Highway Traffic Data for Urbanized Area Project Planning and Design.

5.10.3. Putnam County. Based on the revised full set of input data and new calibration target data developed as part of the BPM 2005 Update, and using the improved application procedures implemented in this update, the BPM was re-calibrated, with a marked improvement in the model's demonstrated ability to replicate observed highway and transit travel in the region's 28 county model area, and to provide reliable future year forecasts.

5.11. Seasonal Adjustment. Seasonal adjustment of daily vehicle miles traveled from

Travel Demand Model results is required to account for increases in traffic volumes and vehicle miles traveled during the ozone season (May through September). Seasonal or monthly adjustment factors convert average daily traffic (ADT) to annual average daily traffic (AADT). The work week seasonal factors are developed from NYSDOT continuous counter data collected for a three year period. Factor Group 30 is characteristic of highways carrying heavy commuter traffic with only a small variance of traffic throughout the year. Factor Group 60 is characterized by large seasonal traffic variations. Factor Group 40 highways lie between these two extremes.

The New York State Implementation Plan developed by the NYSDEC designates the following seasonal Adjustment factors Table 4.

Table 4 Seasonal Adjustment Factors

	Summer Conditions	Winter Conditions
Factor Group 30	1.12	1.00
Factor Group 40	1.16	0.87
Factor Group 60	1.21	0.80

Source: NYSDEC – SIP

5.11.1. Dutchess County. To produce emissions analysis for Dutchess County each link is assigned a functional classification and based upon that classification it is adjusted based on seasonality factors to account for the summer season. The adjustment factors represent the ozone season (May through September).

5.11.2. Orange County. Seasonal adjustment of daily vehicle miles traveled from the OC Travel Demand Model is required to account for increases in traffic volumes and vehicle miles traveled during the ozone season (May through September). A list of State and County Roads by Factor Group was obtained from NYSDOT Region 8. The 9,400+ street segments in the OCTC Travel Demand Model were then coded with the appropriate factor group category. Local roads not listed were assumed to exhibit FG 30 characteristics. DVMT and vehicle emissions were seasonally adjusted on a link by link basis accordingly.

5.11.3. Putnam County. To produce emission analysis, the output from NYBPM is fed into a post processor PPSUITE. PPSUITE processes the trip assignment files from NYBPM to reconcile with HPMS data and seasonal factors followed by speed adjustments for intersection approaches. After these adjustments, the data is converted into appropriate format to run Mobile 6.2 to produce desires emission analysis.

5.12. MOBILE6.2. The USEPA developed the MOBILE emissions model, with the latest revision occurring on January 27, 2002 through the official release of MOBILE6.2; this version has been required of all states (except California) since January 27, 2004. The

emissions model predicts gram per mile emissions of Hydrocarbons (HC), Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Carbon Dioxide (CO₂), and Particulate Matter (PM) under various seasonal and operating conditions. Emission factor tables developed by NYSDOT-EAB based on MOBILE 6.2 were used to measure the air quality impacts of implementing the proposed projects in the MTPs and TIPs. The modeling inputs used to develop the emission factor tables are the most recent inputs that have been established in consultation with the New York State Department of Environmental Conservation (NYSDEC) and the New York State Air Quality Conformity Interagency Consultation Group (ICG). These model inputs include the latest existing and future emissions control programs included in the SIP, and the latest MOBILE 6.2 input assumptions on characteristics of the existing and future vehicle fleets traveling on roadways.

In order to conduct the required regional emissions analyses for Dutchess and Orange Counties, emission factor tables developed by the NYSDOT Environmental Science Bureau in April 2008 were used. In order to conduct the required regional emissions analysis for Putnam County, NYMTC generated its own emission factors. All of the emission factors were generated using the EPA motor vehicle emissions model, MOBILE6.2. The modeling inputs and parameters used to develop the emission factor tables are the most recent inputs for Dutchess, Orange and Putnam Counties established in consultation with the New York State Department of Environmental Conservation (NYSDEC) and the New York State Air Quality Conformity Interagency Consultation Group (ICG). The MOBILE6.2 input files and modeling parameters used for this regional emissions analysis are the most recent inputs that were available for use at the time the NYMTC modeling process began on January 31, 2011. Specific modeling inputs and parameters used to develop the emission factors for Dutchess, Orange and Putnam Counties are described below:

- 5.12.1.1. Evaluation Month.** The month of July (i.e., summertime conditions) was specified in the VOC and NO_x emission factor input files.
- 5.12.1.2. Vehicle Registration Distribution.** Year 2010 registration data were used to model the 2014 year. Year 2010 registration data were used to model all future analysis years.
- 5.12.1.3. Vehicle Mileage Accumulation Rate.** The EPA default mileage accumulation rate data (provided with the MOBILE6.2 model) was used for all modeling years.
- 5.12.1.4. I/M Programs.** NYSDEC inspection and maintenance (I/M) program data were used in the emission modeling. The NYSDEC file, NYVIPup.d, contains data for the Upstate NY I/M program. This file was used for modeling all future analysis years. No I/M program was in place in Dutchess, Orange, and Putnam Counties in the 2002 base year.

5.12.1.5. Anti-Tampering Program. The anti-tampering program data described in the table below was used to model all analysis years:

ANTI-TAMPERING PROGRAM DATA	
Parameter	Years 2002 – 2035
Beginning calendar year	1984
Earliest model year	(Current yr – 25 yrs)
Final model year	(Current yr – 2 yrs)
Light-duty vehicles subject to inspection	LDGV, LDGT1, LDGT2, LDGT3, LDGT4
Heavy-duty vehicles subject to inspection	HDGV2B, HDGV3, HDGV4
Annual or biennial	Annual
Compliance rate	98%
Component inspections (see MOBILE6.2 User's Guide)	All except tailpipe lead deposit test

5.12.2. Fuel Program and Fuel RVP. Average and maximum fuel sulfur levels and fuel Reid Vapor Pressure (RVP) levels were specified in the input files (as listed in the below).

Fuel Sulfur and RVP Levels				
Dutchess, Orange, and Putnam Counties				
Year(s)	Season	Fuel Sulfur Levels (ppm)		RVP (psi)
		Average	Maximum	
2002 - 2003	Summer	85.0	1000.0	6.8
	Winter	137.0	1000.0	12.5
2004	Summer	85.0	303.0	6.8
	Winter	120.0	303.0	12.5
2005	Summer	90.0	303.0	6.8
	Winter	90.0	303.0	12.5
2006 - 2007	Summer	30.0	87.0	6.8
	Winter	30.0	87.0	12.5
2008 - 2009	Summer	30.0	80.0	6.8
	Winter	30.0	87.0	12.5
2010 - 2040	Summer	30.0	80.0	6.8
	Winter	30.0	80.0	12.5
	Winter	30.0	80.0	12.5

Gasoline fuel oxygenate data were also specified in the input files (as listed in the Table below).

Gasoline Fuel Oxygenate Data				
Dutchess, Orange, and Putnam Counties (Reformulated Gasoline Program)				
Year(s)	Season	Oxygenate Type	Oxygenate Content (% by volume)	Market Share Fraction of Oxygenate
2002 - 2003	Summer	MTBE	10.4%	0.98
		TAME	1.01%	0.02
	Winter	MTBE	8.7%	0.96
		TAME	0.3%	0.04
2004 - 2040	Summer/Winter	Ethanol	10%	1.00

5.12.3. Temperature and Humidity. For the summer season, county-specific hourly temperatures and relative humidity levels as verified by NYSDEC in May 2009 were used in the modeling.

- 5.12.4. Diesel Sale Fractions.** Diesel sale fractions for NYSDOT Region 8 were used in the modeling. Year 2002 diesel fractions were used to model the 2002 base year. Year 2007 diesel sale fractions were used to model all future analysis years.
- 5.12.5. Vehicle Start Distribution.** County-specific vehicle start distribution data as received from NYSDEC in May 2009 were used in the modeling.
- 5.12.6. VMT by Hour.** County-specific VMT data (allocated by hour of day) as verified by NYSDEC in May 2009 were used in the modeling.
- 5.12.7. Low-Emission Vehicle (LEV) Standards.** The following files were used to model the effects of implementing California's LEV I/LEV II programs in New York State:
- L2CERT.d – Specifies the LEV II 50,000-mile certification standards
 - L2EVAP.d – Specifies the phase-in schedule for the LEV II evaporative emission standards
 - L2EXH.d – Specifies the phase-in schedule for the LEV II exhaust emission standards
 - LEV2.d – Provides fleet penetration fractions for light-duty gasoline vehicles under the LEV I/LEV II programs.
- 5.12.8. Weighted emissions by vehicle type.** The emission factors for each individual vehicle type were weighted according to the NYSDOT Region 8 vehicle distributions by roadway functional class and then summed to obtain composite emission factors.

These model inputs include the latest existing and future emissions control programs included in NYSDEC's statewide mobile source emission inventory, and the latest MOBILE6.2 input assumptions for the existing and future vehicle fleets traveling on roadways in the PONA. The MOBILE6.2 input and external data files are available by contacting the NYSDOT Environmental Science Bureau.

- 5.13. Mobile 6.2 and PPSUITE.** To produce the emission analysis, the output from NYBPM is fed into a post processor PPSuite. PPSuite processes the trip assignment files from NYBPM to reconcile Vehicle miles traveled (VMT) with HPMS data and seasonal factors, followed by speed estimates for intersection approaches. After these adjustments, the data is converted into appropriate format to run Mobile 6.2 to produce the emission rates. In August 2005, the ICG concurred that the PPSUITE process is an appropriate method to estimate emissions for use in NYMTC conformity determinations. The following are the major steps of post processing before running Mobile 6.2:

- 5.13.1.1. Expand assigned 24 hour volumes.** (daily volume, minus transit buses) from the NYBPM output to 24 one-hour volumes. PPSuite applies VMT hourly distribution data (NY_HourPat_03A.dat) to the daily and peak period volumes from the BPM.

- 5.13.1.2. **Adjust the 24 one-hour volumes.** to match Assigned Peak Volumes and to account for the impacts of off-peak Spreading.
- 5.13.1.3. **Disaggregate to Vehicle Types.** The vehicle pattern files were created using the NYSDOT 'Vehicle Mix 2002D.xls' file to breakdown the one hour traffic volume into five vehicle classes.
- 5.13.1.4. **Apply VMT Adjustments to Hourly Link Volumes.** The assigned traffic volumes input from the network are adjusted to account for a variety of factors, such as accounting for daily/seasonal variation, reconciling VMT totals with totals reported by the Highway Performance Monitoring System (HPMS), and accounting for off-model projects (including TDM) which change VMT.
- 5.13.1.5. **Calculate Link and Approach Capacities.** Link (mid-block) carrying capacities are calculated off-line by the user, reflecting the facility type, area type, and number of lanes, and then a lookup table is built.
- 5.13.1.6. **Calculate Link (mid-block) Delay.** Using the above capacity and hourly volumes as input, link speeds are calculated.
- 5.13.1.7. **Calculate Approach Delay.** On those links where control devices (signals, stop signs) are either coded or implied by defaults, intersection approach delay is calculated.
- 5.13.1.8. **Calculate VMT, Aggregate Link Speed.** Once mid-block and intersection approach V/C ratios and speeds are finalized, the delays that result on both the link and the intersection approach, are summed. The average link speed is calculated from the combination of link and intersection delay.
- 5.13.1.9. **Accumulate VMT, VHT, Average Speed.** Vehicle miles traveled (VMT) and vehicle hours traveled (VHT) are accumulated by area type, facility type, and time period.
- 5.13.1.10. **Apply Post-Speed VMT Adjustments.** Similar to the VMT adjustments performed before speed calculations (Step 5 above), additional VMT adjustments are applied after the speed calculations (to account for such items as local street VMT not in the model).
- 5.13.1.11. **MOBILE Input Vehicle Types.** Calculated in step 3, five vehicle type classes are expanded to 16 classes using the 16-Vehicle Composite which is based on 2002 Vehicle Mix file. In the MOBILE module of the PPSuite,

these 16 classes (after the appropriate number of express and local buses are added to represent the HDBT class), are further expanded to 28 classes by using the Diesel Fractions provided by NYSDOT.

5.13.1.12. Prepare and Run MOBILE6.2 to calculate emission rates. PPSuite assembles VMT, speed, vehicle type fractions, meteorological, I/M, and other related data into a MOBILE input file. This file contains several run scenarios for each area (county) and facility group. Input data also varies for the downstate and upstate counties.

5.13.1.13. Emission Estimates. PPSuite applies emission rates to the VMT by county and facility group to calculate area and regional emissions.

6. CONSISTENCY WITH METROPOLITAN TRANSPORTATION PLANS. The projects proposed in the Draft MTPs for the OCTC and PDCTC are consistent with the goals and objectives of their current MTPs and the federal metropolitan transportation planning process in general. Furthermore, the 2011-2015 TIPs for NYMTC, OCTC, and PDCTC adhere to the goals and objectives of the current MTPs for the New York City metropolitan area [2010-2035 Regional Transportation Plan](#), Orange County [OCTC Long Range Transportation Plan \(2007-2035\)](#), and Dutchess County [New Connections](#) respectively. The proposed MTP projects follow through with the three main areas of each current and draft Plan: 1) maintaining infrastructure and improving safety; 2) meeting future needs by increasing capacity, reducing demand, and expanding travel options; and 3) ensuring that the future transportation system complements and reinforces the land use goals of local communities and their respective county. On September 24, 2009, NYMTC adopted its updated plan, the OCTC adopted its plan on November 28, 2007, and the PDCTC adopted its plan on November 29, 2007. FHWA/FTA approved the NYMTC Plan on October 01, 2009, the PDCTC and OCTC Plans were approved on December 19, 2007.

7. IDENTIFICATION OF EXEMPT/NON-EXEMPT AND REGIONALLY SIGNIFICANT PROJECTS. A crucial step in the modeling process involves identifying which projects might affect regional air quality. In most instances, projects such as safety improvements, resurfacing, bridge repairs, and bus replacements, which maintain current levels of service or capacity, are considered Exempt from the conformity analysis. Similarly, projects that result in operations improvements, but do not increase capacity - an intersection widening - are also excluded from the analysis. Inversely, there are two types of projects (Non-exempt and Regionally Significant) that have the potential to affect air quality:

- **Non-exempt:** highway and road projects that change capacity by at least one travel lane or transit projects that change capacity on a fixed route system. A non-exempt determination is made if the project type is not found in the list of exempt projects derived from "Table 2- Exempt Projects" in 40 CFR Part 93.126, 93.127 and NYCRR Part 240.27.
- **Regionally Significant:** any project, regardless of funding source, on a facility that

serves regional transportation needs and that would normally be included in the modeling of a metropolitan area's transportation network. Includes, at a minimum, all principal arterial highways and all fixed guide way transit facilities that offer an alternative to regional highway travel.

Table 5. Non-exempt and Regionally Significant Projects

Dutchess County

PIN	Project	Agency
801064*	Route 9/44/55 - Reconstruction	NYSDOT
806207*	I84 @ Route 9D - Reconstruction	NYSDOT
881053	Ozone Action Days	NYSDOT
882382	Enhanced Regional Commuter Choice	NYSDOT
882524	Beacon Train Station - Parking improvements	Metro-North
882517	Wassaic Train Station - Parking improvements	Metro-North

Orange County

PIN	Project	Agency
814522	Schutt Rd. - Construction, Dunning Rd. to North Galleria Dr.	T/Walkill
881054	Ozone Action Days	NYSDOT
882038	Metropool Ridesharing Program to Van & Carpool Commuters	NYSDOT
882383	Enhanced Commuter Choice	NYSDOT

Putnam County

PIN	Project	Agency
808804	Integrated 511/Regional Branding	NYSDOT
811356	Advanced Transportation Management Systems (ATMS) - I-684: Exit 2 to I-84	NYSDOT
813064	Route 22 - Reconstruction, from I-84 to CR 65	NYSDOT
880546	Variable message signs - regional highways- interstate 684.	NYSDOT
880697	Park & Ride lots expansion, 100 spaces at I-84 and Route 311. Construct new park & ride lots at various locations along I-84 and Route 6.	PUTNAM
881030	Ozone Action Days	NYSDOT
882038	Metropool TDM services	NYSDOT
882384	Trips 123	NYSDOT
I0096	ITS Equipment Expansion	NYSTA
M402-02	South East Parking Expansion	Metro-North
M502-03	Parking improvements at locations to be determined	Metro-North

*Regionally Significant

7.1. Project Listing. All of the projects in the MTPs and TIPs were first evaluated for applicability using the guidance contained in Appendices B and C of The Air Quality Conformity Determination Process, issued by NYSDOT-EAB on December 10, 2003 and updated on April 23, 2010.

7.1.1. Dutchess County PDCTC staff developed the list of Non-exempt and Regionally Significant projects and forwarded it to NYSDOT-EAB on August 17, 2011 for dissemination to the ICG. On September 22, 2011 the PDCTC received concurrence from the ICG on the list of Non-exempt and Regionally Significant projects to be included in the Regional Emissions Analysis (Table 5). There have been no significant changes to the project list since that time.

7.1.2. Orange County OCTC staff developed the list of Non-exempt and Regionally Significant projects and forwarded it to NYSDOT-EAB in August 2011 for

dissemination to the ICG. On September 22, 2011 the OCTC received concurrence from the ICG on the list of Non-exempt and Regionally Significant projects to be included in the Regional Emissions Analysis (Table 3). There have been no significant changes to the project list since that time.

- 7.1.3. Putnam County** NYMTC staff developed the list of Non-exempt and Regionally Significant projects and forwarded it to NYSDOT for dissemination to the ICG. NYMTC received concurrence from the ICG on the list of Non-exempt and Regionally Significant projects based upon their reviews at various meeting in the summer of 2011. (Table 5).

7.2. Other Projects. Completing the air quality analysis on the MTPs and TIPs meant analyzing some projects that are still in the conceptual stage. In accordance with the final transportation conformity rules issued by the USEPA, if adequate information was available to produce reasonable assumptions, then forecasts of the project impacts on vehicle miles traveled and average vehicle speeds could be produced.

- 7.2.1. Dutchess County.** Future projects with insufficient data to model include those still in the early development stages, such as the Route 9-Route 44/55 interchange.

7.2.2. Orange County. No such projects in Orange County.

7.2.3. Putnam County. No such projects in Putnam County.

8. TIMELY IMPLEMENTATION OF TRANSPORTATION CONTROL MEASURES (TCMS) No TCMs are identified for Dutchess, Orange, or Putnam County as part of the applicable State Implementation Plan (SIP). Therefore, the TCM implementation conformity criterion does not apply to these MPOs. Nothing in the NYMTC, OCTC, and PDCTC MTPs or TIPs will interfere with the timely implementation of TCMs in other areas.

9. DOCUMENTATION OF INTERAGENCY CONSULTATION REQUIREMENTS This conformity determination relied on a high degree of coordination between federal, state, and local agencies. The Interagency Consultation Group (ICG) facilitated this need by ensuring that the appropriate agencies were involved at the required steps. Throughout the development of each Travel Demand Model and the entire conformity determination process, NYMTC, OCTC and the PDCTC routinely updated the ICG on the status and methodologies being used. ICG feedback was sought on any issue that MPO staff believed potentially problematic.

10. PUBLIC INVOLVEMENT Recognizing the importance of public involvement in the transportation planning process, NYMTC, OCTC, and PDCTC Operating Procedures stipulate that private citizens, including public and private agencies, be afforded the opportunity to review and comment on an Air Quality Conformity Determination Statement prior to its adoption. Accordingly, NYMTC, OCTC, and PDCTC sought public input on this Conformity Statement during the following public comment periods:

- NYMTC: began on October 11, 2011 and ended on November 9, 2011
- OCTC: began on November 4, 2011 and ended on December 5, 2011

- PDCTC: began on October 11, 2011 and ended on November 9, 2011

NYMTC, OCTC and PDCTC sought public commentary through notification to all known interested parties and media outlets to review and comment on the draft conformity determination for their respective TIPs and MTP/RTPs. The conformity determination was required to reflect the update of the PDCTC and the OCTC TIPs. No comments were received during the comment period.

11. RESULTS OF EMISSIONS ANALYSIS The OCTC and PDCTC estimated the emissions impacts of their TIPs and applicable MTPs using NYSDOT's MOBILE 6.2 Emission Factor Tables dated April 2008. On May 21, 2008 the air quality transportation conformity Interagency Consultation Group (consisting of representatives of FHWA, FTA, EPA, NYSDEC, and NYSDOT) concurred that use of these emission factor tables in the Mid Hudson Area constitutes use of the latest USEPA approved motor vehicle emissions model, MOBILE 6.2. Methodology. Emission estimates were determined using the MOBILE6.2 Emission Factors Tables dated April 2008.

11.1. Dutchess County PDCTC began its analysis on June 9, 2010. As described previously the model output VMT is adjusted to reflect the ozone season using factors. That adjusted VMT, average speed and functional classification are used in a lookup table of Emission Factors described above to produce emissions on a link by link basis and by direction. The individual link emissions were then grouped by Functional Classification for summary purposes.

11.2. Orange County The OCTC portion of the regional emissions analyses was initiated on June 1, 2010. The emissions analysis was based on speed dependent emissions rates calculated by the NYSDEC using MOBILE 6.2. Each link in the OC Travel Demand Model network was analyzed for the morning peak hour, midday peak hour, evening peak hour and night off-peak hour. Hourly vehicle miles traveled (VMT) and vehicular emissions were then factored using percentages for each time period from the NYS SIP and adjusted to account for seasonal fluxes in traffic to establish total daily VMT and vehicular emissions for the summer ozone season (June-August).

11.3. Putnam County NYMTC began its regional emissions analysis on January 31, 2011. To produce the emissions analysis for Putnam County, MOBILE 6.2 was used to generate vehicle emissions factors which were applied to the Putnam County portion of the NYMTC Best Practices Model (BPM) network generated vehicle miles of travel. A post processor, PPSUITE, was employed to link the BPM to the MOBILE 6.2 model. In June 2005, the ICG concurred that the MOBILE 6.2 input parameters used in PPSUITE are appropriate for use in conformity determinations for the NYMTC planning area. Revised MOBILE6.2 input files provided to NYMTC by NYSDOT ESB in May 07, 2009 were used for the regional emissions analysis for the 2011-2015 TIP and 2035 MTP.

Emissions tests for the Poughkeepsie 8-hour ozone non-attainment area. The boundary of the Poughkeepsie moderate eight hour ozone non-attainment area encompasses all of

Dutchess, Orange, and Putnam Counties. Effective August 17, 2010, the EPA found the motor vehicle emissions estimates for volatile organic compounds (VOC) and nitrogen oxides (NO_x) in the submitted State Implementation Plan for the Poughkeepsie, NY 8-hour ozone nonattainment area to be adequate for transportation conformity purposes. As a result of this adequacy finding, OCTC, PDCTC, and NYMTC (Putnam County only) must compare emissions in the future conformity analysis years to the emission level of VOC and NO_x in the submitted 2009 8-hour ozone “budgets” for VOC and NO_x.

Table 6 summarizes the emission test results for PONA, providing a comparison of the motor vehicle emissions budget emissions for VOC and NO_x under “Build” and “No-Build” scenarios; these results are presented for informational purposes. Table 7 shows the combined results for PONA. The tables show that “Build” scenario emissions of VOC and NO_x generated by on-road motor vehicles in the Moderate 8-hour Ozone Non-attainment Area will be lower than the emissions budgets for VOC and NO_x. We therefore determine that the TIPs and MTPs in PONA meet the applicable emissions reduction standards and conform to the applicable State Implementation Plan for the 8-hour ozone standard.

Table 6. Emissions Detail Summary by MPO (County) and Analysis Year

Volatile Organic Compounds (VOC)

MPO	Future Analysis Years									
	2014		2020		2030		2035		2040	
	Build	No-Build	Build	No-Build	Build	No-Build	Build	No-Build	Build	No-Build
PDCTC (Dutchess County)	1.94	1.96	1.60	1.62	1.31	1.32	1.44	1.46	1.44	1.46
OCTC (Orange County)	5.14	5.31	3.91	4.06	3.37	3.49	3.72	3.86	4.13	4.17
NYMTC (Putnam County)	3.01	3.09	2.34	2.41	2.16	2.25	2.27	2.34	2.41	2.49
TOTALS	10.09	10.36	7.85	8.09	6.84	7.06	7.43	7.66	7.98	8.12
<i>Budget Test Result</i>	<i>Pass</i>		<i>Pass</i>		<i>Pass</i>		<i>Pass</i>		<i>Pass</i>	

Oxides of Nitrogen (Nox)

MPO	Future Analysis Years									
	2014		2020		2030		2035		2040	
	Build	No-Build	Build	No-Build	Build	No-Build	Build	No-Build	Build	No-Build
PDCTC (Dutchess County)	2.74	2.75	1.77	1.78	1.12	1.13	1.16	1.17	1.15	1.16
OCTC (Orange County)	8.37	8.64	4.99	5.18	3.06	3.16	3.01	3.10	3.29	3.31
NYMTC (Putnam County)	5.11	5.24	2.90	2.99	1.74	1.79	1.64	1.69	1.75	1.80
TOTALS	16.22	16.63	9.66	9.95	5.92	6.08	5.81	5.96	6.19	6.27
<i>Budget Test Result</i>	<i>Pass</i>		<i>Pass</i>		<i>Pass</i>		<i>Pass</i>		<i>Pass</i>	

Table 7. Emission Budget Test for PONA 8-hour ozone non-attainment area (tons/day)

PONA						
Ozone Precursor	Year 2009 Emissions Budget	Future Analysis Years				
		2014	2020	2030	2035	2040
		Build	Build	Build	Build	Build
VOC	17.63	10.09	7.85	6.84	7.43	7.98
NOx	29.77	16.22	9.66	5.92	5.81	6.19
<i>Budget Test Result</i>		<i>Pass</i>	<i>Pass</i>	<i>Pass</i>	<i>Pass</i>	<i>Pass</i>

The satisfactory regional emissions analysis results for the required budget tests presented above quantitatively demonstrate that implementation of the NYMTC, OCTC, and PDCTC 2011-2015 TIPs and MTPs will not: cause or contribute to any new violation of the ozone standard; increase the frequency or severity of any existing violation of the ozone standard; or delay timely attainment of any standard or any required interim emissions reductions or other milestones in any area. Appendix C contains further detailed Regional Emissions Analysis results.

Conclusions In conclusion, conformity of the current NYMTC, OCTC, and PDCTC TIPs and MTPs has been demonstrated for the Poughkeepsie Moderate 8-hour Ozone Non-attainment Area. The quantitative analysis of forecasted regional emissions demonstrates that the 2011-2015 TIP and Metropolitan Transportation Plan for each MPO will result in net emission reductions in all actions years, and that future year emissions in the action years will remain below the budgeted emissions level prescribed by the SIP. Given that there are no applicable Transportation Control Measures, this satisfies the conformity review requirement. The NYMTC, OCTC, and PDCTC therefore determine that the 2011-2015 TIPs and MTPs are in conformance with the existing State Implementation Plan for air quality (SIP), and meet the requirements of the Clean Air Act Amendments of 1990 and the EPA's Transportation conformity rules.

12. EVIDENCE OF MPO RESOLUTIONS The NYMTC, OCTC, and PDCTC Executive Committees approved this Air Quality Conformity Determination Statement in fall 2011. Copies of the resolutions are included at the end of Appendix D.

Table 8. Specific MPO conformity actions to be included for finalization of this conformity analysis

MPO Product	MPO Approval Date	FHWA/FTA Approval Date
NYMTC MTP	September 17, 2009	October 1, 2009
NYMTC MTP conformity update	November 17, 2011	December 19, 2011*
NYMTC 2011-2015 TIP	August 4, 2011	December 19, 2011*
OCTC MTP	December 8, 2011	December 19, 2011*
OCTC 2011-2015 TIP, as amended	December 8, 2011	December 19, 2011*
PDCTC MTP	November 18, 2011	December 19, 2011*
PDCTC 2011-2015, as amended	November 18, 2011	December 19, 2011*

* Expected approval date.

Conformity Determination Statement:

The results of the regional emissions analysis demonstrate that the MTPs and 2011-2015 TIPs of the New York Metropolitan Transportation Council, Orange County Transportation Council, and the Poughkeepsie-Dutchess County Transportation Council achieve and maintain National Ambient Air Quality Standards (NAAQS), as required by the Clean Air Act Amendments of 1990 and the New York State Implementation Plan (SIP) for air quality.

Appendix A

2005 Base Year Mileage by Functional Classification

NYMTC Best Practice Model (Putnam County)

Functional Class	Area	Centerline Miles	Lane Miles
11 Interstate	Urban	32	108
12 Principal Arterial Expressway	Urban	27	55
14 Principal Arterial Streets	Urban	32	72
16 Minor Arterial	Urban	70	150
17 Collector	Urban	110	219
1 Rural Interstate	Rural	1	3
2 Rural Principal Arterial	Rural	10	20
6 Rural Minor Arterial	Rural	21	42
7 Rural Major Collector	Rural	17	33
8 Rural Minor Collector	Rural	22	43
20 Ramp	All	8	13
998 Premium Transit Station "Zone" Connector	All	2	3
999 Centroid Connector	All	76	153
Total		427	916

OCTC Travel Demand Model (Orange County)

Functional Class	Area	Centerline Miles
11 Interstate	Urban	104
12 Principal Arterial (Expressway)	Urban	20
14 Principal Arterial (Street)	Urban	143
16 Minor Arterial	Urban	122
17 Collector	Urban	190
19 Local	Urban	39
1 Interstate	Rural	160
2 Principal Arterial	Rural	16
6 Minor Arterial	Rural	135
7 Major Collector	Rural	149
8 Minor Collector	Rural	172
9 Local	Rural	353
Total		1,603

PDCTC Travel Demand Model (Dutchess County)

Functional Class	Area	Centerline Miles	Lane Miles
11 Interstate	Urban	38	79
12 Principal Arterial (Expressway)	Urban	28	56
14 Principal Arterial (Street)	Urban	89	228
16 Minor Arterial	Urban	72	149
17 Collector	Urban	163	331
19 Local	Urban	334	651
1 Interstate	Rural	0	0
2 Principal Arterial	Rural	135	280
6 Minor Arterial	Rural	23	46
7 Major Collector	Rural	81	163
8 Minor Collector	Rural	106	212
9 Local	Rural	214	425
TOTAL		1,285	2,621

Appendix B

NYMTC Best Practice Model - Link Capacities (hourly by lane)

Physical Link Type	Area Type										
	1	2	3	4	5	6	7	8	9	10	11
1	350	400	450	450	500	500	550	600	650	700	700
2	1,850	1,900	2,000	2,050	2,200	2,250	2,200	2,300	2,350	2,350	2,400
3	1,850	1,900	2,000	2,050	2,200	2,250	2,200	2,300	2,350	2,350	2,400
4	2,250	2,300	2,300	2,350	2,300	2,350	2,250	2,350	2,400	2,400	2,450
5	2,200	2,250	2,250	2,300	2,250	2,300	2,200	2,300	2,350	2,350	2,400
6	2,200	2,250	2,250	2,300	2,250	2,300	2,200	2,300	2,350	2,350	2,400
7	2,000	2,050	2,100	2,150	2,150	2,200	2,100	2,200	2,250	2,300	2,350
8	1,800	1,850	1,850	1,900	2,000	2,050	2,000	2,100	2,150	2,250	2,300
9	1,800	1,850	1,850	1,900	2,000	2,050	2,000	2,100	2,150	2,250	2,300
10	1,700	1,750	1,800	1,850	1,950	2,000	1,950	2,050	2,100	2,200	2,250
11	1,650	1,700	1,800	1,850	1,900	1,950	2,000	2,100	2,200	2,300	2,350
12	1,300	1,350	1,500	1,550	1,750	1,800	2,000	2,100	2,200	2,100	2,150
13	1,100	1,150	1,300	1,350	1,500	1,550	1,750	1,850	1,950	1,900	1,950
14	1,000	1,050	1,200	1,250	1,400	1,450	1,600	1,700	1,800	1,850	1,900
15	900	950	1,100	1,150	1,350	1,400	1,500	1,600	1,700	1,750	1,800
16	800	850	1,000	1,050	1,250	1,300	1,450	1,550	1,650	1,700	1,750
17	1,200	1,200	1,200	1,200	1,200	1,200	1,300	1,300	1,300	1,500	1,500
18	700	700	750	750	800	800	900	900	900	1,050	1,050
19	400	400	450	450	500	500	600	600	600	750	750
20	400	500	550	550	600	600	700	700	700	850	850
21	100	100	100	100	100	100	100	100	100	100	100

OCTC Travel Demand Model - Link Capacities

Link Type	Link Capacities
Interstate	2,100
Arterial	1,400
Collector	1,100
Local	850

PDCTC Travel Demand Model-Link Capacities

Functional Class	Rural	Commercial	Village	Area		
				Suburban	City of Poughkeepsie	City of Beacon
11 Interstate	na	1,900	1,900	1,900	1,900	1,900
12 Principal Arterial (Expressway)	na	1,400	1,400	1,400	1,400	1,400
14 Principal Arterial (Street)	na	1,400	1,400	1,400	1,400	1,400
16 Minor Arterial	na	1,100	1,200	1,200	1,000	1,000
17 Collector	na	1,000	1,100	1,100	800	800
19 Local	na	900	900	900	800	800
01 Interstate	1,900	1,900	1,900	1,900	na	na
02 Principal Arterial	1,400	1,400	1,400	1,400	na	na
06 Minor Arterial	1,200	1,100	1,200	1,200	na	na
07 Major Collector	1,100	1,000	1,100	1,100	na	na
08 Minor Collector	1,100	1,000	1,100	1,100	na	na
09 Local	900	900	900	900	na	na
20 On-Ramp	1,100	1,000	1,100	1,100	na	na
25 Ramp	1,100	1,000	1,100	1,100	na	na
30 Off-Ramp	1,100	1,000	1,100	1,100	na	na
40 Centroid Connector	800	800	800	800	na	na

Appendix C

NYMTC Emission Tables

Putnam County Summer Emission Report for the Build Scenario (F)

2002 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	2,165,108	37,082	58.4	2.39	8.49
2) Arterials	1,462,573	61,700	23.7	2.04	2.86
3) Locals	1,777,160	46,853	37.9	2.33	2.59
Total	5,404,841	145,635	37.1	6.75	13.94

2012 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	1,796,944	28,033	64.1	0.76	3.33
2) Arterials	2,371,822	206,245	11.5	1.48	1.94
3) Locals	2,586,122	71,837	36.0	1.18	1.13
Total	6,754,888	306,116	34.9	3.42	6.40

2014 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	1,841,095	28,767	64.0	0.69	2.66
2) Arterials	2,391,394	207,947	11.5	1.29	1.54
3) Locals	2,620,629	73,202	35.8	1.04	0.91
Total	6,853,118	309,916	34.9	3.01	5.11

2020 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	1,991,448	31,312	63.6	0.53	1.49
2) Arterials	2,500,297	238,124	10.5	1.02	0.85
3) Locals	2,864,514	81,610	35.1	0.79	0.56
Total	7,356,259	351,046	34.0	2.34	2.90

2030 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	2,256,022	35,981	62.7	0.47	0.70
2) Arterials	2,771,674	282,824	9.8	0.98	0.58
3) Locals	3,161,509	93,813	33.7	0.72	0.47
Total	8,189,205	412,618	30.1	2.16	1.74

2035 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	2,385,542	38,230	62.4	0.49	0.61
2) Arterials	2,886,146	307,037	9.4	1.04	0.56
3) Locals	3,284,664	98,343	33.4	0.75	0.47
Total	8,556,352	443,610	28.1	2.27	1.64

2040 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	2,516,106	40,714	61.8	0.51	0.66
2) Arterials	3,021,442	328,418	9.2	1.11	0.60
3) Locals	3,430,496	104,588	32.8	0.79	0.49
Total	8,968,044	473,720	28.1	2.41	1.75

Putnam County Summer Emission Report for the No-Build Scenario (NB)

2012 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	1,846,392	28,760	64.2	0.78	3.43
2) Arterials	2,422,851	210,683	11.5	1.53	1.99
3) Locals	2,658,690	74,058	35.9	1.21	1.16
Total	6,927,933	313,501	34.9	3.52	6.58

2014 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	1,883,993	29,437	64.0	0.70	2.72
2) Arterials	2,465,921	214,428	11.5	1.33	1.59
3) Locals	2,692,724	75,006	35.9	1.06	0.93
Total	7,042,638	318,872	34.9	3.09	5.24

2020 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	2,026,425	31,912	63.5	0.54	1.49
2) Arterials	2,631,888	248,291	10.6	1.08	0.93
3) Locals	2,866,616	81,207	35.3	0.80	0.56
Total	7,524,929	361,411	33.1	2.41	2.99

2030 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	2,297,753	36,588	62.8	0.48	0.71
2) Arterials	2,902,571	299,234	9.7	1.05	0.62
3) Locals	3,173,224	92,245	34.4	0.72	0.47
Total	8,373,548	428,067	28.8	2.25	1.79

2035 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	2,435,464	39,093	62.3	0.50	0.62
2) Arterials	3,024,856	321,793	9.4	1.10	0.60
3) Locals	3,313,779	97,752	33.9	0.75	0.47
Total	8,774,099	458,637	25.5	2.34	1.69

2040 Summer Emissions Report

FACILITY	DAILY VMT	VHT	SPEED	VOC	NOx
1) Freeways	2,581,709	41,979	61.5	0.53	0.67
2) Arterials	3,166,260	351,807	9.0	1.18	0.64
3) Locals	3,462,681	103,984	33.3	0.78	0.49
Total	9,210,650	497,770	25.5	2.49	1.80

OCTC Emission Tables

ORANGE COUNTY COMMUTER MODEL RESULTS

SCENARIO INFORMATION

Description	Commuter Choice Poughkeepsie
Scenario Filename	Orange CC June 2010 FINAL.vme
Emission Factor File	
Performing Agency	NYSDOT
Analyst	Patrick Lentlie
Metropolitan Area	
Area Size	3 - Small (under 750,000)
Analysis Scope	1 - Area-Wide (e.g., MSA, county)
Analysis Area/Site	Poughkeepsie
Total Employment	1,558

PROGRAMS EVALUATED

<input type="checkbox"/>	Site Walk Access Improvements
<input type="checkbox"/>	Transit Service Improvements
<input checked="" type="checkbox"/>	Financial Incentives
<input type="checkbox"/>	Employer Support Programs
<input type="checkbox"/>	Alternative Work Schedules
<input type="checkbox"/>	User-Supplied Final Mode Shares

MODE SHARE IMPACTS

Mode	Baseline	Final	%Change
Drive Alone	78.2%	69.7%	-8.6%
Carpool	12.1%	10.8%	-1.3%
Vanpool	0.5%	2.4%	+2.0%
Transit	4.9%	13.3%	+8.4%
Bicycle	0.4%	0.4%	-0.0%
Pedestrian	3.0%	2.7%	-0.3%
Other	0.8%	0.7%	-0.1%
No Trip	-	0.0%	+0.0%
Total	100.0%	100.0%	-

Shifted from Peak to Off-Peak	0.0%
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TRAVEL IMPACTS (relative to affected employment)

Quantity	Peak	Off-Peak	Total
Baseline VMT	31,429	19,758	51,187
Final VMT	28,089	17,658	45,747
VMT Reduction	3,340	2,100	5,440
% VMT Reduction	10.6%	10.6%	10.6%
Baseline Trips	1,601	1,007	2,608
Final Trips	1,431	899	2,330
Trip Reduction	171	107	278
% Trip Reduction	10.6%	10.6%	10.6%

Orange Scenario Inputs:

Commuter saves \$3.10 per day for mode change to vanpool or transit

\$3.10 corresponds to slightly less than a \$65/month benefit of federally allowable pretax benefit of \$230 per month (0.28 tax rate * \$230 allowable = \$65 monthly
100% participation = 1,558 employee participants, based on OCTC population-based corrected MHSTCC SOV diversion rate in Commuter Choice Business Pla
19 mile SOV and Vanpool trip length

All other inputs were default

This is the 2007 diversion rate, due to limits in analysis years in COMMUTER model

Local emission factors will be applied to the trip reduction calculated by the COMMUTER Model

OCTC Enhanced Commuter Choice Emission Credits by Functional Classification & Area Type, October, 2011

Functional Classification	1	2	6	7	8	9	11	12	14	16	17	19	Total	OC Total
Analysis Year 2014														
DVMT	557	95	226	210	159	84	907	534	270	1106	915	377	5,440	
Speed	59.2	49.2	47.1	49.3	48.1	33.7	60.5	56.3	35.4	42.1	39.3	31.1		
VOC tons/day	0.00017918	3.0768E-05	7.4546E-05	6.8427E-05	5.2007E-05	2.9778E-05	0.00029188	0.00017201	9.4886E-05	0.00037445	0.00031465	0.00013586	0.00181844	
NOX tons/day	0.00016691	2.7326E-05	6.4075E-05	6.0772E-05	4.5353E-05	2.2657E-05	0.00027289	0.00015669	7.2577E-05	0.00030736	0.00025112	0.00010346	0.00155118	
Analysis Year 2020														
DVMT	556	94	233	214	165	86	895	544	270	1,092	917	374	5,440	
Speed	57.4	46	44.7	49	47.8	33.7	60.2	57.5	30.6	41.4	38.5	31.1		
VOC tons/day	0.00011898	2.1262E-05	5.3141E-05	4.7327E-05	3.6848E-05	2.0659E-05	0.00018649	0.00011634	6.6949E-05	0.00024918	0.00021233	9.2236E-05	0.00122175	
NOX tons/day	9.6904E-05	1.5765E-05	3.8764E-05	3.6025E-05	2.7727E-05	1.3679E-05	0.00016083	9.4755E-05	4.4335E-05	0.00017575	0.00014459	6.0942E-05	0.00091007	
Analysis Year 2030														
DVMT	559	95	247	222	182	91	963	514	258	1,033	917	359	5,440	
Speed	54	43.6	38.4	48.1	47.2	32.9	59.2	54.7	21	39.5	36.2	27.8		
VOC tons/day	9.0635E-05	1.6419E-05	4.4387E-05	3.8003E-05	3.1032E-05	1.686E-05	0.00015386	8.2114E-05	5.6296E-05	0.00018447	0.00016575	6.4977E-05	0.00094481	
NOX tons/day	7.7071E-05	1.2549E-05	3.1043E-05	3.0157E-05	2.4625E-05	1.134E-05	0.00013264	7.0788E-05	3.2129E-05	0.00012982	0.00011421	4.4771E-05	0.00071114	
Analysis Year 2035														
DVMT	533	94	253	226	191	96	965	510	260	1,002	940	370	5,440	
Speed	49.7	38.8	32.3	46.9	46	32.2	58.4	53	14	35.2	27.8	22.3		
VOC tons/day	0.0000899	0.0000169	0.0000471	0.0000384	0.0000325	0.0000179	0.000154	0.0000832	0.0000703	0.000181	0.000183	0.0000786	0.0009928	
NOX tons/day	0.0000717	0.0000117	0.0000315	0.0000292	0.0000245	0.000012	0.000132	0.0000692	0.0000347	0.000125	0.000117	0.000046	0.0007045	
Analysis Year 2040														
DVMT	558	97	258	231	199	97	984	489	260	995	919	353	5,440	
Speed	46.2	35.9	25.1	45.3	44.6	31.4	56.8	52.4	9.4	34.3	23.1	28.9		
VOC tons/day	0.0000947	0.0000176	0.0000518	0.0000392	0.000034	0.0000181	0.000157	0.0000803	0.0000924	0.000182	0.000192	0.0000678	0.0010269	
NOX tons/day	0.0000713	0.0000121	0.0000322	0.0000293	0.000025	0.000012	0.000133	0.0000663	0.0000474	0.000124	0.000114	0.000044	0.0007106	

OCTC LRTP Update, 2011 Analysis Summary: Analysis Year 2014 Build Scenario, October 3, 2011

Assignment Postprocessor Run	8-Hour Budget, 2009	Model 2014 Build
	DVMT	14,927,090 14,317,658
Emission rates from sheet	VOC	8,879,620 4,660,124 grams
Disaggregated link results into sheet	Nox	14,569,770 7,595,529 grams
VISUM network and assignment in file		
	VOC	9.8 5.14 tons
1 short ton= 907184.74 grams	Nox	16.1 8.37 tons

VMT	NYS DOT_Class														
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area		
	1,465,109	249,027	595,284	553,824	418,092	220,806	2,386,679	1,406,485	710,200	2,912,197	2,407,929	992,025	14,317,658		

VHT_op	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	24,730	5,063	12,629	11,236	8,697	6,548	39,466	24,985	20,083	69,188	61,212	31,895	315,733	

VOC	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	499,946	78,700	190,049	171,420	130,127	74,523	763,737	451,704	238,272	940,825	779,845	340,978	4,660,124	

NOx	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	1,520,627	113,431	264,414	214,157	161,364	81,285	1,638,936	922,404	283,741	1,164,203	878,629	352,340	7,595,529	

Ave. Speed	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Ave. Speed	
	59.24	49.19	47.14	49.29	48.07	33.72	60.47	56.29	35.36	42.09	39.34	31.10	45.35	

LOCMA=Lower Orange County Metropolitan Area VMT = Vehicle Miles Traveled VOC=Volatile Organic Compounds
 UOC=Upper Orange County VHT=Vehicle Hours Traveled Nox=Nitrogen Oxides

OCTC LRTP Update, 2011 Analysis Summary: Analysis Year 2014 No-Build Scenario, October 3, 2011

Assignment Postprocessor Run	8-Hour Budget, 2009	Model 2014 No-Build
Emission rates from sheet	DVMT 14,927,090	14,785,536
Disaggregated link results into sheet	VOC 8,879,620	4,818,220 grams
VISUM network and assignment in file	Nox 14,569,770	7,838,771 grams
1 short ton= 907184.74 grams	VOC 9.8	5.31 tons
	Nox 16.1	8.64 tons

VMT	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	1,511,363	258,399	613,366	571,570	431,044	228,420	2,471,486	1,452,715	731,325	3,009,486	2,495,546	1,010,815	14,785,536	

VHT_op	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	25,630	5,479	13,080	11,605	8,967	6,773	40,910	25,881	21,062	71,902	63,789	32,560	327,638	

VOC	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	516,490	82,656	195,805	176,929	134,230	77,084	790,876	466,657	246,748	973,222	810,069	347,455	4,818,220	

NOx	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	1,563,864	118,172	272,402	220,968	166,330	84,083	1,695,383	951,993	292,711	1,202,879	910,995	358,991	7,838,771	

Ave. Speed	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Ave. Speed	
	58.97	47.16	46.89	49.25	48.07	33.73	60.41	56.13	34.72	41.86	39.12	31.04	45.13	

LOCMA=Lower Orange County Metropolitan Area; **VMT** = Vehicle Miles Traveled; **VOC**=Volatile Organic Compounds
UOC=Upper Orange County; **VHT**=Vehicle Hours Traveled; **Nox**=Nitrogen Oxides

OCTC LRTP Update, 2011 Analysis Summary: Analysis Year 2020 Build Scenario, October 3, 2011

Assignment Postprocessor Run	8-Hour Budget, 2018	Model 2020 Build
	DVMT	17,196,730 15,581,980
Emission rates from sheet	VOC	5,327,680 3,543,536 grams
Disaggregated link results into sheet	Nox	6,476,960 4,525,908 grams
VISUM network and assignment in file		
	VOC	5.9 3.91 tons
1 short ton= 907184.74 grams	Nox	7.1 4.99 tons

VMT	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	1,593,687	269,507	667,077	611,828	474,003	245,127	2,563,951	1,558,351	773,176	3,127,952	2,627,348	1,069,974	15,581,980	

VHT_op	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	27,780	5,860	14,924	12,489	9,920	7,282	42,604	27,092	25,235	75,584	68,322	34,404	351,496

VOC	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	385,904	59,847	151,463	131,283	102,174	58,474	564,069	343,663	190,958	696,071	599,360	260,269	3,543,536

NOx	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	861,793	67,979	164,916	133,550	103,402	51,328	950,160	558,391	177,641	700,175	542,125	214,446	4,525,908

Ave. Speed	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Ave. Speed
	57.37	45.99	44.70	48.99	47.78	33.66	60.18	57.52	30.64	41.38	38.46	31.10	44.33

LOCMA=Lower Orange County Metropolitan Area VMT = Vehicle Miles Traveled VOC=Volatile Organic Compounds
 UOC=Upper Orange County VHT=Vehicle Hours Traveled Nox=Nitrogen Oxides

OCTC LRTP Update, 2011 Analysis Summary: Analysis Year 2020 No-Build Scenario, October 3, 2011

Assignment Postprocessor Run	8-Hour Budget, 2018	Model 2020 No-Build
	DVMT	17,196,730 16,131,904
Emission rates from sheet	VOC	5,327,680 3,684,883 grams
Disaggregated link results into sheet	Nox	6,476,960 4,698,715 grams
VISUM network and assignment in file		
	VOC	5.9 4.06 tons
1 short ton= 907184.74 grams	Nox	7.1 5.18 tons

VMT	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	1,646,403	288,532	700,935	636,937	484,958	261,128	2,856,592	1,566,833	798,241	3,161,485	2,703,019	1,026,842	16,131,904	

VHT_op	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	28,363	6,506	15,782	13,109	10,146	7,829	47,930	28,247	26,879	78,159	72,992	33,622	369,562

VOC	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	396,860	64,999	159,294	136,897	104,542	62,496	628,676	347,189	197,492	708,420	626,606	251,413	3,684,883

NOx	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	899,667	72,887	172,511	139,001	105,843	54,689	1,047,112	549,069	183,596	708,932	558,815	206,593	4,698,715

Ave. Speed	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Ave. Speed
	58.05	44.35	44.41	48.59	47.80	33.35	59.60	55.47	29.70	40.45	37.03	30.54	43.65

LOCMA=Lower Orange County Metropolitan Area
UOC=Upper Orange County

VMT = Vehicle Miles Traveled
VHT=Vehicle Hours Traveled

VOC=Volatile Organic Compounds
Nox=Nitrogen Oxides

OCTC LRTP Update, 2011 Analysis Summary: Analysis Year 2030 Build Scenario, October 3, 2011

Assignment Postprocessor Run	8-Hour Budget, 2018	Model 2030 Build
	DVMT	17,196,730 17,201,155
Emission rates from sheet	VOC	5,327,680 3,061,204 grams
Disaggregated link results into sheet	Nox	6,476,960 2,778,987 grams
VISUM network and assignment in file		
	VOC	5.9 3.37 tons
1 short ton= 907184.74 grams	Nox	7.1 3.06 tons

VMT	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	1,768,624	299,978	781,123	703,306	574,289	287,876	3,043,831	1,624,443	815,586	3,266,440	2,899,163	1,136,497	17,201,155	

VHT_op	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	32,759	6,880	20,338	14,634	12,155	8,748	51,403	29,675	38,850	82,644	80,018	40,859	418,963

VOC	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	308,973	51,495	139,404	116,160	95,204	53,727	489,051	265,205	217,252	572,839	526,651	225,242	3,061,204

NOx	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	393,221	46,108	116,777	99,838	81,554	40,091	552,651	284,463	128,659	474,449	406,163	155,014	2,778,987

Ave. Speed	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Ave. Speed
	53.99	43.60	38.41	48.06	47.25	32.91	59.22	54.74	20.99	39.52	36.23	27.82	41.06

LOCMA=Lower Orange County Metropolitan Area VMT = Vehicle Miles Traveled VOC=Volatile Organic Compounds
 UOC=Upper Orange County VHT=Vehicle Hours Traveled Nox=Nitrogen Oxides

OCTC LRTP Update, 2011 Analysis Summary: Analysis Year 2030 No-Build Scenario, October 3, 2011

Assignment Postprocessor Run	8-Hour Budget, 2018	Model 2030 No-Build
Emission rates from sheet	DVMT 17,196,730	17,729,132
Disaggregated link results into sheet	VOC 5,327,680	3,164,167 grams
VISUM network and assignment in file	Nox 6,476,960	2,868,962 grams
	VOC	5.9 3.49 tons
1 short ton= 907184.74 grams	Nox	7.1 3.16 tons

VMT	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	1,826,475	310,336	803,661	717,999	591,974	297,991	3,159,816	1,681,142	845,527	3,387,016	2,993,235	1,113,962	17,729,132	

VHT_op	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	34,390	7,128	22,332	14,930	12,537	9,003	53,729	30,749	48,013	92,057	83,394	36,436	444,698

VOC	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	319,020	53,241	144,086	118,529	98,145	55,488	508,386	275,050	232,005	601,196	545,160	213,861	3,164,167

NOx	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	406,463	47,684	120,415	101,917	84,142	41,463	573,398	294,058	135,107	493,811	419,425	151,081	2,868,962

Ave. Speed	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Ave. Speed
	53.11	43.54	35.99	48.09	47.22	33.10	58.81	54.67	17.61	36.79	35.89	30.57	39.87

LOCMA=Lower Orange County Metropolitan Area
UOC=Upper Orange County

VMT = Vehicle Miles Traveled
VHT=Vehicle Hours Traveled

VOC=Volatile Organic Compounds
Nox=Nitrogen Oxides

OCTC LRTP Update, 2011 Analysis Summary: Analysis Year 2035 Build Scenario, October 3, 2011

Assignment Postprocessor Run	8-Hour Budget, 2018	Model 2035 Build
	DVMT	17,196,730 18,446,059
Emission rates from sheet	VOC	5,327,680 3,376,606 grams
Disaggregated link results into sheet	Nox	6,476,960 2,726,679 grams
VISUM network and assignment in file		
	VOC	5.9 3.72 tons
1 short ton= 907184.74 grams	Nox	7.1 3.01 tons

VMT	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	1,807,772	319,643	856,504	767,980	649,217	325,908	3,272,651	1,729,729	883,143	3,398,637	3,182,622	1,252,253	18,446,059	

VHT_op	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	36,390	8,245	26,529	16,375	14,126	10,133	56,029	32,656	63,156	96,510	114,608	56,257	531,015

VOC	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	319,253	56,674	154,275	127,771	108,287	61,396	527,453	284,840	281,108	610,663	593,557	251,330	3,376,606

NOx	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	342,341	46,697	120,036	104,823	88,556	43,816	520,782	267,734	134,890	466,891	424,909	165,202	2,726,679

Ave. Speed	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Ave. Speed
	49.68	38.77	32.29	46.90	45.96	32.16	58.41	52.97	13.98	35.22	27.77	22.26	34.74

LOCMA=Lower Orange County Metropolitan Area VMT = Vehicle Miles Traveled VOC=Volatile Organic Compounds
 UOC=Upper Orange County VHT=Vehicle Hours Traveled Nox=Nitrogen Oxides

OCTC LRTP Update, 2011 Analysis Summary: Analysis Year 2035 No-Build Scenario, October 3, 2011

Assignment Postprocessor Run	8-Hour Budget, 2018	Model 2035 No-Build
Emission rates from sheet	DVMT 17,196,730	18,961,165
Disaggregated link results into sheet	VOC 5,327,680	3,501,745 grams
VISUM network and assignment in file	Nox 6,476,960	2,809,677 grams
1 short ton= 907184.74 grams	VOC 5.9	3.86 tons
	Nox 7.1	3.10 tons

VMT	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	1,873,843	327,211	880,270	779,462	665,095	330,423	3,356,408	1,773,023	908,464	3,583,879	3,262,816	1,220,269	18,961,165	

VHT_op	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	38,221	8,185	29,724	16,518	14,456	9,999	57,267	33,122	77,106	113,163	103,505	42,476	543,743	

VOC	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	337,547	57,122	159,686	129,291	110,908	61,705	540,024	291,044	296,883	666,480	612,423	238,631	3,501,745	

NOx	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	355,263	47,239	123,640	106,277	90,801	44,203	534,769	274,734	140,858	495,598	435,997	160,299	2,809,677	

Ave. Speed	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Ave. Speed	
	49.03	39.98	29.61	47.19	46.01	33.05	58.61	53.53	11.78	31.67	31.52	28.73	34.87	

LOCMA=Lower Orange County Metropolitan Area
UOC=Upper Orange County

VMT = Vehicle Miles Traveled
VHT=Vehicle Hours Traveled

VOC=Volatile Organic Compounds
Nox=Nitrogen Oxides

OCTC LRTP Update, 2011 Analysis Summary: Analysis Year 2040 Build Scenario, October 3, 2011

Assignment Postprocessor Run	8-Hour Budget, 2018	Model 2040 Build
	DVMT	17,196,730 20,128,504
Emission rates from sheet	VOC	5,327,680 3,745,942 grams
Disaggregated link results into sheet	Nox	6,476,960 2,986,597 grams
VISUM network and assignment in file	VOC	5.9 4.13 tons
1 short ton= 907184.74 grams	Nox	7.1 3.29 tons

VMT	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	2,063,080	359,333	956,046	855,068	737,261	357,474	3,641,708	1,809,220	963,498	3,680,877	3,397,017	1,307,920	20,128,504	

VHT_op	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	44,666	10,000	38,161	18,864	16,528	11,378	64,099	34,498	102,975	107,287	147,166	45,269	640,890

VOC	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	370,925	65,675	178,220	143,439	123,945	67,884	590,014	298,459	325,375	680,116	646,286	255,603	3,745,942

NOx	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	386,469	52,535	134,243	116,736	100,816	48,251	576,609	280,466	151,647	511,570	455,684	171,572	2,986,597

Ave. Speed	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Ave. Speed
	46.19	35.93	25.05	45.33	44.61	31.42	56.81	52.44	9.36	34.31	23.08	28.89	31.41

LOCMA=Lower Orange County Metropolitan Area
UOC=Upper Orange County

VMT = Vehicle Miles Traveled
VHT=Vehicle Hours Traveled

VOC=Volatile Organic Compounds
Nox=Nitrogen Oxides

OCTC LRTP Update, 2011 Analysis Summary: Analysis Year 2040 No-Build Scenario, October 3, 2011

Assignment Postprocessor Run	8-Hour Budget, 2018	Model 2040 No-Build
	DVMT	17,196,730 20,199,130
Emission rates from sheet	VOC	5,327,680 3,783,944 grams
Disaggregated link results into sheet	Nox	6,476,960 3,002,650 grams
VISUM network and assignment in file	VOC	5.9 4.17 tons
1 short ton= 907184.74 grams	Nox	7.1 3.31 tons

VMT	NYS DOT_Class													
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area	
	2,100,700	355,149	966,991	842,538	735,299	361,802	3,688,878	1,815,528	969,687	3,740,958	3,363,483	1,258,118	20,199,130	

VHT_op	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	48,707	9,258	44,513	18,419	16,581	10,928	65,052	34,709	128,417	116,505	113,032	44,431	650,552

VOC	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	393,680	63,254	182,929	141,111	124,218	67,370	598,104	299,961	332,548	699,829	635,965	244,976	3,783,944

NOx	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Daily by Area
	394,720	51,629	136,625	114,979	100,824	48,298	583,623	281,241	153,437	521,946	450,158	165,172	3,002,650

Ave. Speed	NYS DOT_Class												
OZON_ATT	1	2	6	7	8	9	11	12	14	16	17	19	Total Ave. Speed
	43.13	38.36	21.72	45.74	44.35	33.11	56.71	52.31	7.55	32.11	29.76	28.32	31.05

LOCMA=Lower Orange County Metropolitan Area
UOC=Upper Orange County

VMT = Vehicle Miles Traveled
VHT=Vehicle Hours Traveled

VOC=Volatile Organic Compounds
Nox=Nitrogen Oxides

PDCTC Emission Tables

2014 PDCTC Scenarios

2014 No-Build Model (TransCAD results)

Functional Class	Centerline Mileage	Lane Miles	TOTAL DVMT	TOTAL ADJ DVMT*	% of Total VMT	Avg. Speed mi/hr	VOC g/day	NOx g/day	CO g/day
01 Interstate	0	0	0	0	0.0%	0.0	0	0	0
02 Principal Arterial	135	280	648,925	752,753	13.8%	40.9	235,999	337,838	9,194,645
06 Minor Arterial	23	46	72,616	84,234	1.5%	51.5	26,370	38,012	1,031,897
07 Major Collector	86	172	323,982	375,819	6.9%	49.4	113,922	150,581	4,636,163
08 Minor Collector	106	212	92,577	107,389	2.0%	44.3	33,387	39,906	1,273,038
09 Local	211	420	199,613	231,256	4.2%	31.3	80,197	84,654	2,616,338
11 Interstate	38	79	896,195	1,003,739	18.4%	29.1	322,024	679,512	12,442,549
12 Principal Arterial (Expressway)	28	56	232,442	260,336	4.8%	26.5	83,844	158,734	3,102,688
14 Principal Arterial (Street)	89	228	915,599	1,025,971	18.8%	37.8	328,764	404,371	12,143,135
16 Minor Arterial	70	144	432,613	484,901	8.9%	39.3	156,970	187,212	5,648,242
17 Collector	169	344	639,602	716,773	13.2%	40.1	226,930	254,800	8,451,602
19 Local	328	638	358,137	402,392	7.4%	18.2	171,190	163,161	4,879,006
TOTAL	1,283	2,619	4,812,301	5,445,563	100%		1,779,597	2,498,781	65,419,303
							1.962	2.754	72.111 tons/day

Scenario 1: 2014 Build Model (TransCAD results)

Functional Class	Centerline Mileage	Lane Miles	TOTAL DVMT	TOTAL ADJ DVMT*	% of Total VMT	Avg. Speed mi/hr	VOC g/day	NOx g/day	CO g/day
01 Interstate	0	0	0	0	0.0%	0.0	0	0	0
02 Principal Arterial	135	280	648,925	752,753	13.8%	40.9	235,999	337,838	9,194,645
06 Minor Arterial	23	46	72,616	84,234	1.5%	51.5	26,370	38,012	1,031,897
07 Major Collector	86	172	323,982	375,819	6.9%	49.4	113,922	150,581	4,636,163
08 Minor Collector	106	212	92,577	107,389	2.0%	44.3	33,387	39,906	1,273,038
09 Local	211	420	199,613	231,256	4.2%	31.3	80,197	84,654	2,616,338
11 Interstate	38	79	896,195	1,003,739	18.4%	29.1	322,024	679,512	12,442,549
12 Principal Arterial (Expressway)	28	56	232,442	260,336	4.8%	26.5	83,844	158,734	3,102,688
14 Principal Arterial (Street)	89	228	915,599	1,025,971	18.8%	37.8	328,764	404,371	12,143,135
16 Minor Arterial	70	144	432,613	484,901	8.9%	39.3	156,970	187,212	5,648,242
17 Collector	169	344	639,602	716,773	13.2%	40.1	226,930	254,800	8,451,602
19 Local	328	638	358,137	402,392	7.4%	18.2	171,190	163,161	4,879,006
TOTAL	1,283	2,619	4,812,301	5,445,563	100%		1,779,597	2,498,781	65,419,303
							1.962	2.754	72.111 tons/day

Scenario 2 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice

Total Emissions Benefits (tons/day)

0.0012

0.0010

0.0462

Revised Total Emissions (tons/day)

1.960

2.753

72.065

Scenario 3 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice & Wassaic Station Parking Expansion

Assumptions: ESB analysis June 2008.

Change in VOC -0.009 tons/day

Change in NOx -0.005 tons/day

Change in CO -0.404 tons/day

Methods: The emissions reductions are subtracted from the total daily emissions, changes are added to total emissions results for the scenario.

Scenario 2 Total VOC 1.960 tons/day
Change in VOC -0.009 tons/day
New Total VOC 1.951 tons/day

Scenario 2 Total NOx 2.753 tons/day
Change in NOx -0.005 tons/day
New Total NOx 2.748 tons/day

Scenario 2 Total CO 72.065 tons/day
Change in CO -0.404 tons/day
New Total CO 71.661 tons/day

Scenario 4 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice & Wassaic Station Parking Expansion & Beacon Station Parking Expansion

Assumptions: ESB analysis June 2008.

Change in VOC -0.010 tons/day

Change in NOx -0.006 tons/day

Change in CO -0.481 tons/day

Methods: The emissions reductions are subtracted from the total daily emissions, changes are added to total emissions results for the scenario.

Scenario 3 Total VOC 1.951 tons/day
Change in VOC -0.010 tons/day
New Total VOC 1.941 tons/day

Scenario 3 Total NOx 2.748 tons/day
Change in NOx -0.006 tons/day
New Total NOx 2.742 tons/day

Scenario 3 Total CO 71.661 tons/day
Change in CO -0.481 tons/day
New Total CO 71.180 tons/day

2020 PDCTC Scenarios

Scenario 1: 2020 Build Model (TransCAD results)

Functional Class	Centerline Mileage	Lane Miles	TOTAL DVMT	TOTAL ADJ DVMT*	% of Total VMT	Avg. Speed mi/hr	VOC g/day	NOx g/day	CO g/day
01 Interstate	0	0	0	0	0.0%	0.0	0	0	0
02 Principal Arterial	135	280	548,733	636,531	9.9%	40.9	136,639	159,349	7,039,856
06 Minor Arterial	23	46	70,669	81,976	1.3%	51.5	17,416	20,823	913,282
07 Major Collector	86	172	388,555	450,724	7.0%	49.3	95,693	101,338	5,054,159
08 Minor Collector	106	212	110,860	128,597	2.0%	44.3	28,305	27,106	1,387,575
09 Local	211	420	273,425	316,781	4.9%	31.3	77,748	64,525	3,259,533
11 Interstate	38	79	1,044,519	1,169,861	18.2%	28.7	258,310	428,940	13,223,371
12 Principal Arterial (Expressway)	28	56	186,474	208,850	3.2%	26.6	46,648	69,054	2,255,589
14 Principal Arterial (Street)	89	228	1,110,498	1,244,235	19.3%	37.6	273,558	273,161	13,384,821
16 Minor Arterial	70	144	584,753	655,365	10.2%	39.0	145,963	140,680	6,945,055
17 Collector	169	344	856,569	959,747	14.9%	40.0	213,535	191,861	10,285,825
19 Local	328	638	518,805	582,600	9.1%	18.2	177,817	135,688	6,431,017
TOTAL	1,283	2,619	5,693,860	6,435,267	100%		1,471,632	1,612,525	70,180,083
							1.622	1.777	77.359 tons/day

Scenario 2 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice

Total Emissions Benefits (tons/day)

0.0008

0.0006

0.0424

Revised Total Emissions (tons/day)

1.621

1.777

77.317

Scenario 3 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice & Wassaic Station Parking Expansion

Assumptions:

ESB analysis June 2008.

Change in VOC

-0.009 tons/day

Change in NOx

-0.005 tons/day

Change in CO

-0.404 tons/day

Methods:

The emissions reductions are subtracted from the total daily emissions.changes are added to total emissions results for the scenario.

Scenario 2 Total VOC

1.621 tons/day

Change in VOC

-0.009 tons/day

New Total VOC

1.612 tons/day

0.001

Scenario 2 Total NOx

1.777 tons/day

Change in NOx

-0.005 tons/day

New Total NOx

1.772 tons/day

Scenario 2 Total CO

77.317 tons/day

Change in CO

-0.404 tons/day

New Total CO

76.913 tons/day

Scenario 4 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice & Wassaic Station Parking Expansion & Beacon Station Parking Expansion

Assumptions:

ESB analysis June 2008.

Change in VOC

-0.010 tons/day

Change in NOx

-0.006 tons/day

Change in CO

-0.481 tons/day

Methods:

The emissions reductions are subtracted from the total daily emissions.changes are added to total emissions results for the scenario.

Scenario 3 Total VOC

1.612 tons/day

Change in VOC

-0.010 tons/day

New Total VOC

1.602 tons/day

Scenario 3 Total NOx

1.772 tons/day

Change in NOx

-0.006 tons/day

New Total NOx

1.766 tons/day

Scenario 3 Total CO

76.913 tons/day

Change in CO

-0.481 tons/day

New Total CO

76.432 tons/day

2030 PDCTC Scenarios

Scenario 1: 2030 Build Model (TransCAD results)

Functional Class	Centerline Mileage	Lane Miles	TOTAL DVMT	TOTAL ADJ DVMT*	% of Total VMT	Avg. Speed mi/hr	VOC g/day	NOx g/day	CO g/day
01 Interstate	0	0	0	0	0.0%	0.0	0	0	0
02 Principal Arterial	135	280	571,970	663,485	9.8%	40.9	108,824	97,672	7,178,515
06 Minor Arterial	23	46	74,776	86,740	1.3%	51.5	14,094	12,855	944,756
07 Major Collector	86	172	396,293	459,700	6.8%	49.3	74,609	67,556	5,032,995
08 Minor Collector	106	212	113,807	132,016	1.9%	44.3	22,455	18,542	1,391,557
09 Local	211	420	278,877	323,094	4.8%	31.3	62,933	45,854	3,249,777
11 Interstate	38	79	1,142,356	1,279,438	18.8%	28.2	205,744	227,641	14,052,532
12 Principal Arterial (Expressway)	28	56	201,098	225,230	3.3%	26.5	36,797	37,529	2,379,205
14 Principal Arterial (Street)	89	228	1,162,075	1,302,023	19.1%	37.6	221,138	184,513	13,698,059
16 Minor Arterial	70	144	620,723	695,685	10.2%	39.0	120,156	97,634	7,206,931
17 Collector	169	344	904,170	1,013,089	14.9%	40.0	174,826	137,103	10,617,050
19 Local	328	638	551,300	619,080	9.1%	18.2	157,263	100,533	6,684,466
TOTAL	1,283	2,619	6,017,445	6,799,580	100%		1,198,839	1,027,432	72,435,843
							1.321	1.133	79.846 tons/day

Scenario 2 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice

Total Emissions Benefits (tons/day)

0.0007

0.0004

0.0415

Revised Total Emissions (tons/day)

1.321

1.132

79.804

Scenario 3 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice & Wassaic Station Parking Expansion

Assumptions:

ESB analysis June 2008.

Change in VOC

-0.007 tons/day

Change in NOx

-0.004 tons/day

Change in CO

-0.400 tons/day

Methods:

The emissions reductions are subtracted from the total daily emissions.changes are added to total emissions results for the scenario.

Scenario 2 Total VOC

1.321 tons/day

Change in VOC

-0.007 tons/day

New Total VOC

1.314 tons/day

0.001

Scenario 2 Total NOx

1.132 tons/day

Change in NOx

-0.004 tons/day

New Total NOx

1.128 tons/day

Scenario 2 Total CO

79.804 tons/day

Change in CO

-0.400 tons/day

New Total CO

79.404 tons/day

Scenario 4 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice & Wassaic Station Parking Expansion & Beacon Station Parking Expansion

Assumptions:

ESB analysis June 2008.

Change in VOC

-0.008 tons/day

Change in NOx

-0.005 tons/day

Change in CO

-0.475 tons/day

Methods:

The emissions reductions are subtracted from the total daily emissions.changes are added to total emissions results for the scenario.

Scenario 3 Total VOC

1.314 tons/day

Change in VOC

-0.008 tons/day

New Total VOC

1.306 tons/day

Scenario 3 Total NOx

1.128 tons/day

Change in NOx

-0.005 tons/day

New Total NOx

1.123 tons/day

Scenario 3 Total CO

79.404 tons/day

Change in CO

-0.475 tons/day

New Total CO

78.929 tons/day

2035 PDCTC Scenarios

Scenario 1: 2035 Build Model (TransCAD results)

Functional Class	Centerline Mileage	Lane Miles	TOTAL DVMT	TOTAL ADJ DVMT*	% of Total VMT	Avg. Speed mi/hr	VOC g/day	NOx g/day	CO g/day
01 Interstate	0	0	0	0	0.0%	0.0	0	0	0
02 Principal Arterial	135	280	965,652	1,120,156	14.8%	40.9	181,516	155,069	12,221,901
06 Minor Arterial	23	46	98,751	114,551	1.5%	51.4	18,588	15,844	1,248,994
07 Major Collector	86	172	424,141	492,003	6.5%	49.2	79,809	67,619	5,389,574
08 Minor Collector	106	212	125,536	145,621	1.9%	44.3	24,763	19,000	1,535,160
09 Local	211	420	282,206	326,948	4.3%	31.3	63,701	43,326	3,291,751
11 Interstate	38	79	919,118	1,029,413	13.6%	29.0	165,424	166,228	11,438,681
12 Principal Arterial (Expressway)	28	56	398,000	445,760	5.9%	26.3	72,101	66,393	4,740,002
14 Principal Arterial (Street)	89	228	1,311,604	1,469,880	19.4%	37.4	249,167	194,174	15,484,556
16 Minor Arterial	70	144	652,955	731,866	9.7%	38.9	126,331	95,640	7,595,002
17 Collector	170	345	927,705	1,039,691	13.7%	40.0	179,376	134,958	10,903,473
19 Local	330	641	575,177	646,121	8.5%	18.2	163,434	99,538	6,970,677
TOTAL	1,286	2,623	6,680,845	7,562,010	100%		1,324,210	1,057,789	80,819,771
							1.460	1.166	89.087 tons/day

Scenario 2 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice

Total Emissions Benefits (tons/day) 0.0006 0.0004 0.0416

Revised Total Emissions (tons/day) 1.459 1.166 89.045

Scenario 3 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice & Wassaic Station Parking Expansion

Assumptions: ESB analysis June 2008.

Change in VOC -0.007 tons/day

Change in NOx -0.004 tons/day

Change in CO -0.400 tons/day

Methods: The emissions reductions are subtracted from the total daily emissions.changes are added to total emissions results for the scenario.

Scenario 2 Total VOC 1.459 tons/day
Change in VOC -0.007 tons/day
New Total VOC 1.452 tons/day

0.001

Scenario 2 Total NOx 1.166 tons/day
Change in NOx -0.004 tons/day
New Total NOx 1.162 tons/day

Scenario 2 Total CO 89.045 tons/day
Change in CO -0.400 tons/day
New Total CO 88.645 tons/day

Scenario 4 - Seasonally Adjusted Model Outupt & Enhanced Commuter Choice & Wassaic Station Parking Expansion & Beacon Station Parking Expansion

Assumptions: ESB analysis June 2008.

Change in VOC -0.008 tons/day

Change in NOx -0.005 tons/day

Change in CO -0.475 tons/day

Methods: The emissions reductions are subtracted from the total daily emissions.changes are added to total emissions results for the scenario.

Scenario 3 Total VOC 1.452 tons/day
Change in VOC -0.008 tons/day
New Total VOC 1.444 tons/day

Scenario 3 Total NOx 1.162 tons/day
Change in NOx -0.005 tons/day
New Total NOx 1.157 tons/day

Scenario 3 Total CO 88.645 tons/day
Change in CO -0.475 tons/day
New Total CO 88.170 tons/day

2040 PDCTC Scenarios

2040 No-build Model (TransCAD results)

Functional Class	Centerline Mileage	Lane Miles	TOTAL DVMT	TOTAL ADJ DVMT*	% of Total VMT	Avg. Speed mi/hr	VOC g/day	NOx g/day	CO g/day
01 Interstate	0	0	0	0	0.0%	0.0	0	0	0
02 Principal Arterial	135	280	818,402	949,346	12.6%	41.0	154,408	130,972	10,324,425
06 Minor Arterial	23	46	99,738	115,697	1.5%	51.0	18,775	16,007	1,261,480
07 Major Collector	86	172	397,325	460,897	6.1%	49.0	74,814	63,279	5,045,058
08 Minor Collector	106	212	119,794	138,961	1.8%	44.0	23,630	18,136	1,465,116
09 Local	211	420	285,313	330,544	4.4%	31.0	64,420	43,812	3,328,249
11 Interstate	38	79	1,175,993	1,317,113	17.5%	28.0	213,845	208,410	14,419,579
12 Principal Arterial (Expressway)	28	56	317,403	355,492	4.7%	26.0	57,672	52,785	3,771,341
14 Principal Arterial (Street)	89	228	1,251,549	1,402,429	18.6%	37.0	238,012	185,139	14,773,461
16 Minor Arterial	70	144	663,112	743,216	9.9%	39.0	128,360	97,112	7,712,102
17 Collector	169	344	951,108	1,065,811	14.1%	40.0	183,906	138,354	11,175,138
19 Local	328	638	585,151	657,204	8.7%	18.0	166,720	101,424	7,093,949
TOTAL	1,283	2,619	6,664,888	7,536,710	100%		1,324,562	1,055,430	80,369,898
							1.460	1.163	88.591 tons/day

Scenario 1: 2040 Build Model (TransCAD results)

Functional Class	Centerline Mileage	Lane Miles	TOTAL DVMT	TOTAL ADJ DVMT*	% of Total VMT	Avg. Speed mi/hr	VOC g/day	NOx g/day	CO g/day
01 Interstate	0	0	0	0	0.0%	0.0	0	0	0
02 Principal Arterial	135	280	818,338	949,272	12.6%	40.9	154,394	130,963	10,323,707
06 Minor Arterial	23	46	99,739	115,697	1.5%	51.4	18,775	16,007	1,261,480
07 Major Collector	86	172	397,274	460,838	6.1%	49.3	74,804	63,270	5,044,391
08 Minor Collector	106	212	119,921	139,108	1.8%	44.3	23,655	18,155	1,466,663
09 Local	211	420	285,311	330,542	4.4%	31.3	64,420	43,811	3,328,232
11 Interstate	38	79	1,182,097	1,323,949	17.6%	27.9	214,968	209,610	14,498,101
12 Principal Arterial (Expressway)	28	56	317,816	355,954	4.7%	26.4	57,746	52,854	3,776,299
14 Principal Arterial (Street)	89	228	1,250,193	1,400,910	18.6%	37.5	237,763	184,941	14,757,593
16 Minor Arterial	70	144	657,611	737,055	9.8%	38.9	127,308	96,311	7,648,799
17 Collector	170	345	948,694	1,063,107	14.1%	40.0	183,432	138,002	11,147,516
19 Local	330	641	588,116	660,524	8.8%	18.2	167,279	101,844	7,128,390
TOTAL	1,286	2,623	6,665,110	7,536,956	100%		1,324,544	1,055,768	80,381,161
							1.460	1.164	88.604 tons/day

Scenario 2 - Seasonally Adjusted Model Output & Enhanced Commuter Choice

Total Emissions Benefits (tons/day) 0.0007 0.0004 0.0416

Revised Total Emissions (tons/day) 1.459 1.163 88.562

Scenario 3 - Seasonally Adjusted Model Output & Enhanced Commuter Choice & Wassaic Station Parking Expansion

Assumptions: ESB analysis June 2008.

Change in VOC -0.007 tons/day

Change in NOx -0.004 tons/day

Change in CO -0.400 tons/day

Methods: The emissions reductions are subtracted from the total daily emissions.changes are added to total emissions results for the scenario.

Scenario 2 Total VOC 1.459 tons/day
Change in VOC -0.007 tons/day
New Total VOC 1.452 tons/day

Scenario 2 Total NOx 1.163 tons/day
Change in NOx -0.004 tons/day
New Total NOx 1.159 tons/day

Scenario 2 Total CO 88.562 tons/day
Change in CO -0.400 tons/day
New Total CO 88.162 tons/day

Scenario 4 - Seasonally Adjusted Model Output & Enhanced Commuter Choice & Wassaic Station Parking Expansion & Beacon Station Parking Expansion

Assumptions: ESB analysis June 2008.

Change in VOC -0.008 tons/day

Change in NOx -0.005 tons/day

Change in CO -0.475 tons/day

Methods: The emissions reductions are subtracted from the total daily emissions.changes are added to total emissions results for the scenario.

Scenario 3 Total VOC 1.452 tons/day
Change in VOC -0.008 tons/day
New Total VOC 1.444 tons/day

Scenario 3 Total NOx 1.159 tons/day
Change in NOx -0.005 tons/day
New Total NOx 1.154 tons/day

Scenario 3 Total CO 88.162 tons/day
Change in CO -0.475 tons/day
New Total CO 87.687 tons/day

Appendix D (Resolutions)