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

## DRAFT for Public and Interagency Review: October __, 2011

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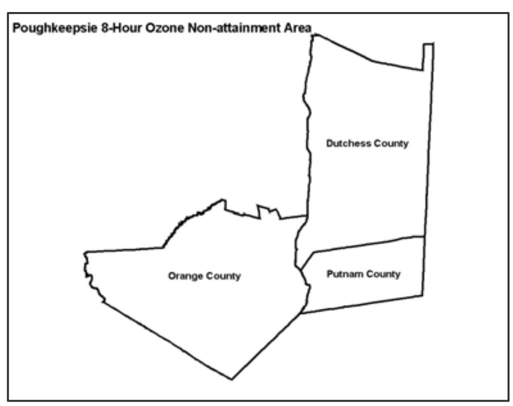
1. **INTRODUCTION.** The New York Metropolitan Transportation Council (NYMTC), the Orange County Transportation Council (OCTC), and the Poughkeepsie-Dutchess County Transportation Council (PDCTC), have completed this Draft Air Quality Conformity Determination in conjunction with the completion of new 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.

> **Vehicle Miles of Travel:**
> 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.

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 | 99,700 | 104,200 | 107,200 | 117,700 | 124,200 | 131,900 | 1.1% | 32% |
| Employment | 39,500 | 42,200 | 44,500 | 46,500 | 48,100 | 51,200 | 1.0% | 30% |
| Households | 32,700 | 36,633 | 39,919 | 43,530 | 44,798 | 46,597 | 1.4% | 42% |

[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 where 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 done in 2008 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: 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 2035 Forecasts adopted by NYMTC's Program Finance and Administration Committee (February, 2009) 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 OCTC began the regional emissions analysis for their proposed MTP on August 24, 2011, while the PDCTC began on September 12, 2011. Since there were no significant changes to the NYMTC TIP and MTP, no revisions were made to the emissions analysis for Putnam County that was used to support the conformity determination approved in May 16, 2011. The planning assumptions used in the regional emissions analysis to support this conformity determination are the most recent planning assumptions that were in force at the time the analysis began and include data from the 2005 Census.

## 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 digitizes 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 NOX 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 | | | | |
|---|---|---|---|---|---|
| | 1 Person | 2 Person | 3 Person | 4+ Person | Total |
| 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. I**n 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 2002 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 (NOx), 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 NOx emission factor input files.

**5.12.1.2. Vehicle Registration Distribution.** Year 2007 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.

**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 | |
| 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 |
| 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 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 current TIPs are consistent with the current NYMTC MTP and the proposed MTPs for the OCTC and PDCTC. The projects proposed in the TIPs and MTPs focus on three main areas: 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 |

**Regionnally Signifigant*

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 meetings 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 and the Taconic State Parkway/Rossway Rd intersection.

**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: will begin on October 5, 2011 and end on November 3, 2011

- OCTC: will begin on October 5, 2011 and end on November 3, 2011
- PDCTC: will begin on October 5, 2011 and end on November 3, 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 MTPs. Any comments received during the comment period will be addressed in the final analysis and documentation, as appropriate.

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 August 24, 2011 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 September 12, 2011. 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.

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 NOX 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 NOx 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 NOx 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** |
| *Budget Test Result* | *Pass* | | *Pass* | | *Pass* | | *Pass* | | *Pass* | |

**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** |
| *Budget Test Result* | *Pass* | | *Pass* | | *Pass* | | *Pass* | | *Pass* | |

**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 |
| *Budget Test Result* | | *Pass* | *Pass* | *Pass* | *Pass* | *Pass* |

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 expect to approve this Air Quality Conformity Determination Statement in fall 2011. Copies of the resolutions are included at the end of Appendix C.

**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 | September 17, 2009 | December 19, 2011* |
| NYMTC 2011-2015 TIP | August 4, 2011 | December 19, 2011* |
| OCTC MTP | November __, 2011* | December 19, 2011* |
| OCTC 2011-2015 TIP, as amended | November __, 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 dates.

**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

## 2002 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)

| | Area Type | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Physical Link 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 | | Area | | | | | |
|---|---|---|---|---|---|---|---|
| | | Rural | Commercial | Village | 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

| | |
|---|---|
| | Site Walk Access Improvements |
| | Transit Service Improvements |
| X | Financial Incentives |
| | Employer Support Programs |
| | Alternative Work Schedules |

| | |
|---|---|
| | 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% |

## 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| nalysis 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 | |
| nalysis 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 | |
| nalysis 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 | |
| nalysis 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 | |
| nalysis 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

Emission rates from sheet
Disaggregated link results into sheet
VISUM network and assignment in file

1 short ton= 907184.74 grams

| | 8-Hour Budget, 2009 | Model 2014 Build | |
|---|---|---|---|
| **DVMT** | 14,927,090 | 14,317,658 | |
| **VOC** | 8,879,620 | 4,660,124 | grams |
| **Nox** | 14,569,770 | 7,595,529 | grams |
| **VOC** | 9.8 | 5.14 | tons |
| **Nox** | 16.1 | 8.37 | tons |

| **VMT** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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 Are 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

Emission rates from sheet

Disaggregated link results into sheet

VISUM network and assignment in file

1 short ton= 907184.74 grams

| | 8-Hour Budget, 2009 | Model 2014 No-Build | |
|---|---|---|---|
| **DVMT** | 14,927,090 | 14,785,536 | |
| **VOC** | 8,879,620 | 4,818,220 | grams |
| **Nox** | 14,569,770 | 7,838,771 | grams |
| **VOC** | 9.8 | 5.31 | tons |
| **Nox** | 16.1 | 8.64 | tons |

| **VMT** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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 Are; **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

Emission rates from sheet
Disaggregated link results into sheet
VISUM network and assignment in file

1 short ton= 907184.74 grams

| | 8-Hour Budget, 2018 | Model 2020 Build | |
|---|---|---|---|
| **DVMT** | 17,196,730 | 15,581,980 | |
| **VOC** | 5,327,680 | 3,543,536 | grams |
| **Nox** | 6,476,960 | 4,525,908 | grams |
| **VOC** | 5.9 | 3.91 | tons |
| **Nox** | 7.1 | 4.99 | tons |

| VMT | NYSDOT_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 | NYSDOT_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 | NYSDOT_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 | NYSDOT_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 | NYSDOT_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 Are** **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

Emission rates from sheet
Disaggregated link results into sheet
VISUM network and assignment in file

1 short ton= 907184.74 grams

| | 8-Hour Budget, 2018 | Model 2020 No-Build | |
|---|---|---|---|
| **DVMT** | 17,196,730 | 16,131,904 | |
| **VOC** | 5,327,680 | 3,684,883 | grams |
| **Nox** | 6,476,960 | 4,698,715 | grams |
| **VOC** | 5.9 | 4.06 | tons |
| **Nox** | 7.1 | 5.18 | tons |

| **VMT** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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

Emission rates from sheet
Disaggregated link results into sheet
VISUM network and assignment in file

1 short ton= 907184.74 grams

| | 8-Hour Budget, 2018 | Model 2030 Build | |
|---|---|---|---|
| DVMT | 17,196,730 | 17,201,155 | |
| VOC | 5,327,680 | 3,061,204 | grams |
| Nox | 6,476,960 | 2,778,987 | grams |
| VOC | 5.9 | 3.37 | tons |
| Nox | 7.1 | 3.06 | tons |

| VMT | NYSDOT_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 | NYSDOT_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 | NYSDOT_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 | NYSDOT_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 | NYSDOT_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 Are** **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

Emission rates from sheet
Disaggregated link results into sheet
VISUM network and assignment in file

1 short ton= 907184.74 grams

| | 8-Hour Budget, 2018 | Model 2030 No-Build | |
|---|---|---|---|
| **DVMT** | 17,196,730 | 17,729,132 | |
| **VOC** | 5,327,680 | 3,164,167 | grams |
| **Nox** | 6,476,960 | 2,868,962 | grams |
| **VOC** | 5.9 | 3.49 | tons |
| **Nox** | 7.1 | 3.16 | tons |

| VMT | NYSDOT_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 | NYSDOT_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 | NYSDOT_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 | NYSDOT_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 | NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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 Are 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

Emission rates from sheet
Disaggregated link results into sheet
VISUM network and assignment in file

1 short ton= 907184.74 grams

| | 8-Hour Budget, 2018 | Model 2035 No-Build | |
|---|---|---|---|
| **DVMT** | 17,196,730 | 18,961,165 | |
| **VOC** | 5,327,680 | 3,501,745 | grams |
| **Nox** | 6,476,960 | 2,809,677 | grams |
| **VOC** | 5.9 | 3.86 | tons |
| **Nox** | 7.1 | 3.10 | tons |

| **VMT** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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

Emission rates from sheet
Disaggregated link results into sheet
VISUM network and assignment in file

1 short ton= 907184.74 grams

| | 8-Hour Budget, 2018 | Model 2040 Build | |
|---|---|---|---|
| **DVMT** | 17,196,730 | 20,128,504 | |
| **VOC** | 5,327,680 | 3,745,942 | grams |
| **Nox** | 6,476,960 | 2,986,597 | grams |
| **VOC** | 5.9 | 4.13 | tons |
| **Nox** | 7.1 | 3.29 | tons |

| **VMT** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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

Emission rates from sheet
Disaggregated link results into sheet
VISUM network and assignment in file

1 short ton= 907184.74 grams

| | 8-Hour Budget, 2018 | Model 2040 No-Build | |
|---|---|---|---|
| **DVMT** | 17,196,730 | 20,199,130 | |
| **VOC** | 5,327,680 | 3,783,944 | grams |
| **Nox** | 6,476,960 | 3,002,650 | grams |
| **VOC** | 5.9 | 4.17 | tons |
| **Nox** | 7.1 | 3.31 | tons |

| **VMT** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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** | **NYSDOT_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

# DUTCHESS COUNTY COMMUTER MODEL RESULTS

## SCENARIO INFORMATION

| | |
|---|---|
| Description | Commuter Choice Poughkeepsie |
| Scenario Filename | Poughkeepsie CC June 2010 Test 3.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 | 1,150 |

## PROGRAMS EVALUATED

| | |
|---|---|
| | Site Walk Access Improvements |
| | Transit Service Improvements |
| X | Financial Incentives |
| | Employer Support Programs |
| | Alternative Work Schedules |

| | |
|---|---|
| | 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% |

## TRAVEL IMPACTS (relative to affected employment)

| Quantity | Peak | Off-Peak | Total |
|---|---|---|---|
| Baseline VMT | 20,139 | 12,661 | 32,800 |
| Final VMT | 17,999 | 11,315 | 29,314 |
| VMT Reduction | 2,140 | 1,346 | 3,486 |
| % VMT Reduction | 10.6% | 10.6% | 10.6% |
| | | | |
| Baseline Trips | 1,182 | 743 | 1,925 |
| Final Trips | 1,056 | 664 | 1,720 |
| Trip Reduction | 126 | 79 | 205 |
| % Trip Reduction | 10.6% | 10.6% | 10.6% |

***Poughkeepsie 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 benefit)*

*100% participation = 1,150 employee participants, based on PDCTC population-based corrected MHSTCC SOV diversion rate in Commuter Choice Business Plan*

*16.5 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*

# 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**

| | VOC | NOx | CO |
|---|---|---|---|
| **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** |

| | | VOC | NOx | CO |
|---|---|---|---|---|
| **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**

| | VOC | NOx | CO |
|---|---|---|---|
| **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 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 | 965,747 | 1,120,267 | 14.8% | 40.9 | 181,537 | 155,083 | 12,222,947 |
| 06 | Minor Arterial | 23 | 46 | 98,774 | 114,578 | 1.5% | 51.4 | 18,593 | 15,848 | 1,249,289 |
| 07 | Major Collector | 86 | 172 | 424,208 | 492,082 | 6.5% | 49.2 | 79,821 | 67,630 | 5,390,468 |
| 08 | Minor Collector | 106 | 212 | 125,243 | 145,282 | 1.9% | 44.3 | 24,706 | 18,956 | 1,531,586 |
| 09 | Local | 211 | 420 | 282,209 | 326,951 | 4.3% | 31.3 | 63,701 | 43,327 | 3,291,789 |
| 11 | Interstate | 38 | 79 | 912,276 | 1,021,750 | 13.5% | 29.1 | 164,198 | 164,924 | 11,351,211 |
| 12 | Principal Arterial (Expressway) | 28 | 56 | 397,391 | 445,077 | 5.9% | 26.3 | 71,992 | 66,291 | 4,732,692 |
| 14 | Principal Arterial (Street) | 89 | 228 | 1,313,647 | 1,472,169 | 19.5% | 37.4 | 249,552 | 194,473 | 15,508,372 |
| 16 | Minor Arterial | 70 | 144 | 658,399 | 737,963 | 9.8% | 38.9 | 127,369 | 96,432 | 7,657,687 |
| 17 | Collector | 170 | 345 | 930,234 | 1,042,524 | 13.8% | 40.0 | 179,873 | 135,327 | 10,932,403 |
| 19 | Local | 330 | 641 | 572,257 | 642,853 | 8.5% | 18.2 | 162,889 | 99,132 | 6,936,713 |
| **TOTAL** | | **1,286** | **2,623** | **6,680,385** | **7,561,496** | **100%** | | **1,324,231** | **1,057,423** | **80,805,157** |
| | | | | | | | | **1.460** | **1.166** | **89.071 tons/day** |

**Scenario 2: 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 3 - 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** | **1.165** | **89.029** |

**Scenario 4 - 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 | 1.165 tons/day | |
| Change in NOx | -0.004 tons/day | |
| **New Total NOx** | **1.161 tons/day** | |
| Scenario 2 Total CO | 89.029 tons/day | |
| Change in CO | -0.400 tons/day | |
| **New Total CO** | **88.629 tons/day** | |

**Scenario 5 - 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 | 1.161 tons/day |
| Change in NOx | -0.005 tons/day |
| **New Total NOx** | **1.156 tons/day** |
| Scenario 3 Total CO | 88.629 tons/day |
| Change in CO | -0.475 tons/day |
| **New Total CO** | **88.154 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 | 3,776,289 |
| 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 Outupt & Enhanced Commuter Choice**

| | VOC | NOx | CO |
|---|---|---|---|
| **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 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** |
| 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 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 | 1.159 | 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** |