Connecticut Department of Transportation

Central Naugatuck Valley Metropolitan Planning Organization
Greater Bridgeport Valley Metropolitan Planning Organization
South Central Region Metropolitan Planning Organization
South Western Region Metropolitan Planning Organization
Housatonic Valley Metropolitan Planning Organization

PM 2.5 Air Quality Conformity Determination

of the
2015 Regional Transportation Plans and the
FY 2015-2018 Transportation Improvement Programs Amendments
for the Connecticut portion of
the NY-NJ-CT
$PM_{2.5}$ Attainment/Maintenance Area

September 2016,Amended

Note: The five Connecticut MPOs (CNVMPO, GBVMPO, HVMPO, SCRCOG and SWRMPO) are part of the larger NY-NJ-CT $PM_{2.5}$ Attainment/Maintenance Area and this document includes the documentation of the regional analysis for the entire Connecticut portion of the Attainment/Maintenance area, as well as documentation and information on the processes and procedures undertaken by CTDOT, coordinator of the Air Quality Conformity for the five Connecticut Metropolitan Planning Organizations.

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Regional Emissions Analysis

1) OVERVIEW

In March 2007, the Metropolitan Planning Organizations (MPOs) in Connecticut proposed to update their Long Range Transportation Plans (LRTPs). These revisions to Connecticut's LRTPs required a new multi-state transportation conformity determination for fine particulate matter ($PM_{2.5}$). Therefore, the November 2006 NY-NJ-CT $PM_{2.5}$ non-attainment area conformity determination was revised to reflect emission projections from the new or revised, non-exempt projects in Connecticut's 2007-2035 LRTPs. On April 17, 2007, the Connecticut Department of Energy and Environmental Protection (CTDEEP) submitted to the U.S. Environmental Protection Agency (EPA) its State Implementation Plan (SIP) Revision for Establishment of Interim Progress for the Fine Particle National Ambient Air Quality Standard (NAAQS) and early fine particulate ($PM_{2.5}$) transportation conformity emission budgets. The SIP revision identified year 2009 annual direct $PM_{2.5}$ and annual nitrogen oxides (NOx) Motor Vehicle Emission Budgets (MVEBs) associated with the Interim/Early Progress SIP. The annual 2009 MVEBs for the Connecticut portion of the New York-Northern New Jersey-Long Island, NY-NJ-CT $PM_{2.5}$ Area were 360 tons per year of direct $PM_{2.5}$ and 18,279 tons per year of NOx.[1] These emissions budgets were found adequate as of June 20, 2007 and were approved into the Connecticut SIP on August 30, 2007.

The annual 2009 motor vehicle emissions budgets for the Connecticut portion of the New York-Northern New Jersey-Long Island, NY-NJ-CT $PM_{2.5}$ Area were determined adequate through a May 24, 2007 letter from Anne E. Arnold, Manager Air Quality Planning Unit, EPA New England Regional Office to Anne Gobin, Chief CTDEEP and a June 5, 2007 Federal Register Notice of Adequacy. The adequacy process made the MVEBs effective June 20, 2007 for transportation conformity determinations.

The annual 2009 motor vehicle emissions budgets for the Connecticut portion of the New York-Northern New Jersey-Long Island, NY-NJ-CT $PM_{2.5}$ Area were approved into the Connecticut SIP through a direct final rulemaking Federal Register on August 30, 2007 (72 FR 50029). This SIP element "2009 Early Progress Direct $PM_{2.5}$ and NOx Motor Vehicle Emission Budgets (MVEBs) for Transportation Conformity Purposes; Connecticut; New York-Northern New Jersey-Long Island, NY-NJ-CT $PM_{2.5}$ Area" became effective on October 29, 2007.

On December 14, 2009, EPA's final rule designating areas for the 2006 $PM_{2.5}$ NAAQS became effective. This Air Quality Conformity analysis is being prepared to meet both the 1997 Annual $PM_{2.5}$ NAAQS and the 2006 24-hour $PM_{2.5}$ NAAQS.

[1] Letter from U.S. EPA to Anne Gobin, Chief CTDEP, dated May 24, 2007.

This report was prepared to document the emissions analysis that was completed to evaluate Fiscal Year 2015-2018 Conformity of the Statewide Transportation Improvement Program (STIP) Amendments and the 2015 LRTPs to the SIP for air quality. This submittal incorporates the FY 2015 - 2018 STIP and 2015 LRTPs from Connecticut's Regional Planning Organizations (RPO), and the 2017 and 2025 MOVES2010b emissions budgets deemed adequate by EPA and effective as of February 20, 2013[2]. EPA's guidance for maintenance plans calls for a demonstration of continued compliance by showing that future emissions during the maintenance period will not exceed the level of emission in the attainment inventory.

The end of the maintenance period was established as 2025, consistent with the CAA section 175A(a) requirement that the plan provide for maintenance of the NAAQS for at least 10 years after EPA formally approves the redesignation request. Emission estimates were developed for direct $PM_{2.5}$, as well as for the most important $PM_{2.5}$ precursor NOx. Emissions are projected to decrease from the levels in the 2007 attainment inventory through the end of the maintenance period in 2025, including in the selected interim year of 2017, thus providing for continuing maintenance of the NAAQS.

The report is submitted to satisfy the requirements of the SIP, as revised.

2) PURPOSE AND NEED

a - What is Transportation Conformity?

Transportation Conformity is the process, established by joint guidance from the United States Department of Transportation (USDOT) and the United States Environmental Protection Agency (EPA) that ensures that transportation investments will contribute to improving air quality in areas where concentrations of certain pollutants exceed national air quality standards. Transportation conformity as it currently exists emerged from the passage of environmental and transportation legislation in the early 1990s (Clean Air Act Amendments of 1990 and the Intermodal Surface Transportation Efficiency Act of 1991). EPA promulgated a transportation conformity rule initially in 1993. The latest amendment to the transportation conformity rule, Transportation Conformity Rule, Amendments to Implement Provisions Contained in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, Final Rule was published January 24, 2008 (73 FR 4420).

Other recent conformity rules related to particulate matter include: $PM_{2.5}$ and PM_{10} Hot-Spot Analyses in Project-Level Transportation Conformity Determinations for the New $PM_{2.5}$ and

[2] Federal Register, February 15, 2013. EPA-R01-OAR-2013-0020; A-1-FRL-9776-2 Adequacy Status of Motor Vehicles Emission Budgets for Transportation Conformity Purposes; Connecticut http://www.gpo.gov/fdsys/pkg/FR-2013-02-05/pdf/2013-02492.pdf

Existing PM_{10} National Ambient Air Quality Standards; Final Rule March 10, 2006 (71 FR 12468); Transportation Conformity Rule Amendments for the New $PM_{2.5}$ National Ambient Air Quality Standard: $PM_{2.5}$ Precursors; Final Rule May 6, 2005 (70 FR 24280), [*Note: On June 1, 2005, (70 FR 31354), EPA published a Final Rule correction effective June 6, 2005 for Transportation Conformity Rule Amendments for the New PM $_{2.5}$National Ambient Air Quality Standard: PM $_{2.5}$ Precursors*]; and, Transportation Conformity Rule Amendments for the New 8-hour Ozone and $PM_{2.5}$ National Ambient Air Quality Standards and Miscellaneous Revisions for Existing Areas; Transportation Conformity Rule Amendments: Response to Court Decision and Additional Rule Changes; Final Rule July 1, 2004 (69 FT 40004).

Recently EPA published Transportation Conformity Rule $PM_{2.5}$ and PM_{10} Amendments, Final Rule March 24, 2010 (75 FR 14259-14285). Transportation Conformity rulemaking actions can be found on EPA's Office of Transportation and Air Quality web site at URL address:

http://www.epa.gov/otaq/stateresources/trasconf/conf-regs.htm

Transportation conformity works in the following way:

- EPA establishes National Ambient Air Quality Standards (NAAQS) based on public health research. The standards set maximum concentrations of six criteria pollutants in the ambient (outdoor) air.

- EPA designates parts of the country where the NAAQS are exceeded as a "non-attainment area." States that have non-attainment areas within their boundaries are required to submit State Implementation Plans (SIPs) to EPA to demonstrate how the non-attainment areas will improve their air quality and meet the NAAQS in the timeframe specified by the Clean Air Act.

- Non-attainment areas must conform their transportation plans, programs and projects to their area's motor vehicle emissions budget that is contained within its SIP. If a state does not yet have SIP emissions budgets in place, interim emission tests must be passed to show conformity.

Under the Conformity Rules, the following test for $PM_{2.5}$ and NOx must be met:

- TEST: Emissions from future Action Scenarios from 2017 on, must be less than the 2017 Motor Vehicle Emission Budgets

- TEST: Emissions from future Action Scenarios from 2025 on, must be less than the 2025 Motor Vehicle Emission Budgets

To do this, MPOs use a model created by the EPA that applies emission factors to the region's vehicle fleet. These emission factors are combined with vehicle miles traveled data, which is generated by an MPO's travel demand model. The travel demand model uses the region's highway network, estimated travel conditions and demographic data to estimate where trips begin and end.

It is important to note that the transportation conformity determination is based on the mix of new and existing projects and the current infrastructure. Some projects, particularly highway capacity expansions, may be individually deleterious to air quality but are offset by beneficial initiatives such as new transit projects and engineering improvements that mitigate local congestion or reduce vehicular travel. The conformity regulations recognize this balance between projects that increase and reduce emissions by requiring that MPOs demonstrate that the overall set of investments moves the region toward cleaner air, in keeping with EPA policies.

b - Background on Fine Particulate Matter ($PM_{2.5}$)

Fine particulate matter, also called $PM_{2.5}$, is a mixture of microscopic solids and liquid droplets suspended in air, where the size of the particles is equal to or less than 2.5 micrometers (about one-thirtieth the diameter of a human hair). Fine particles can be emitted directly (such as smoke from a fire, or as a component of automobile exhaust) or be formed indirectly in the air from power plant, industrial and mobile source emissions of gases such as sulfur dioxide and nitrogen oxides.

The health effects associated with exposure to fine particles are serious. Scientific studies have shown significant associations between elevated fine particle levels and premature death. Effects associated with fine particle exposure include aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions, emergency room visits, absences from school or work, and restricted activity days), lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems such as heart attacks and cardiac arrhythmia. While fine particles are unhealthy for anyone to breathe, people with heart or lung disease, asthmatics, older adults, and children are especially at risk.

c - $PM_{2.5}$ National Ambient Air Quality Standards

In July 1997, EPA issued NAAQS for $PM_{2.5}$, designed to protect the public from exposure to $PM_{2.5}$ at levels that may cause health problems. The standards include an annual standard set at 15 micrograms per cubic meter, based on the three year average of annual $PM_{2.5}$ concentrations and a 24-hour standard of 65 micrograms per cubic meter based on the three-

year average of 24-hour concentrations. In general, areas need to meet both standards to be considered to attain $PM_{2.5}$ NAAQS.

Areas not meeting the $PM_{2.5}$ NAAQS are called $PM_{2.5}$ non-attainment areas. These areas have had or contributed to $PM_{2.5}$ levels higher than allowed under the NAAQS. Non-attainment areas are subject to transportation conformity, through which local transportation and air quality officials coordinate planning efforts to ensure that transportation projects do not hinder an area's ability to reach its clean air goals. Transportation conformity requirements become effective one year after an area is designated as a non-attainment area.

EPA issued official designations for the $PM_{2.5}$ standard on December 17, 2004 and made modifications in April 2005. On April 5, 2005, designations under the national air quality standards for fine particle pollution or $PM_{2.5}$ became effective. Therefore, by April 4, 2006, all $PM_{2.5}$ non-attainment areas were required to implement transportation conformity. Under the EPA designation, non-attainment areas are required to meet the $PM_{2.5}$ NAAQS as soon as possible, but no later than 2010. EPA may grant attainment date extensions of up to five years in areas with more severe $PM_{2.5}$ problems and where emissions control measures are not available or feasible.

EPA has determined that meeting the $PM_{2.5}$ NAAQS nationwide will annually prevent at least 15,000 premature deaths; 75,000 cases of chronic bronchitis; 10,000 hospital admissions for respiratory and cardiovascular disease; hundreds of thousands of occurrences of aggravated asthma; and 3.1 million person-days of missed work due to symptoms related to particle pollution exposure.

On April 17, 2007, Connecticut Department of Environmental Protection submitted a SIP Revision for 2009 Early Progress Direct $PM_{2.5}$ and NO_x Motor Vehicle Emission Budgets for Transportation Conformity Purposes; Connecticut; New York-Northern New Jersey-Long Island, NY-NJ-CT $PM_{2.5}$ Area. (See http://www.regulations.govsearch on docket number EPA-R01-OAR-2007-0373).

States with designated $PM_{2.5}$ non-attainment areas had to submit SIPs that outline how they will meet the $PM_{2.5}$ NAAQS within three years of April 5, 2005. On November 18, 2008 CTDEEP submitted a SIP Revision "Attainment Demonstration for the 1997 Annual $PM_{2.5}$ National Ambient Air Quality Standard for the Connecticut portion of the New York-Northern New Jersey-Long Island, NY-NJ-CT $PM_{2.5}$ Non-attainment Area". EPA determined Connecticut's $PM_{2.5}$ attainment demonstration SIP to be administratively and technically complete on January 8, 2009.

On October 17, 2006, EPA issued a final rule which tightened the 24-hour $PM_{2.5}$ NAAQS from the 1997 level of 65 micrograms per cubic meter (ug/m^3) to 35 ug/m^3 (71FR61144). In this final rule, EPA retained the 1997 annual $PM_{2.5}$ NAAQS of 15.0 ug/m^3. EPA's final rule designating non-attainment areas for the 2006 $PM_{2.5}$ NAAQS, published in the *Federal Register* on November 13, 2009, was effective December 14, 2009.

A MPO and the U.S. Department of Transportation (U.S.DOT) must make a conformity determination with regard to the 2006 $PM_{2.5}$ NAAQS for the metropolitan transportation plan and TIP within one year after the effective date of the initial non-attainment designation for this NAAQS, as stated in 40CFR Part 93, "Transportation Conformity Rule $PM_{2.5}$ and PM_{10} Amendments; Final Rule", dated March 24, 2010.

On June 22, 2012, CTDEEP submitted a "$PM_{2.5}$ Redesignation/Maintenance State Implementation Plan" which established new Motor Vehicle Emission Budgets for 2017 and 2025 using new EPA required software, MOVES 2010b. These budgets were deemed adequate by EPA and effective as of February 20, 2013.

Monitoring data show that the NY-NJ-CT multi-state area has achieved compliance with both the 1997 annual and 2006 24-hour $PM_{2.5}$ NAAQS since 2009. On November 15, 2010, EPA published a formal determination that the NY-NJ-CT multi-state area had achieved measured attainment of the 1997 annual $PM_{2.5}$ NAAQS. EPA published a similar finding for the 2006 24-hour $PM_{2.5}$ NAAQS on December 31, 2012. DEEP monitoring data also indicate that Connecticut complies with the 2012 annual NAAQS.

On June 22, 2012, DEEP formally submitted to the EPA, the final PM2.5 redesignation request and maintenance plan State Implementation Plan (SIP) for Connecticut's portion of the NY-NJ-CT $PM_{2.5}$ Nonattainment Area. The plan demonstrated that Connecticut's air quality met both the 1997 annual and the 2006 24-hour $PM_{2.5}$ NAAQS due to a combination of national, regional and local control measures implemented to reduce emissions and presented a maintenance plan that ensures continued attainment through the year 2025. On September 24, 2013, EPA published its approval of the $PM_{2.5}$ redesignation request, establishing October 24, 2013 as the effective date of redesignation to attainment/maintenance for Connecticut's portion of the NY-NJ-CT Area for both the 1997 annual and 2006 24-hour $PM_{2.5}$ NAAQS.

This report was prepared to show conformity for the 1997 Annual $PM_{2.5}$ NAAQS and the 2006 $PM_{2.5}$ 24-hour NAAQS by meeting new MOVES2010b 2017 and 2025 motor vehicle budgets as discussed above.

The Metropolitan Planning Organizations (MPOs) within this area are as follows:

1. South Western Region Metropolitan Planning Organization (SWRMPO)
2. Housatonic Valley Metropolitan Planning Organization (HVMPO)
3. Central Naugatuck Valley Metropolitan Planning Organization (CNVMPO)
4. Greater Bridgeport Valley Metropolitan Planning Organization (GBVMPO)
5. South Central Region Metropolitan Planning Organization (SCRMPO)

Figure 1 below shows the Connecticut counties included in the $PM_{2.5}$ attainment/maintenance area.

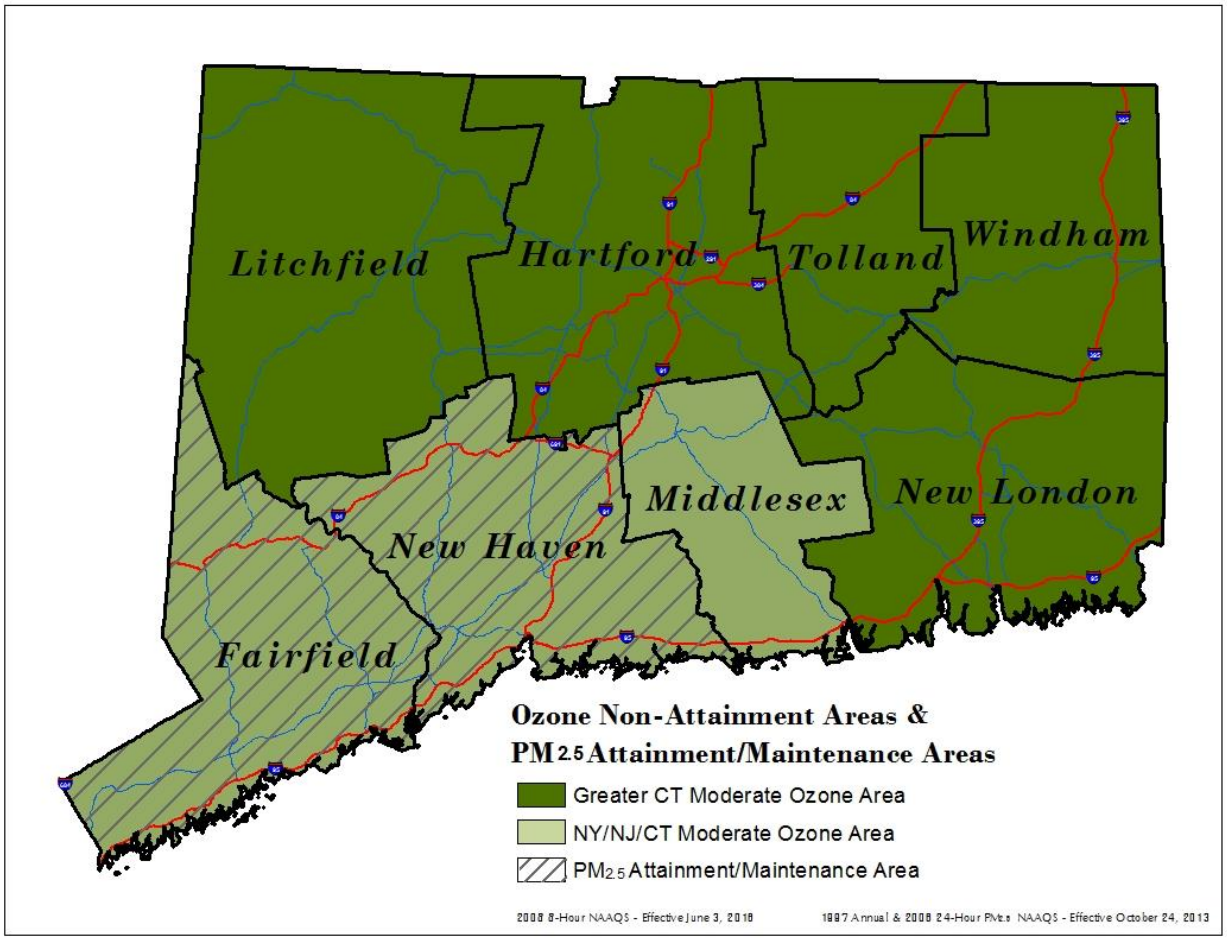

Figure 1: Connecticut Portion of the NY-NJ-CT PM $_{2.5}$ Attainment/Maintenance Area

d – PM_{10} Attainment/Maintenance Area

EPA previously designated the City of New Haven as Nonattainment with respect to the National Ambient Air Quality Standards (NAAQS) for particulate matter with a nominal diameter of ten microns or less (PM_{10}). The PM_{10} Nonattainment status in New Haven was a local problem stemming from activities of several businesses located in the Stiles Street section of the City. Numerous violations in the late 1980's and early 1990's of Section 22a-174-18 (Fugitive Dust) of CTDEEP regulations in that section of the city led to a nonattainment designation (CTDEEP, 1994: Narrative Connecticut Department of Energy and Environmental Protection, State Implementation Plan Revision For PM_{10}, March 1994). Corrective actions were subsequently identified in the State Implementation Plan and implemented, with no violations of the PM_{10} NAAQS since the mid-1990's.

All construction activities undertaken in the City of New Haven are required to be performed in compliance with Section 22a-174-18 (Control of Particulate "Emissions") of the CTDEEP regulations. All reasonable available control measures must be implemented during construction to mitigate particulate matter emissions, including wind-blown fugitive dust, mud and dirt carry out, and re-entrained fugitive emission from mobile equipment. The projects contained in the STIP and Plans, designated within the City of New Haven, are expected to have little effect on the overall projected vehicle miles of travel for the area and are not expected to cause significant additional airborne particulate matter to be generated. The transportation projects initiated in New Haven are not designed to enhance development in the area. Therefore, the projects undertaken in this area will not have a detrimental effect on PM_{10} in New Haven.

On October 13, 2005, EPA published in the Federal Register (Vol. 70, No. 197), approval of a request by CTDEEP for a Limited Maintenance Plan and redesignation of the New Haven Nonattainment Area to Attainment for the National Ambient Air Quality Standards for PM_{10}. This direct final rule became effective on December 12, 2005.

As with limited maintenance plans for other pollutants, emissions budgets are considered to satisfy transportation conformity's "budget test". However, future "project level" conformity determination may require "hot spot" PM_{10} analyses for new transportation projects with significant diesel traffic in accordance with EPA's Final Rule for "$PM_{2.5}$ and PM_{10} Hot-Spot Analyses in Project-level Transportation Conformity Rule $PM_{2.5}$ and PM_{10} Amendments; Final Rule (75 FR 4260, March 24, 2010) which became effective on April 23, 2010.

3) CONNECTICUT $PM_{2.5}$ ATTAINMENT MAINTENANCE AREA

The New Jersey – New York – Connecticut multi-state non-attainment area was designated by EPA because this region's air quality fails to meet the annual $PM_{2.5}$ NAAQS. As EPA New England has determined the MOVES2010b 2017 and 2025 motor vehicle emissions budgets submitted on June 22, 2012 to be adequate for transportation conformity purposes, the emissions analysis in this report will be limited to these areas only and the budgets effective as of February 20, 2013.

The non-attainment areas under the 2006 $PM_{2.5}$ 24-hour NAAQS are the same as under the 1997 $PM_{2.5}$ non-attainments areas. Since the 1997 $PM_{2.5}$ non-attainment area has an adequate budget, EPA states that to be consistent with the Clean Air Act, the areas must meet the budget test for the 2006 $PM_{2.5}$ NAAQS using existing adequate or approved SIP budgets for the 1997 $PM_{2.5}$ NAAQS. Effective October 24, 2013, the Connecticut portion of the New Jersey – New York – Connecticut multi-state $PM_{2.5}$ Non-Attainment Areas were redesignated as Attainment Maintenance.

4) INTERAGENCY CONSULTATION

An Interagency Consultation Meeting was held on April 19, 2016 to review the air quality codes for projects funded in the regions' Transportation Improvement Plans and the 2015 Long Range Transportation Plans. The meeting also discussed the analysis years to be modeled.

The project Air Quality coding is as follows:

CC – Conformity Analysis Completed

M – Modeled in the Department's highway or transit networks

NM – Requires modeling and will be included into the Department's highway and transit networks prior to conformity analysis

NRS –a highway or transit project on a facility that does not serve regional needs or is not normally included in the regional travel simulation model and does not fit into an exempt project category in Table 2 or 3 of the Final Rule (40 CFR 93).

RS – Regionally significant refers to a transportation project in the TIP and/or STIP (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the regions, major planned development such as new retail malls, sports complexes, etc., or transportation terminals as well as most terminals themselves) and would normally be

included in the modeling of a metropolitan area's transportation network, including at a minimum all principal arterial highways and all fixed guide-way transit facilities that offer an alternative to regional highway travel (40 CFR 93.101). Once a project is identified as regionally significant, it must be included in the analysis regardless of funding source.

Exempt Project – a project listed in Table 2 or 3 of the Final Rule (40 CFR 93) that primarily enhances safety or aesthetics, maintains mass transit, continues current levels of ridesharing, or builds bicycle and pedestrian facilities.

X6 - Project exempt from the requirement to determine conformity under 40 CFR 93.126

X7 – Project exempt form regional emissions analysis requirements under 40 CFR 93.127

X8 – Traffic synchronization projects may be approved, funded and implemented without satisfying conformity requirements under 40 CFR 93.128

It was agreed upon that the 2011 vehicle registration data file would be utilized for this Conformity Determination and CTDEEP and CTDOT staff would discuss update of this file at a May 2016 meeting.

A copy of the minutes of the Interagency Consultation Meeting is included in Appendix A, as well as a list of attendees and call-in participants. The final emissions analysis was prepared and the report was distributed for the 30-day public comment period.

5) PUBLIC CONSULTATION

As required by the Final Rule, the transportation conformity process must include public consultation on the emissions analysis and conformity determination for PM2.5 determinations. This includes posting of relevant documentation and analysis on a "clearinghouse" webpage maintained through the interagency consultation process. All MPOs in the Connecticut $PM_{2.5}$ non-attainment area must provide thirty-day public comment periods and address any comments received. For this PM2.5 transportation conformity determination, all Connecticut MPOs will hold a thirty-day public comment period.

6) $PM_{2.5}$ EMISSIONS ANALYSIS

As stated above, EPA has found that the 2017 and 2025 MVEBs in the June 22, 2012 Connecticut SIP revision are adequate for transportation conformity purposes and effective as of February 20, 2013. Table 1 shows the MOVES2010b MVEBs for 2017 and 2025.

Table 1: Adequate Motor Vehicle Emissions Budgets - MOVE2010b

	Direct $PM_{2.5}$ (Tons/Year)	**NOx** (Tons/Year)
Year 2017 MVEBs for the Connecticut portion of the New York- Northern New Jersey-, Long Island, NY-NJ-CT $PM_{2.5}$ Area	575.8	12,791.8
Year 2025 MVEBs for the Connecticut portion of the New York- Northern New Jersey-, Long Island, NY-NJ-CT $PM_{2.5}$ Area	516.0	9,728.1

The $PM_{2.5}$ budget emissions are the amount to which projected future emissions resulting from implementation of Plans and TIPs will be compared.

Per 75 FR 14271, as the non-attainment boundary for the 2006 Connecticut portion of the NY-NJ-CT $PM_{2.5}$ Non-attainment Area is exactly the same as the 1997 $PM_{2.5}$ boundary, the budget test for the 2006 $PM_{2.5}$ NAAQS must use the existing adequate or approved SIP budgets for the 1997 $PM_{2.5}$ NAAQS.

EPA regulations require that emissions analysis be conducted for specific analysis years. Section 93.119(g) of the Final Rule states that these analysis years must include:

- Attainment or near term year
- The last (horizon) year of the regions' long range transportation plan
- An intermediate year or years such that the analysis years are no more than 10 years apart

The attainment year is based upon the Clean Air Act section 172(a)(2) which states that the attainment year for the 2006 $PM_{2.5}$ areas will be 2014, five years after the effective date of designations (December 14, 2009). The year 2017 is also within five years (near-term) of the year in which the analysis is being performed (2015). Furthermore, because this attainment/maintenance area includes multiple MPOs, the last year of all of the MPOs' Plans must be included as analysis years. Within the Connecticut $PM_{2.5}$ attainment area, the plan horizon year is 2040. Intermediate years of 2025 and 2035 have been selected so that no two-analysis years are more than 10 years apart. Therefore, the analysis years for this conformity determination are 2017, 2025, 2035 and 2040.

7) CONNECTICUT $PM_{2.5}$ REGIONAL EMISSIONS ANALYSIS COMPONENTS

$PM_{2.5}$ emissions can result from both direct and indirect sources. Gasoline and diesel on-road vehicles emit both direct $PM_{2.5}$ and other gases that react in the air to form $PM_{2.5}$. Direct $PM_{2.5}$ emissions can result from particles in exhaust fumes, from brake and tire wear, from road dust kicked up by vehicles, and from highway and transit construction. Indirect $PM_{2.5}$ emissions can result from one or more of several exhaust components, including nitrogen oxides (NOx), volatile organic compounds (VOCs), sulfur oxides (SOx), and ammonia (NH_3).

For the regional analysis of direct $PM_{2.5}$ emissions, EPA has ruled that both exhaust and brake/tire wear must be included. However, EPA has also ruled that emissions analysis for direct $PM_{2.5}$ should include road dust only if road dust is found to be a significant contributor to $PM_{2.5}$ by either the EPA Regional Administrator or a state air quality agency. For the Connecticut $PM_{2.5}$ non-attainment area, neither the EPA Regional Administrators nor the state air quality agency have found that road dust is a significant $PM_{2.5}$ contributor.

For the regional analysis of indirect $PM_{2.5}$ emissions (also called $PM_{2.5}$ precursors), EPA has identified four potential transportation-related $PM_{2.5}$ precursors: NOx, VOCs, SOx, and NH_3. The only indirect $PM_{2.5}$ component that needs to be considered in the Connecticut $PM_{2.5}$ non-attainment area is NOx.

8) ANNUAL INVENTORIES FOR $PM_{2.5}$

Because the multi-state $PM_{2.5}$ non-attainment area did not meet the annual $PM_{2.5}$ NAAQS, the emissions analysis for $PM_{2.5}$ considered annual emissions. Guidance from EPA (dated November, 2015) presented two possible options for developing an annual inventory before a SIP is developed: using a typical seasonal day or an annual inventory that is based on monthly estimtes. The twelve-month approach for the Connecticut $PM_{2.5}$ non-attainment area was utilized.

9) VEHICLE MILES OF TRAVEL AND EMISSIONS ANALYSIS

Vehicle Miles of Travel (VMT) estimates were developed from the Connecticut Department of Transportation's (CTDOT's) statewide network-based travel model supplemented by off-model analysis. The 2015 travel model network, to the extent practical, represents all state highways and major connecting non-state streets and roads as well as the rail, local bus and express bus systems that currently exist. Future highway networks for 2018, 2020, 2025 and 2030 and transit networks for 2015, 2016, 2020, 2030 and 2040 were built by adding STIP, TIP and LRTP projects (programmed for opening after 2015) to the 2015 network. These networks were used to run travel models and conduct emissions analysis for the years 2017, 2025, 2035 and 2040. Table 2 lists the projects for each model analysis year for which network changes were required.

TABLE 2 LIST OF NETWORK CHANGES

2015 NETWORK CHANGES

MPO PROJECT NUMBER HIGHWAY NAME TOWN IMPROVEMENT	DESCRIPTION	LANES FROM	TO
CAPITOL REGION			
0063-XXXX INTERMODAL TRIANGLE HARTFORD	Project enhancing Union Station as a regional intermodal transportation Hub and connecting that with the rest of downtown through improved transit, pedestrian and biking infrastructure	Varies	
0077-0215 HILLSIDE ROAD MANSFIELD NEW ROAD	Extension of existing Hillside Road to Route 44. Congressional earmark CCD 2015, TIP	0/0	1/1
0171-0305 CT FASTRAK NEW BRITAIN-HARTFORD NEW BUS SERVICE	From New Britain to Hartford, District 1 funding Hartford and New Britain CCD 8/14/2015, TIP	N/A	
CENTRAL NAUGATUCK VALLEY			
0151-XXXX BOYDEN STREET WATERBURY EXTENSION	Boyden Street Extension Construct new road from Bucks Hill Road to North Main Street Long Range Plan	0/0	1/1
SOUTH CENTRAL			
0092-0614 ROUTE 34 NEW HAVEN BOULEVARD	Reconstruction of Route 34 to at grade Boulevard Long Range Plan	N/A	
0106-0125 EDISON ROAD ORANGE EXTEND	Project to extend Edison Road from its current terminus to Marsh Hill Road, a length of approximately 2,200 feet	0/0	1/1

SOUTH WESTERN			
0102-0278 I-95 NORWALK OPERATIONAL LANES	Add auxiliary lanes between Int. 14 and 15 (NB and SB) on I-95 CCD 12-1-2014	3/3	4/4
0135-0310 WEST MAIN STREET STAMFORD BRIDGE REPLACEMENT	Removal of automobile bridge over the Mill River CCD 2014, TIP	1/1	0/0

2016 NETWORK CHANGES

MPO PROJECT NUMBER HIGHWAY NAME TOWN IMPROVEMENT	DESCRIPTION	LANES FROM	TO
LOWER CT RIVER VALLEY			
0478-0077 MADISON-MIDDLETOWN NEW BUS SERVICE	New Estuary Transit District bus service starting in the center of Madison that will travel along Route 1, Route 81, and Route 154 to downtown Middletown. CCD 2016 TIP	N/A	
SOUTH CENTRAL		N/A	
0478-0077 MADISON-MIDDLETOWN NEW BUS SERVICE	New Estuary Transit District bus service starting in the center of Madison that will travel along Route 1, Route 81, and Route 154 to downtown Middletown. CCD 2016 TIP		
HOUSATONIC VALLEY			
0416-0076 MATRIX COMMUTER DANBURY NEW BUS SERVICE	New HARTransit bus service loop between the Interstate 84 Exit 2 Park & Ride, Belimo, and the Matrix Corporate Center. CCD 2016, TIP	N/A	

2018 NETWORK CHANGES

MPO PROJECT NUMBER HIGHWAY NAME TOWN	DESCRIPTION	LANES FROM	 TO
CAPITAL REGION			
0131-0190 ROUTE 10 SOUTHINGTON BRIDGE REMOVAL	Remove Bridge Number 00518 Reconstruct 10/322 Intersection CCD 11/2017, TIP	1/1	0/0
GREATER BRIDGEPORT			
0015-TMP1 LAFAYETTE CIRCLE BRIDGEPORT REALIGNMENT	Realignment of Lafayette Circle and establishment of bidirectional traffic on Fairfield Avenue CCD 2017, TIP	0/1	1/1
0036-0184 ROUTE 34 DERBY WIDENING	Main Street Derby from Bridge Street to Route 8 South Exit15 On/Off Ramps (Ausonio Street) CCD 2018, TIP	1/1	2/2
HOUSATONIC VALLEY			
0034-0347 SR 806 NEWTOWN ROAD DANBURY	State Route 806 (Newtown Road) from Old Newtown to Plumtrees & from Eagle to Industrial Plaza, Danbury - Widening from 1 lane each direction to 2 lanes each direction CCD 2016, TIP	1/1	2/2
SOUTH CENTRAL			
0079-XXXX WEST MAIN STREET MERIDEN MULTIPLE LANE CHANGES	Multiple lane and directional changes in the center of town. Conversion of multiple one way streets to two ways, two way streets to one way, lane reductions. CCD 2017, TIP	VARIOUS	
0092-0531 I-95 NEW HAVEN BRIDGE REPLACEMENT	Q Bridge Replacement and demolition; Contract E CCD 2016, TIP	3/3	5/5

0092-0532 I-95 NEW HAVEN BRIDGE REPLACEMENT	Q Bridge Replacement and demolition; Contract B CCD 2016, TIP	3/3	5/5
0092-0627 I-95 NEW HAVEN BRIDGE REPLACEMENT	Q Bridge Replacement and demolition; Contract B2 CCD 2016, TIP	3/3	5/5
0092-XXXX NORTH FRONTAGE ROAD NEW HAVEN ROADWAY REMOVAL	Removal of North Frontage Road between State Street & Orange Street CCD 2016, TIP	1/1	0/0
0100-0175 SACKETT POINT ROAD NORTH HAVEN WIDENING	Project to widen Sackett Point Road from 1 lane to 2 lanes CCD 2018, TIP	1/1	2/2
SOUTH WESTERN			
0102-0325 ROUTE 1 NORWALK WIDENING	Addition of a through lane on Route 1 Northbound from France Street to Route 53 CCD 2017, TIP	1/1	1/2
0135-0301 ATLANTIC STREET STAMFORD WIDENING	Reconstruction of I-95 off ramps and Atlantic Street in vicinity of Metro North Railroad Bridge No. 08012R CCD 2018, TIP	2/2	3/3
GREATER BRIDGEPORT			
0138-0211 ROUTE 1 STRATFORD WIDENING	Addition of a through lane on Route 1 Southbound from Nobel Street to Soundview Avenue CCD 2017, TIP	1/1	2/1

CENTRAL NAUGATUCK VALLEY			
0017-0182 ROUTE 6 BRISTOL WIDENING	Addition of a second through lane on Route 6 Eastbound from Carol Drive to Peggy Lane CCD 2018, TIP	2/1	2/2

2020 NETWORK CHANGES

MPO PROJECT NUMBER HIGHWAY NAME TOWN IMPROVEMENT	DESCRIPTION	LANES FROM	 TO
CAPITAL REGION			
0051-0259 I84/RT4/RT6 FARMINGTON INTERCHANGE BSWY	Interchange improvements at Routes 4, 6, and 9 including a new EB C/D Roadway BID 12-31-08, CCD 2019, TIP	N/A	
0063-0703 I-91, EXIT 29 HARTFORD WIDENING	Relocation and Reconfiguration of Interchange 29 on I-91; New addtioanl lanes Rte. 15 NB from 2 to 3 lanes exit 90 to 0.5 miles beyond Exit 91 CCD 2020 Long Range Plan	3/3	4/3
0155-0156 I-84 WEST HARTFORD OPERATIONAL LANES	Add an Operational Lane WB between Interchanges 42 & 39A; Add an Operational Lane EB between Interchanges 40 & 41 CCD 2018	3/3	4/4
CENTRAL NAUGATUCK VALLEY			
0151-0273 I-84 WATERBURY WIDENING	Interstate 84 CCD 11/2020, TIP	2/2	3/3
0151-XXXX DOWNTOWN AREA WATERBURY ADDED ROADWAY	TIGER Grant includes various roadway changes including reconstruction/extension of Jackson Street. Extension will meet at Freight Street and continue to West Main CCD 2019, Long Range Plan	N/A	1/1

GREATER BRIDGEPORT

0015-HXXX ROUTE 130 BRIDGEPORT WIDENING	Reconstruct and widen Route 130 from Stratford Avenue bridge to Yellow Mill bridge Long Range Plan	1/1	2/2
0124-0165 ROUTE 67 SEYMOUR MAJOR WIDENING	**As of 2/15/2011current scope from consultant is spot improvements for from Swan Avenue to Franklin Street Project Manager**Bank Street from West Street to North Main St is full scope being reviewed by consultant Long Range Plan	1/1	2/2
0124-XXXX ROUTE 8 SEYMOUR INTERCHANGE	Between Interchange 22 and 23 to improve access Long Range Plan	N/A	
0124-XXXX ROUTE 8 SEYMOUR INTERCHANGE	Realign interchange with new extension of Derby Road Long Range Plan	N/A	
0126-XXXX ROUTE 8 SHELTON MAJOR WIDENING	Interchaneg 11- Construct new SB entrance ramp, Widen Bridgeport Avenue Long Range Plan	N/A	
0126-XXXX ROUTE 714 SHELTON MAJOR WIDENING	Between Huntington Avenue and Constitution Boulevard Long Range Plan	1/1	2/2
0138-0248 I-95, EXIT 33 STRATFORD INTERCHANGE RECONSTRUCTION	Recontsruct Interchange 33 on I-95 to provide full interchange from partial to full diamond interchange CCD 2020, Long Range Plan	N/A	

HOUSATONIC VALLEY			
0008-XXXX WHITE STREET DANBURY WIDENING	Operational Improvements on White Street at Locust Avenue and Eighth Avenue CCD 2020, Long Range Plan	1/1	1/2
0096-0204 ROUTE 34 NEWTOWN WIDENING	Addition of a through lane on Route 34 EB from Wasserman Way to Toddy Hill Road. Addition of I-84 WB and EB on-ramp from Route 34 WB CCD 2020, TIP	1/1	2/1
SOUTH CENTRAL			
0092-XXXX ROUTE 69 NEW HAVEN INTERSECTION IMPROVEMENTS	Intersection Imrpovements at Route 69 and Pond Lily Avenue Long Range Plan	N/A	

2025 NETWORK CHANGES

MPO PROJECT NUMBER HIGHWAY NAME TOWN IMPROVEMENT	DESCRIPTION	LANES FROM	 TO
CAPITAL REGION			
0042-0317 ROUTE 2 EAST HARTFORD WIDENING	Removal of Cambridge Street to Route 2 WB On-Ramp and Sutton Avenue to Route 2 EB Off-Ramp. New through lane on Main Street NB at the approach to the Route 2 WB Off-Ramp. CCD 2021, TIP	0/1	0/2
LOWER CT RIVER VALLEY			
0082-0316 ROUTE 17 MIDDLETOWN INTERCHANGE RECONFIGURATION	Reconfiguration and realignment of Route 17 On-Ramp onto Route 9 from Main Street. Removal of the Harbor Drive to Route 9 NB On-Ramp CCD 2021, TIP	N/A	
SOUTH WESTERN			
0102-0358 ROUTES 7 & 15 NORWALK INTERCHANGE RECONFIGURATION	Reconfiguration of the interchanges between Route 7, Route 15, and Main Avenue. These changes include multiple new and reconfigured on and off ramps designed to allow access to and from all three major roadways. CCD 2025, TIP	N/A	

2030 NETWORK CHANGES

MPO PROJECT NUMBER HIGHWAY NAME TOWN IMPROVEMENT	DESCRIPTION	LANES FROM	TO
CAPITAL REGION			
VARIOUS TOWNS NEW COMMUTER RAIL	New Haven/Hartford/Springfield Rail Service Governor's Transportation Initiative Long Range Plan	N/A	
0109-XXXX PLAINVILLE ADD LANE	New Britain Avenue Cooke Street to Hooker Street Long Range Plan	1/1	2/2
CENTRAL NAUGATUCK VALLEY			
0080-0128 I-84, Routes 63-64 MIDDLEBURY/WATERBURY WIDENING	Add auxiliary lanes at Int. 17 and on Routes 63/64 CCD 2030 Long Range Plan	1/1	2/2
GREATER BRIDGEPORT			
0036-0179 ROUTE 8 ANSONIA INTERCHANGE	Interchange 18 - Construct New NB entrance ramp. Long Range Plan	N/A	
0036-XXXX ROUTE 8 DERBY INTERCHANGE	Route 8 Interchange 16 and 17; Construct new NB ramps. Close old ramps Long Range Plan	N/A	
0126-XXXX ROUTE 8 SHELTON INTERCHANGE	Interchange 14 - Construct new SB entrance ramp Long Range Plan	N/A	

HOUSATONIC VALLEY

0018-0124 US 202 BROOKFIELD WIDENING	South of Old State Road to Route 133 Long Range Plan	1/1	2/2
0034-0288 ROUTE 6 DANBURY ADD LANES	From Kenosia Avenue easterly to I-84 (Exit 4) Long Range Plan	1/1	2/2
0034-XXXX ROUTE 6 DANBURY ADD LANES	From I-84 (Exit 2) East to Kenosia Avenue Long Range Plan	1/1	2/2
0034-XXXX ROUTE 37 DANBURY ADD LANES	From Route I-84 (Exit 6) Northerly to Jeanette Street Long Range Plan	1/1	2/2
0034-XXXX I-84 DANBURY, NEWTOWN, SOUTHBURY ADD LANES	Between Interchanges 3 and 4.Between Interchanges 12 and 13 Long Range Plan	3/3	4/4
0034-XXXX DANBURY ADD LANES	Widen Kenosia Avenue from Backus Avenue to Vicinity of Lake Kenosia Long Range Plan	1/1	2/2
0034-XXXX DANBURY ADD LANES	Widen Backus Avenue from Kenosia Avenue to Miry Brook Road Long Range Plan	1/1	2/2
0034-XXXX ROUTE 53 DANBURY ADD LANES	From South Street northerly to Boughton Street; Long Range Plan	1/1	2/2

0034-XXXX ROUTE 37 DANBURY ADD LANES	From Route 53 (Main Street) northerly to I-84 (Exit 6) Long Range Plan	1/1	2/2
0096-XXXX NEWTOWN NEW ROAD ADD LANES	New Road across Old Fairfield Hills Hospital Campus, From Route 6 South to Route 860 Long Range Plan	0/0	1/1
SOUTH CENTRAL			
0014-XXXX ROUTE 1 BRANFORD WIDENING	East Haven Town Line to Alps Road (Echlin Road Private) Long Range Plan	2/2	2/3
0014-XXXX ROUTE 1 BRANFORD WIDENING	Route 146 to Cedar Street Long Range Plan	2/2	2/3
0014-XXXX ROUTE 1 BRANFORD WIDENING	Cedar Street to East Main Long Range Plan	1/1	1/2
0014-XXXX ROUTE 1 BRANFORD WIDENING	East Main to 1-95 Exit 55 Long Range Plan	1/1	1/2
0014-XXXX ROUTE 1 BRANFORD WIDENING	I-95 Exit 55 to Leetes Island Road Long Range Plan	1/1	1/2
0059-XXXX BULLARD RD GUILFORD WIDENING	Bullard Road extension to Route 77 Long Range Plan	0/0	1/1

0059-XXXX ROUTE 1 GUILFORD WIDENING	State Street to Tanner Marsh Road Long Range Plan	1/1	1/2
0061-XXXX ROUTE 10 HAMDEN WIDENING	Washington Avenue to Route 40 Long Range Plan	2/2	2/3
0061-XXXX ROUTE 10 HAMDEN WIDENING	Route 40 to Todd Street Long Range Plan	2/2	2/3
0061-XXXX ROUTE 10 HAMDEN WIDENING	Todd Street to Shepard Avenue Long Range Plan	1/1	2/2
0061-XXXX ROUTE 10 HAMDEN WIDENING	River Street to Cheshire Town Line Long Range Plan	1/1	2/2
0061-XXXX ROUTE 5 HAMDEN, NORTH HAVEN WIDENING	Olds Street (Hamden) to Sackett Point Road Long Range Plan	1/1	2/2
0073-XXXX ORANGE NEW COMMUTER RAIL	New Rail Station near Salemme Lane in Orange CCD 2030, Long Range Plan	N/A	
0079-XXXX ROUTE 5 MERIDEN WIDENING	Wallingford Town Line to Olive Street (Route 71) Long Range Plan	1/1	2/2
0083-XXXX ROUTE 162 MILFORD WIDENING	From West of Old Gate Lane to Gulf Street/Clark Street to Route 1 Long Range Plan	1/1	2/2

0092-0649 NEW HAVEN	Long Wharf access Plan Widen I-95 (in separate project), Eliminate Long Wharf Drive to expand park, add new road from Long Wharf Drive Long Range Plan	VARIES	
0092-XXXX ROUTE 69 NEW HAVEN, WOODBRIDGE WIDENING	From Route 63 to Landin Street Long Range Plan	1/1	2/2
0092-XXXX ROUTE 63 NEW HAVEN, WOODBRIDGE WIDENING	From Dayton Street (NH) to Landin Street (Wdbg) Long Range Plan	1/2	2/3
0098-XXXX ROUTE 80 NORTH BRANFORD WIDENING	From East Haven Town Line to Doral Farms Road and Route 22 to Guilford Town Line Long Range Plan	1/1	1/2
0106-XXXX ROUTE 162 ORANGE WIDENING	From West Haven Town Line to US 1 Long Range Plan	1/1	2/2
0148-XXXX ROUTE 5 WALLINGFORD ROUTE 5	From South Orchard Street. to Ward Street and Christian Road to Meriden Town Line Long Range Plan	1/1	2/2
0148-XXXX ROUTE 150 WALLINGFORD WIDENING	From Route 71 overpass South of Old Colony Road to Route 68 Long Range Plan	1/1	1/2
0156-XXXX ROUTE 122 WEST HAVEN WIDENING	Route 1 to Elm Street Long Range Plan	1/1	2/2

0156-XXXX ROUTE 1 WEST HAVEN WIDENING	Campbell Avenue to Orange Town Line Long Range Plan	1/1	2/2
0156-XXXX ROUTE 162 WEST HAVEN WIDENING	Elm Street to Greta Street Long Range Plan	2/2	2/3
0156-XXXX ROUTE 162 WEST HAVEN WIDENING	Bull Hill Ln to Orange Town Line Long Range Plan	1/1	2/2
VARIOUS TOWNS NEW COMMUTER RAIL	New Haven/Hartford/Springfield Rail Service Governor's Transportation Initiative Long Range Plan	N/A	
SOUTH WESTERN			
0035-XXXX I-95 Darien-Stamford WIDENING	Add Lane from Stamford Exit 8 to Darien Exit 10, Operational Lane Long Range Plan	3/3	4/4
0102-0269 US 7/RT 15 NORWALK UPGRADE EXPRESSWAY	Upgrade to full interchange at Merritt Parkway (Route 15) BID 01-09-08 CCD 2030, Long Range Plan	N/A	
0102-0297 EAST AVE #1 NORWALK WIDENING	East Avenue from the vicinity of the I-95 Ramps southerly to the vicinity of Van Zant Street Long Range Plan	1/1	2/2
0102-0312 ROUTE 7/15 NORWALK UPGRADE EXPRESSWAY	Reconstruction of Interchange 40 Merritt Parkway and Route 7 (Main Avenue). Breakout of 0102-0269 Phase 1 CCD 2030, Long Range Plan	N/A	

0102-XXXX NORWALK-GREENWICH BRT	Express Bus/BRT between Norwalk and Greenwich Long Range Plan	N/A

2040 NETWORK CHANGES

MPO PROJECT NUMBER HIGHWAY NAME TOWN IMPROVEMENT	DESCRIPTION	LANES FROM	TO
GREATER BRIDGEPORT			
0015-XXXX NEW COMMUTER RAIL	New Rail Station near Barnum Street in Bridgeport CCD 2040 Long Range Plan	N/A	

The PM 2.5 input file into MOVES2014a for each analysis year consisted of “annual average” scenario. All months were selected for an “annual average” evaluation. Appropriate minimum/maximum temperatures were employed, as well as annual average FUEL RVP, SPEED VMT, and DIESEL SULFUR values. Annual emission factors were obtained for each county by roadway classification.

In addition, model runs incorporate the effect of the Employer Commute Options (ECO) Program in Southwest Connecticut (Fairfield County). In response to federal legislation, Connecticut has restructured the ECO program to emphasize voluntary participation, combined with positive incentives, to encourage employees to rideshare, use transit and continue to expand their trip reduction activities. In addition, the program has been made available to all employers. It is felt that this process is an effective means of achieving Connecticut's clean air targets. Funding of this effort under the Congestion Mitigation and Air Quality Improvement (CMAQ) program is included in the TIP for FY 2015-2018. It is estimated that this program, if fully successful, could reduce VMT and mobile source emissions by 2% in Southwest Connecticut.

It should be noted that TIP and LRTP projects, which have negligible impact on trip distribution and/or highway capacity, have not been incorporated into the network. These include, but are not limited to, geometric improvements of existing interchanges, short sections of climbing lanes, intersection improvements, transit projects dealing with equipment for existing facilities and vehicles, and transit operating assistance. Essentially, those projects that do not impact the travel demand forecasts are not included in the network and/or analysis.

The network-based travel model used for this analysis is the model that CTDOT utilizes for transportation planning, programming and design requirements. This travel demand model uses demographic and land use assumptions based on the 2010 Census population and Connecticut Department of Labor 2010 employment estimates. Population and employment projections for the years 2020, 2030 and 2040 were developed by the Connecticut Department of Transportation, Travel Demand and Air Quality Modeling Unit and approved by all the regional planning agencies in early 2012.

The model uses a constrained equilibrium approach to allocate trips among links. The model was calibrated using 2013 ground counts and 2013 HPMS VMT data.

Peak hour directional traffic volumes were estimated as a percentage of the Average Daily Traffic (ADT) on a link-by-link basis. Based on automatic traffic recorder data, 9.0 percent, 8.5 percent, 8.0percent and 7.5 percent of the ADT occurs during the four highest hours of the day. A 55:45 directional split was assumed. Hourly volumes were then converted to Service Flow Levels (SFL) and Volume to Capacity (V/C) ratios calculated as follows:

$$SFL = DHV/PHF*N$$
$$VC = SFL / C$$

where: DHV = Directional Hourly Volume
PHF = Peak Hour Factor = 0.9
N = Number of lanes
C = Capacity of lane

Peak period speeds were estimated from the 2000 Highway Capacity Manual based on the design speed, facility class, area type and calculated V/C ratio. On the expressway system, Connecticut-based free flow speed data was available. This data was deemed more appropriate and superseded the capacity manual speed values. The expressway free flow speeds were updated in 2005.

For the off - peak hours, traffic volume is not the controlling factor for vehicle speed. Off-peak link speeds were based on the Highway Capacity Manual free flow speeds as a function of facility class and area type. As before, Connecticut-based speed data was substituted for expressway travel, where available, and was also updated in 2005.

Two special cases exist in the travel demand modeling process. These are centroid connectors and intrazonal trips.

- Centroid connectors represent the local roads used to gain access to the model network from centers of activity in each traffic analysis zone (TAZ). A speed of 25 mph is utilized for these links.
- Intrazonal trips are trips that are too short to get on to the model network. VMT for intrazonal trips is calculated based on the size of each individual TAZ. A speed of 20 to 24 mph is utilized for peak period and 25 to 29 mph for off - peak.

The Daily Vehicle Miles of Travel (DVMT) is calculated using a methodology based on disaggregate speed and summarized by inventory area, functional classification, and speed. The annual VMT and speed profiles developed by this process are then combined with the emission factors from the MOVES2014a model to produce emission estimates for each scenario and time frame. MOVES2014a PM 2.5 and NOx annual emissions by County may be found in Appendix B. The MOVES2014a input files are in Appendix C. Appendix D lists various acronyms used in the report.

In all cases the transportation program and plan meets the required conformity tests:

- For years 2017 to 2024, Direct PM 2.5 in the Connecticut portion of the New York-Northern New Jersey-Long Island attainment/maintenance area must be less than 575.8 tons per

year.

- For years 2017 to 2024, NOx in the Connecticut portion of the New York-Northern New Jersey-Long Island attainment/maintenance area must be less than 12,791.8 tons per year.

- For year 2025 and subsequent years, Direct PM 2.5 in the Connecticut portion of the New York-Northern New Jersey-Long Island attainment/maintenance area must be less than 516.0 tons per year.

- In year 2025 and subsequent years, NOx in the Connecticut portion of the New York-Northern New Jersey-Long Island attainment/maintenance area must be less than 9,728.1 tons per year.

This analysis in no way reflects the full benefit on air quality from the transportation plan and program. The network-based modeling process is capable of assessing the impact of major new highway or transit service. It does not reflect the impact from the many projects, which are categorically excluded from the requirement of conformity. These projects include numerous improvements to intersections, which will allow traffic to flow more efficiently, thus reducing delay, fuel usage and emissions. Included in the TIP, but not reflected in this analysis, are many projects to maintain existing rail and bus systems. Without these projects, those systems could not offer the high level of service they do. With them, the mass transit systems function more efficiently, improve safety, and provide a more dependable and aesthetically appealing service. These advantages will retain existing patrons and attract additional riders to the system. The technology to quantify the air quality benefits from these programs is not currently available.

As shown in this analysis, transportation emissions are declining dramatically and will continue to do so. This is primarily due to programs such as reformulated fuels, enhanced inspection and maintenance programs, stage two vapor recovery (area source), the low emissions vehicles (LEV) program, and the Tier 2 / Sulfur-in-Gas reduction program.

MOVES2014a includes there new emission control programs associated with regulation promulgated since the release of MOVES2010b:

- Tier 3 emission standards that phase in beginning in 2017 for cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty trucks, and Tier 3 fuel standards that require lower sulfur gasoling beginning in 2017.

- Heavy-duty engine and vehicle greenhouse gas (GHG) regulations that phase in during model years 2014-2018.

- The second phase of light-duty vehicle GHG regulations that phase in for model years 2017-2025 cars and light trucks.

MOVES2014a estimates exhaust and evaporative emissions as well as brake and tire wear emissions from all types of on-road vehicles. MOVES2014a also uses a vehicle classification system based on the way cehicles are classified in the FHWA's Highway Performance Monitoring System (HPMS). Other parameters include vehicle miles traveled (VMT) by vehicle and road type, vehicle hours traveled (VHT) by vehicle and road type, the number of each type of vehicle in the fleet, vehicle age distribution, model year, travel speed, roadway type, fuel information, meterorological data, such as ambient temperatirue and humidity, and applicable control measures such as reformulated gasoline (RFG) and inspection and maintenance (I/M). Local inputs were cooperatively developed by CTDEEP and CTDOT, where applicable, using EPA recommended metods.[3]

Changes in the transportation system will not produce significant emissions reductions because of the massive existing rail, bus, highway systems, and land development already in place. Change in these aspects is always at the margin, producing very small impacts.

10) ANALYSIS RESULTS

As part of the redesignation request, the State submitted a maintenance plan as required by section 175A of the Clean Air Act. Elements of the section 175A maintenance plan include a contingency plan and an obligation to submit a subsequent maintenance plan revision as required by the Clean Air Act. The $PM_{2.5}$ maintenance plan also establishes 2017 and 2025 MVEBs for the Area. Connecticut is establishing 2017 MVEBs of 575.8 tons per year (tpy) for direct $PM_{2.5}$ and 12,791.8 tpy for NO_X, and 2025 MVEBs of 516 tpy for direct $PM_{2.5}$ and 9,728.1tpy for NO_X, for the Southwestern CT Area for maintenance of the 1997 annual and 2006 24- hour $PM_{2.5}$ standards. The emissions analysis results for the Connecticut portion of the New York-Northern New Jersey-Long Island multi-state attainment/maintenance area are presented in Table 3 on the next page.

[3] "MOVES2014 and MOVES2014a Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity", EPA-420-B-15-093. November 2015

Table 3: Direct PM2.5 and NOx Emission Budget Test Results (tons per year)

Year	Series 31A		Budgets		Difference	
	Direct PM 2.5	NOx	Direct PM 2.5	NOx	Direct PM 2.5	NOx
2017	313.1	7,942.8	575.8	12,791.8	-262.7	-4,848.2
2025	201.5	4,350.3	516.0	9,728.1	-314.5	-5,377.8
2035	153.5	2,713.1	516.0	9,728.1	-362.5	-7,015.0
2040	143.9	2,563.8	516.0	9,728.1	-372.1	-7,164.3

11) CONCLUSION

This emissions analysis transportation conformity has been demonstrated for the Connecticut portion of the NY-NJ-CT $PM_{2.5}$ Attainment/Maintenance Area based upon the direct $PM_{2.5}$ and the NOx emission budgets for 2017 and 2025 effective as of February 20, 2013. The region has attained National Ambient Air Quality Standards and EPA published its approval of the $PM_{2.5}$ redesignation request, establishing October 24, 2013 as the effective date of redesignation to attainment for Connecticut's portion of the NY-NJ-CT Area for both the 1997 annual and 2006 24-hour $PM_{2.5}$ NAAQS.

Please direct any questions you may have on the air quality emission analysis to:

Connecticut Department of Transportation
Bureau of Policy and Planning
Division of Coordination, Modeling and Crash Data – Unit 57531
2800 Berlin Turnpike
Newington, CT. 06111
(860) 594-2032
Email: *Judy.Raymond@ct.gov*

APPENDIX A

Interagency Consultation Meeting Minutes

INTERAGENCY CONSULTATION MEETING
Statewide Transportation Improvement Program Amendments
Connecticut Department of Transportation
Room 2324 –April 19, 2016 Go To Meeting

Attendees:

Eloise Powell – FHWA
Ken Shooshan-Stoller, FHWA
Paul Farrell - CTDEEP
Paul Bodner – CTDEEP
Lou Corsino - CTDEEP
Jennifer Carrier - CRCOG
Pramad Pandey – CRCOG
Cara Radzins – CRCOG
Jillian Massey - CRCOG
Mark Nielson – CNVMPO
Christian Meyer – CNVMPO
Meghan Sloan – CT Metro COG
Pat Carleton – CT Metro COG
Robert Haramut – LCRVCOG
Stephen Dudley –SCRCOG
James Rode – SCRCOG
Richard Guggenheim – SECCOG
Joanna Wozniak – NWHill COG
Hoween Flexer – NECT COG
Susan Prosi – Western COG
Jon Chew – Housatonic Valley
Maribeth Wojenski – CTDOT
Judy Raymond – CTDOT
Rose Etuka – CTDOT
Roxane Fromson -CTDOT
Grayson Wright – CTDOT
Edgar Wynkoop - CTDOT
Sara Radacsi – CTDOT
Matthew Cegielski- CTDOT
Tiffany Garcia – CTDOT
Joe Ouellette – CTDOT
Ryan Dolan – CTDOT

The Interagency Consultation Meeting was held to review projects submitted to the STIP Unit for inclusion in the updated, amended STIP.

Both the Ozone and PM 2.5 reports will be electronically distributed to the MPOs in the appropriate Nonattainment/Maintenance areas, FTA, FHWA, DEEP and EPA. The MPOs will need to hold a 30 day public comment and review period. At the end of this review period, the MPO will hold a Policy Board meeting to endorse the Air Quality Conformity determination.

There was also a brief discussion on the travel model and emissions software planning assumptions employed in the conformity analysis.

The schedule for the 2015-2018 Regional Transportation Improvement Plans Amendments Conformity Determination Analysis is as follow:

- MPOs transmit signed and dated Concurrence Form to judy.raymond@ct.gov by April 19, 2016.
- CTDOT Travel Demand Model Unit performs the air quality analysis and sends the Air Quality Conformity Determination Reports electronically to all MPOs in August 2016.
- MPOs advertise and hold a 30-day public review and comment period for the Air Quality Conformity.
- MPOs hold a Policy Board meeting approving and endorsing the Air Quality Conformity.
- MPOs transmit resolutions endorsing the Air Quality Conformity to judy.raymond@ct.gov by end of October 2016.

It is important that all MPOs follow this schedule to ensure that the LRTP and TIP/STIP Amendment Conformity Determinations can go forward on schedule.

PLANNING ASSUMPTIONS

Ozone and PM2.5

2015 Regional Long Range Transportation Plan

Conformity Analysis A p r i l 19, 2016

Planning Assumptions for Review	Frequency of Review*	Responsible Agency	Year of Data
Socioeconomic Data	At least every 5 years	CTDOT	2010 Census Data available 2012
DMV Vehicle Registration Data	At least every 5 years	CTDEEP	2011 Data available 2012
State Vehicle Inspection and Maintenance Program	Each conformity round	CTDEEP	Same as currently approved I&M SIP
State Low Emission Vehicle Program	Each conformity round following approval into the SIP	CTDEEP	Same as SIP
VMT Mix Data	At least every 5 years	CTDEEP	2010**
Analysis Years – PM 2.5	Each conformity round	CTDOT CTDEEP	2017, 2025, 2035, 2040
Analysis Years – Ozone	Each conformity round	CTDOT CTDEEP	2017, 2025, 2035, 2040
Emission Budget – PM2.5	As SIP revised/updated	CTDEEP	2017 / 2025 PM 2.5
Emission Budget – Ozone	As SIP revised/updated	CTDEEP	2009
Temperatures and Humidity	As SIP revised/updated	CTDEEP	X
Control Strategies	Each conformity round	CTDEEP	X
HPMS VMT	Each conformity round	CTDOT	2013

***** Review of Planning Assumptions does not necessarily prelude an update or calibration of the travel demand model.

** Data not available until 2011

APPENDIX B

PM 2.5 AND NOx PRECURSOR EMISSION OUTPUTS BY ANALYSIS YEAR

MOVES2014a 2017 County Summary:

County	Total Energy Consumption 91 (Joules/Day)	Oxides of Nitrogen 3 (Tons/Day)	110 Primary Exhaust 2.5 Total	116 Brakewear	117 Tirewear	**County Total**
Fairfield	4.156320E+16	3.949566E+03	120.5385196	24.24356767	10.9236477	**155.70573**
New Haven	4.169195E+16	3.993233E+03	123.429806	23.07694603	10.89799633	**157.40475**
Totals	**8.325515E+16**	**7.942799E+03**				**313.11048**

MOVES2014a 2025 County Summary:

County	Total Energy Consumption 91 (Joules/Day)	Oxides of Nitrogen 3 (Tons/Day)	110 Primary Exhaust 2.5 Total	116 Brakewear	117 Tirewear	County Total
Fairfield	3.495167E+16	2.143620E+03	63.45501713	25.92118839	11.48147335	**100.85768**
New Haven	3.541139E+16	2.206702E+03	64.2380279	24.90041685	11.53142286	**100.66987**
Totals	**7.036306E+16**	**4.350323E+03**				**201.52755**

MOVES2014a 2035 County Summary:

County	Total Energy Consumption 91 (Joules/Day)	Oxides of Nitrogen 3 (Tons/Day)	110 Primary Exhaust 2.5 Total	116 Brakewear	117 Tirewear	**County Total**
Fairfield	2.938622E+16	1.300432E+03	35.0217624	27.70370133	12.04642738	**74.77189**
New Haven	3.115337E+16	1.412685E+03	36.79070391	29.27241723	12.62698451	**78.69011**
Totals	**6.053959E+16**	**2.713118E+03**				**153.46200**

MOVES2014a 2040 County Summary:

County	Total Energy Consumption 91 (Joules/Day)	Oxides of Nitrogen 3 (Tons/Day)	110 Primary Exhaust 2.5 Total	116 Brakewear	117 Tirewear	**County Total**
Fairfield	2.886547E+16	1.223008E+03	29.37515389	28.33778892	12.22001177	69.93295
New Haven	3.072112E+16	1.340771E+03	31.07709275	30.0642041	12.85691512	73.99821
Totals	**5.958659E+16**	**2.563780E+03**				**143.93117**

APPENDIX C

PM2.5 and NOx INPUT FILES TO MOVES2014a

2017 Fairfield


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County scale, inventory mode, 12 months (annual run), weekdays and weekends, 24 hours, all fuels (except placeholder and LPG)/source use type combinations, all road types.
All pollutants. Caution: Need to eliminate Primary Exhaust PM2.5 Total to avoid double counting.
CALEV and NLEV databases.
Output:
Activity: all.
Include: Fuel Type, Emission Processes, Road Type and Source Use Type
For use in 2016 Conformity.
September 8, 2016]]></description>
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2017 New Haven


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All pollutants. Caution: Need to eliminate Primary Exhaust PM2.5 Total to avoid double counting.
CALEV and NLEV databases.
Output:
Activity: all.
Include: Fuel Type, Emission Processes, Road Type and Source Use Type
For use in 2016 Conformity.
September 8, 2016]]></description>
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<emissionprocess selected="true"/>
<onroadoffroad selected="true"/>
<roadtype selected="true"/>
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<distancefactors selected="true" units="Miles"/>
<massfactors selected="true" units="U.S. Ton" energyunits="Joules"/>
</outputfactors>
<savedata>

</savedata>

<donotexecute>

</donotexecute>

<generatordatabase shouldsave="false" servername="" databasename="" description=""/>
<donotperformfinalaggregation selected="false"/>
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</runspec>

2025 Fairfield


```
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County scale, inventory mode, 12 months (annual run), weekdays and weekends, 24 hours, all fuels (except placeholder
and LPG)/source use type combinations, all road types.
All pollutants. Caution: Need to eliminate Primary Exhaust PM2.5 Total to avoid double counting.
CALEV and NLEV databases.
Output:
Activity: all.
Include: Fuel Type, Emission Processes, Road Type and Source Use Type
For use in 2016 Conformity.
September 8, 2016]]></description>
	<models>
		<model value="ONROAD"/>
	</models>
	<modelscale value="Inv"/>
	<modeldomain value="SINGLE"/>
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	</geographicselections>
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		<month id="12"/>
		<day id="2"/>
		<day id="5"/>
		<beginhour id="1"/>
		<endhour id="24"/>
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sourcetypename="Transit Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="62"
sourcetypename="Combination Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="61"
sourcetypename="Combination Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity
Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light
Commercial Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="54" sourcetypename="Motor
Home"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21"
sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31"
sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse
Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School
Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="53" sourcetypename="Single
Unit Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="52" sourcetypename="Single
Unit Short-haul Truck"/>
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Car"/>
        <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="31" sourcetypename="Passenger
Truck"/>
        <onroadvehicleselection fueltypeid="5" fueltypedesc="Ethanol (E-85)" sourcetypeid="32" sourcetypename="Light
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        <onroadvehicleselection fueltypeid="5" fueltypedesc="Ethanol (E-85)" sourcetypeid="21"
sourcetypename="Passenger Car"/>
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sourcetypename="Passenger Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="61"
sourcetypename="Combination Short-haul Truck"/>
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Truck"/>
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Bus"/>
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Long-haul Truck"/>
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Short-haul Truck"/>
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processname="Auxiliary Power Exhaust"/>
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        <pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="2"
processname="Start Exhaust"/>
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processname="Crankcase Start Exhaust"/>
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<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="2" processname="Start Exhaust"/>
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useParameters No

]]></internalcontrolstrategy>
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<fuelsubtype selected="false"/>
<emissionprocess selected="true"/>
<onroadoffroad selected="true"/>
<roadtype selected="true"/>
<sourceusetype selected="true"/>
<movesvehicletype selected="false"/>
<onroadscc selected="false"/>
<estimateuncertainty selected="false" numberOfIterations="2" keepSampledData="false" keepIterations="false"/>
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<engtechid selected="false"/>
<hpclass selected="false"/>
<regclassid selected="false"/>
</outputemissionsbreakdownselection>
<outputdatabase servername="" databasename="out_ct_2025_2016conformity_annual_20160908" description=""/>
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<outputvmtdata value="true"/>
<outputsho value="true"/>
<outputsh value="true"/>
<outputshp value="true"/>
<outputshidling value="true"/>
<outputstarts value="true"/>
<outputpopulation value="true"/>
<scaleinputdatabase servername="localhost" databasename="in_2025_9001_ff_2016conformity_annual20160908" description=""/>
<pmsize value="0"/>
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<distancefactors selected="true" units="Miles"/>
<massfactors selected="true" units="U.S. Ton" energyunits="Joules"/>

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    </savedata>

    <donotexecute>

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</runspec>
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2025 New Haven


```
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County scale, inventory mode, 12 months (annual run), weekdays and weekends, 24 hours, all fuels (except placeholder
and LPG)/source use type combinations, all road types.
All pollutants. Caution: Need to eliminate Primary Exhaust PM2.5 Total to avoid double counting.
CALEV and NLEV databases.
Output:
Activity: all.
Include: Fuel Type, Emission Processes, Road Type and Source Use Type
For use in 2016 Conformity.
September 8, 2016]]></description>
	<models>
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	</models>
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		<month id="12"/>
		<day id="2"/>
		<day id="5"/>
		<beginhour id="1"/>
		<endhour id="24"/>
		<aggregateBy key="Hour"/>
	</timespan>
	<onroadvehicleselections>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="42"
sourcetypename="Transit Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="62"
sourcetypename="Combination Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="61"
sourcetypename="Combination Short-haul Truck"/>
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Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light
Commercial Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="54" sourcetypename="Motor
Home"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21"
sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31"
sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse
Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School
Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="53" sourcetypename="Single
Unit Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="52" sourcetypename="Single
Unit Short-haul Truck"/>
```

```
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Bus"/>
        <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="32" sourcetypename="Light
Commercial Truck"/>
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Car"/>
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Truck"/>
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Commercial Truck"/>
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sourcetypename="Passenger Car"/>
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2035 Fairfield


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County scale, inventory mode, 12 months (annual run), weekdays and weekends, 24 hours, all fuels (except placeholder
and LPG)/source use type combinations, all road types.
All pollutants. Caution: Need to eliminate Primary Exhaust PM2.5 Total to avoid double counting.
CALEV and NLEV databases.
Output:
Activity: all.
Include: Fuel Type, Emission Processes, Road Type and Source Use Type
For use in 2016 Conformity.
September 8, 2016]]></description>
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    <lookuptableflags scenarioid="" truncateoutput="true" truncateactivity="true" truncatebaserates="true"/>
</runspec>
```

2035 New Haven


```
<runspec version="MOVES2014a-20151201">
	<description><![CDATA[RunSpec for New Haven County (09009) for 2035.
County scale, inventory mode, 12 months (annual run), weekdays and weekends, 24 hours, all fuels (except placeholder
and LPG)/source use type combinations, all road types.
All pollutants. Caution: Need to eliminate Primary Exhaust PM2.5 Total to avoid double counting.
CALEV and NLEV databases.
Output:
Activity: all.
Include: Fuel Type, Emission Processes, Road Type and Source Use Type
For use in 2016 Conformity.
September 8, 2016]]></description>
	<models>
		<model value="ONROAD"/>
	</models>
	<modelscale value="Inv"/>
	<modeldomain value="SINGLE"/>
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		<geographicselection type="COUNTY" key="9009" description="CONNECTICUT - New Haven County"/>
	</geographicselections>
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		<month id="9"/>
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		<month id="11"/>
		<month id="12"/>
		<day id="2"/>
		<day id="5"/>
		<beginhour id="1"/>
		<endhour id="24"/>
		<aggregateBy key="Hour"/>
	</timespan>
	<onroadvehicleselections>
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sourcetypename="Transit Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="62"
sourcetypename="Combination Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="61"
sourcetypename="Combination Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity
Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light
Commercial Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="54" sourcetypename="Motor
Home"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21"
sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31"
sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse
Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School
Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="53" sourcetypename="Single
Unit Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="52" sourcetypename="Single
Unit Short-haul Truck"/>
```

```
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit
Bus"/>
        <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="32" sourcetypename="Light
Commercial Truck"/>
        <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="21" sourcetypename="Passenger
Car"/>
        <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="31" sourcetypename="Passenger
Truck"/>
        <onroadvehicleselection fueltypeid="5" fueltypedesc="Ethanol (E-85)" sourcetypeid="32" sourcetypename="Light
Commercial Truck"/>
        <onroadvehicleselection fueltypeid="5" fueltypedesc="Ethanol (E-85)" sourcetypeid="21"
sourcetypename="Passenger Car"/>
        <onroadvehicleselection fueltypeid="5" fueltypedesc="Ethanol (E-85)" sourcetypeid="31"
sourcetypename="Passenger Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="61"
sourcetypename="Combination Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="32" sourcetypename="Light
Commercial Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="54" sourcetypename="Motor
Home"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="11"
sourcetypename="Motorcycle"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="21" sourcetypename="Passenger
Car"/>
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Truck"/>
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Truck"/>
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Bus"/>
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Long-haul Truck"/>
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Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="42" sourcetypename="Transit
Bus"/>
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    </offroadvehicleselections>
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    </offroadvehiclesccs>
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        <roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access" modelCombination="M1"/>
        <roadtype roadtypeid="4" roadtypename="Urban Restricted Access" modelCombination="M1"/>
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processname="Start Exhaust"/>
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processname="Extended Idle Exhaust"/>
        <pollutantprocessassociation pollutantkey="118" pollutantname="Composite - NonECPM" processkey="91"
processname="Auxiliary Power Exhaust"/>
        <pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="1"
processname="Running Exhaust"/>
        <pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="2"
processname="Start Exhaust"/>
        <pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="15"
processname="Crankcase Running Exhaust"/>
        <pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="16"
processname="Crankcase Start Exhaust"/>
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<pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
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<pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="119" pollutantname="H2O (aerosol)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="119" pollutantname="H2O (aerosol)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="119" pollutantname="H2O (aerosol)" processkey="90" processname="Extended Idle Exhaust"/>
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<pollutantprocessassociation pollutantkey="111" pollutantname="Organic Carbon" processkey="2" processname="Start Exhaust"/>
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<pollutantprocessassociation pollutantkey="111" pollutantname="Organic Carbon" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Organic Carbon" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Organic Carbon" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Organic Carbon" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="2" processname="Start Exhaust"/>
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<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="16" processname="Crankcase Start Exhaust"/>
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<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="91" processname="Auxiliary Power Exhaust"/>
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<pollutantprocessassociation pollutantkey="117" pollutantname="Primary PM2.5 - Tirewear Particulate" processkey="10" processname="Tirewear"/>
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<pollutantprocessassociation pollutantkey="115" pollutantname="Sulfate Particulate" processkey="2" processname="Start Exhaust"/>
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processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Sulfate Particulate" processkey="16" processname="Crankcase Start Exhaust"/>
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<pollutantprocessassociation pollutantkey="115" pollutantname="Sulfate Particulate" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Sulfate Particulate" processkey="91" processname="Auxiliary Power Exhaust"/>
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<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="90" processname="Extended Idle Exhaust"/>
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</databaseselections>
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useParameters No

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</internalcontrolstrategies>
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<uncertaintyparameters uncertaintymodeenabled="false" numberofrunspersimulation="0" numberofsimulations="0"/>
<geographicoutputdetail description="COUNTY"/>
<outputemissionsbreakdownselection>
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<fueltype selected="true"/>
<fuelsubtype selected="false"/>
<emissionprocess selected="true"/>
<onroadoffroad selected="true"/>
<roadtype selected="true"/>
<sourceusetype selected="true"/>
<movesvehicletype selected="false"/>
<onroadscc selected="false"/>
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<hpclass selected="false"/>
<regclassid selected="false"/>
</outputemissionsbreakdownselection>
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<outputvmtdata value="true"/>
<outputsho value="true"/>
<outputsh value="true"/>
<outputshp value="true"/>
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<outputstarts value="true"/>
<outputpopulation value="true"/>
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<distancefactors selected="true" units="Miles"/>
<massfactors selected="true" units="U.S. Ton" energyunits="Joules"/>

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    </outputfactors>
    <savedata>

    </savedata>

    <donotexecute>

    </donotexecute>

    <generatordatabase shouldsave="false" servername="" databasename="" description=""/>
        <donotperformfinalaggregation selected="false"/>
    <lookuptableflags scenarioid="" truncateoutput="true" truncateactivity="true" truncatebaserates="true"/>
</runspec>
```

2040 Fairfield


```
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	<description><![CDATA[RunSpec for Fairfield County (09001) for 2040.
County scale, inventory mode, 12 months (annual run), weekdays and weekends, 24 hours, all fuels (except placeholder
and LPG)/source use type combinations, all road types.
All pollutants. Caution: Need to eliminate Primary Exhaust PM2.5 Total to avoid double counting.
CALEV and NLEV databases.
Output:
Activity: all.
Include: Fuel Type, Emission Processes, Road Type and Source Use Type
For use in 2016 Conformity.
September 8, 2016]]></description>
	<models>
		<model value="ONROAD"/>
	</models>
	<modelscale value="Inv"/>
	<modeldomain value="SINGLE"/>
	<geographicselections>
		<geographicselection type="COUNTY" key="9001" description="CONNECTICUT - Fairfield County"/>
	</geographicselections>
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		<month id="4"/>
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		<month id="12"/>
		<day id="2"/>
		<day id="5"/>
		<beginhour id="1"/>
		<endhour id="24"/>
		<aggregateBy key="Hour"/>
	</timespan>
	<onroadvehicleselections>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="42"
sourcetypename="Transit Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="62"
sourcetypename="Combination Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="61"
sourcetypename="Combination Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity
Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light
Commercial Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="54" sourcetypename="Motor
Home"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21"
sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31"
sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse
Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School
Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="53" sourcetypename="Single
Unit Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="52" sourcetypename="Single
Unit Short-haul Truck"/>
```

```
        <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit
Bus"/>
        <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="32" sourcetypename="Light
Commercial Truck"/>
        <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="21" sourcetypename="Passenger
Car"/>
        <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="31" sourcetypename="Passenger
Truck"/>
        <onroadvehicleselection fueltypeid="5" fueltypedesc="Ethanol (E-85)" sourcetypeid="32" sourcetypename="Light
Commercial Truck"/>
        <onroadvehicleselection fueltypeid="5" fueltypedesc="Ethanol (E-85)" sourcetypeid="21"
sourcetypename="Passenger Car"/>
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sourcetypename="Passenger Truck"/>
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sourcetypename="Combination Short-haul Truck"/>
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Commercial Truck"/>
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Home"/>
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sourcetypename="Motorcycle"/>
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Car"/>
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Truck"/>
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Truck"/>
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Bus"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="53" sourcetypename="Single Unit
Long-haul Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="52" sourcetypename="Single Unit
Short-haul Truck"/>
        <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="42" sourcetypename="Transit
Bus"/>
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    <offroadvehicleselections>
    </offroadvehicleselections>
    <offroadvehiclesccs>
    </offroadvehiclesccs>
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        <roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access" modelCombination="M1"/>
        <roadtype roadtypeid="4" roadtypename="Urban Restricted Access" modelCombination="M1"/>
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processname="Start Exhaust"/>
        <pollutantprocessassociation pollutantkey="118" pollutantname="Composite - NonECPM" processkey="90"
processname="Extended Idle Exhaust"/>
        <pollutantprocessassociation pollutantkey="118" pollutantname="Composite - NonECPM" processkey="91"
processname="Auxiliary Power Exhaust"/>
        <pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="1"
processname="Running Exhaust"/>
        <pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="2"
processname="Start Exhaust"/>
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processname="Crankcase Running Exhaust"/>
        <pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="16"
processname="Crankcase Start Exhaust"/>
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<pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
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<pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="91" processname="Auxiliary Power Exhaust"/>
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<pollutantprocessassociation pollutantkey="119" pollutantname="H2O (aerosol)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="119" pollutantname="H2O (aerosol)" processkey="90" processname="Extended Idle Exhaust"/>
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<pollutantprocessassociation pollutantkey="111" pollutantname="Organic Carbon" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Organic Carbon" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="111" pollutantname="Organic Carbon" processkey="90" processname="Extended Idle Exhaust"/>
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<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="91" processname="Auxiliary Power Exhaust"/>
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All pollutants. Caution: Need to eliminate Primary Exhaust PM2.5 Total to avoid double counting.
CALEV and NLEV databases.
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For use in 2016 Conformity.
September 12, 2016]]></description>
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APPENDIX D

ACRONYMS

Acronyms

Acronym	Meaning
CAAA	Clean Air Act Amendments (1990)
CO	Carbon Monoxide
COG	Council of Government
CTDOT	Connecticut Department of Transportation
CTDEEP	Connecticut Department of Environmental Protection
EPA	U.S. Environmental Protection Agency
FSD	Final Scope Development (Now PD)
ISTEA	Intermodal Surface Transportation Efficiency Act
MAP-21	Moving Ahead for Progress in the 21st Century Act
MOVES	Mobile Vehicle Emission Simulator
MPO	Metropolitan Planning Organization
NAAQS	National Ambient Air Quality Standards
NH_3	Ammonia
NOx	Nitrogen Oxides
PD	Preliminary Design (Formerly FSD)
PDWP	Project Development Work Program
$PM_{2.5}$	Fine Particulate Matter
PMT	Person Miles Traveled
RA	Regional Administer
ROP	Rate of Progress
RTP	Regional Transportation Plan (generally refers to Regional Transportation Plan Update)
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SD	Study and Development
SIP	State Implementation Plan
SO_x	Sulfur Oxides
STIP	Statewide Transportation Improvement Program
TCM	Transportation Control Measure
TIP	Transportation Improvement Program
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound

APPENDIX E

Comments Received During Public Review Period

During the public review peiord, comments were received by email from the CTDEEP and EPA. All comments were incorporated into the final report.

Below are the original comments received.

From Louis Corsino CTDDEP to Judy Raymond CTDOT on September 29, 2016
At 11:04 A.M.
Cc: Paul Bodner, Maribeth Wojenski, Matthew Cegielski, Ryan Dolan

Hi Judy,

I took a look at the conformity documents this morning and have the following comments:

PM2.5 Document

- Page 4 - June 5, 2009 should be June 5, 2007 (see: http://www.ct.gov/deep/lib/deep/air/regulations/proposed_and_reports/epa_june5approval.pdf) .
- Page 37 – Last paragraph before "10". Might want to add additional improvements for MOVES2014a - Tier 3, HD GHG regs for MYs 2014-2018, and Phase 2 LD GHG regs for 2017-2025 etc. See page 7 of ozone document for example language.
- The ozone doc also includes a more thorough description of MOVES2014 on pages 7-8. Is this something that should also be included somewhere in the PM2.5 document, especially since the text talks about PM emissions?
- Page 38 – Table 3 – Emissions table was not updated. Series should be "31A". All emissions for Series 31A must also be updated to the correct results shown on Page 44. Update the difference column also.
- Just a formatting question – why is the table of contents a completely different small font and looks squished? Some of the table of content sections link to the proper section in the document and some of the table of contents items do not link.

Ozone Document

- Page 8 – Second to last paragraph. Sentence doesn't make sense. The 2009 MVEBs were developed with MOBILE 6.2, correct? We are just using MOVES2014a to compare to those existing budgets. Until the budgets are updated using the latest models, we will be using the latest model (MOVES2014a) to demonstrate compliance with existing MOBILE6.2 emission budgets. See EPA policy guidance for more info. This sentence implies that there are MOVES2014a emission budgets, which is not the case at this time.
- Page 15 – Second line starts "The 2015 travel model year" whereas in the PM2.5 document it states "The 2015 travel model network". Please make consistent.
- Page 34 – Second to last paragraph – make consistent with PM2.5 document or whatever is correct. Example:
    - Ozone doc: *This travel demand model uses demographic and land use assumptions which are based on 2010 Census population and population projections developed jointly by CTDOT and Connecticut's 14 RPOs in 2012*

    - PM2.5 doc: *This travel demand model uses demographic and land use assumptions based on the 2010 Census population and Connecticut Department of Labor 2010 employment estimates.*
- Page 35 – First paragraph - Automatic traffic recorder data – 9.0, 8.5, 8.0 and 7.5 but in the PM2.5 doc it is 9.0, 8.5, 8.1, 7.5. Correct where applicable.
- Page 37 - Table 3 – Emissions table was not updated - Update for Series 31A and the results obtained on Page 48. Also the first year should be 2017 not 2015.
- Page 38 – last paragraph – update similar to PM2.5 document (page 37) and comments above.
- Page 40 – PM2.5 paragraph – There is a sentence in there that is talking about PM2.5 MVEBs and implies that the NOx document is limited to the budgets for PM2.5.
    - *"As EPA New England has determined the MOVES2010b 2017 and 2025 motor vehicle emissions budgets submitted on June 22, 2012 to be adequate for transportation conformity purposes, the emissions analysis in this report will be limited to these areas only and the budgets effective as of February 20, 2013."*
- Page 41 – Conclusions - last sentence – *"and the approved interim transportation conformity budgets."* Why are the budgets listed as interim?
- Same formatting question for the Table of Contents as PM2.5 doc.
- Section headings in text of document are not numbered like the PM2.5 document. Formatting between the two documents should be consistent.

General comment – consistency between the two documents should be worked on in future iterations. They should flow very similarly and any boiler plate text that is used in both documents should be checked for consistency.

Let me know if you have any questions.

Thanks!
Lou

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Bureau of Air Management
Planning & Standards Division
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From Ariel Garcia, EPA to Judy Raymond, CTDOT on October 5, 2016 9:20 A.M.

CC: Paul Bodner, Anne Arnold

Hello Judy,

EPA Region 1 will soon be sending out a letter to FHWA in support of a positive transportation conformity determination, but I had a few minor edits to point out for future revisions to the Ozone and PM2.5 AQ analysis documents.

In the Ozone document:

- In the Table of Contents, List of Appendices:
  Appendix B & C should properly refer to MOVES2014a. Everything is labeled appropriately in the actual appendices, it is just the Table of Contents that need to be revised.
- Page 38:
  Remove reference to “Stage II Vapor Recovery” as a control measure in place, since all Stage II vapor recovery systems in Connecticut were required to be decommissioned as of July 1, 2015.

In the PM2.5 document:

- In the Table of Contents, List of Appendices:
  Appendix C should properly refer to MOVES2014a. Again, everything is fine in the actual appendix.
- Page 14, Table 1:
  Title should be edited to remove “MOVES2014a” and properly reference “MOVES2010b”, since that was the version of the model used to develop those MVEBs.
- Page 37:
  Remove reference to “Stage II vapor recovery”.

Let me know if you have any questions.

Thanks,

Ariel