

Nashua Metropolitan Area Air Quality Conformity Analysis 2009-2035

8-Hour Rule



NASHUA REGIONAL PLANNING COMMISSION

Nashua Regional Planning Commission

**FINAL Adopted October 15, 2008
Amended March, 2009 (STIP Amendment #1)**

9 Executive Park Drive
Suite 201
Merrimack, NH 03054
(603) 424-2240
www.nashuarpc.org

TABLE OF CONTENTS

INTRODUCTION	1
MODEL PROCESS.....	1
TRAFFIC MODEL ASSUMPTIONS.....	2
OTHER ASSUMPTIONS	2
PROJECT LISTING FOR AIR QUALITY ANALYSIS	2
EXEMPT PROJECTS:	2
NOT EXEMPT PROJECTS:.....	3
OFF-MODEL PROJECTS	4
OFF-MODEL ADJUSTMENTS:.....	5
SUMMARY OF AIR QUALITY ANALYSIS RESULTS.....	8

LIST OF TABLES

TABLE 1: Analysis Years.....	1
TABLE 2: Exempt Project List	2
TABLE 3: Not Exempt Project List (Projects Included in NRPC Traffic Model).....	3
TABLE 4: Off-Model Project List	4
TABLE 5: Vehicle Emissions Reduced/South Nashua Commuter Rail Station	5
TABLE 6: Vehicle Emissions Reduced/Downtown Nashua Commuter Rail Station	6
TABLE 7: Vehicle Emissions Reduced/Merrimack Commuter Rail Station.....	6
TABLE 8: Air Quality Benefits from Signal Coordination	6
TABLE 9: Air Quality Benefits from Boston Express Bus Service	7
TABLE 10: Air Quality Benefits from increase in Nashua Transit Service hours	7
TABLE 11: NRPC Ozone Analysis Summary	8
TABLE 12: 2009 Ozone Analysis	8
TABLE 13: 2017 Ozone Analysis	9
TABLE 14: 2026 Ozone Analysis	9
TABLE 15: 2035 Ozone Analysis	9
TABLE 16: Carbon Monoxide Analysis Summary - City of Nashua	10
TABLE 17: 2010 Carbon Monoxide Analysis/City of Nashua.....	10
TABLE 18: 2017 Carbon Monoxide Analysis/City of Nashua.....	10
TABLE 19: 2026 Carbon Monoxide Analysis/City of Nashua.....	10
TABLE 20: 2035 Carbon Monoxide Analysis/City of Nashua.....	11

APPENDICES

APPENDIX A	STATE SUMMARY OF CONFORMITY TESTS
APPENDIX B	AIR QUALITY ANALYSIS EXEMPT CODES/PROJECTS EXEMPT FROM CONFORMITY
APPENDIX C	OFF-MODEL ADJUSTMENTS
APPENDIX D	MOBILE 6.2 EMISSIONS MODEL INPUTS
APPENDIX E	MOBILE 6.2 EMISSIONS FACTORS

INTRODUCTION

As mandated by the Clean Air Act Amendments of 1990 (CAAA), the Transportation Equity Act for the 21st Century (TEA 21) and SAFETEA-LU, Transportation Improvement Programs (TIP) and Long Range Transportation Plans (LRTP) in areas not in attainment with National Ambient Air Quality Standards (NAAQS) must be found to conform to the State Implementation Plan (SIP). The Nashua Regional Planning Commission (NRPC) area, with the exception of Lyndeborough, Mason, Mont Vernon and Wilton is part of the Boston-Manchester-Portsmouth (SE) NH Non-Attainment Area for the 8-Hour Ozone Standard. New Hampshire's SIP establishes mobile source emission budgets for ozone precursors [volatile organic compounds (VOCs) and nitrogen oxides (NOx)]. [Previous budgets have been for the State's serious 1-hour non-attainment areas. Per guidance from the Environmental Protection Agency and the Federal Highway Administration, MPOs have used these 1-hour budgets to demonstrate conformity under the new 8-hour standard]. The New Hampshire Department of Environmental Services (DES) prepared a new motor vehicle emissions budget for the 8-hour ozone non-attainment area in early 2008. This budget was deemed adequate for conformity purposes by the Environmental Protection Agency prior to final adoption of this TIP and Plan, therefore the new 8-hour budget is used to demonstrate that the TIP and LRTP conform to the SIP. As was the case with the 1-hour ozone budgets, MPOs must also review the air quality analyses from all MPOs that are within the 8-hour non-attainment area (there are four) to determine if the region-wide emissions conform to the SIP. This process is orchestrated by NHDOT. The CAAA requires a demonstration of conformity to these budgets as part of the transportation planning process. A summary of the results of this analysis can be found in Table 11.

In addition to the region being in non-attainment for ground level ozone, the City of Nashua was designated non-attainment for carbon monoxide (CO) standards in the 1980s. The City demonstrated attainment with the standard in the mid-1990s and now must continue to comply with an established maintenance plan. The plan contains a mobile source emission budget for CO and a demonstration of conformity to this budget must be made. A summary of the results of this analysis can be found in Table 16.

MODEL PROCESS

The air quality analysis is conducted by using the traffic data and speed outputs of the NRPC traffic model. The NRPC traffic model includes all communities within the planning region and is calibrated to replicate existing traffic conditions. The outputs from the model are inserted into a spreadsheet containing emission factors generated by the New Hampshire Department of Environmental Services using the most recent version of the Environmental Protection Agency's mobile source emissions model which is MOBILE 6.2. Summertime conditions are used for the ozone analysis, when this pollutant reaches its peak generation. For carbon monoxide, wintertime conditions represent the annual peak.

A regional land use growth analysis for the NRPC area has been conducted through 2035. Interim year land use forecasts are based on an interpolation of the 2035 projections. Analysis years for ozone are 2009, 2017, 2026 and 2035. The analysis years for carbon monoxide are 2010, 2017, 2026 and 2035. The final analysis year represents the long-range planning horizon for the NRPC Transportation Plan.

The NHDOT will integrate the analysis results from other regions with those from the NRPC area to produce a final finding of air quality conformity for the Boston-Manchester-Portsmouth (SE) NH Non-Attainment Area for the 8-hour Ozone Standard. The analysis will determine whether the critical test of conformity is met for each analysis year.

TABLE 1: Analysis Years

Ozone Non-Attainment Area	Classification	Analysis Year
Southern NH		
Amherst, Brookline, Hollis, Hudson, Litchfield, Merrimack, Milford, Nashua, Pelham	Moderate	2009, 2017, 2026, 2035
CO Non-Attainment Area		
Nashua	Maintenance	2010, 2017, 2026, 2035

TRAFFIC MODEL ASSUMPTIONS

The NRPC Transportation Model was updated in 2003 and now uses TRANSCAD software. The TRANSCAD model network is comprised of roadway segments represented in a link file. Many new links have been added to the model network to reflect the improved capability of the new software. The new links were used to develop the 2009 motor vehicle emissions budgets that have been used for this round of air quality analysis.

In conducting the traffic model analysis, speed is a critical element because there is a specific emission factor (measured in grams per vehicle mile) associated with each speed for each emission type. The traffic model assigns an average congested speed* to each link on the transportation network. Each link is then assigned an emission factor** based on that speed. The emission factor is multiplied by the Vehicle Miles Traveled (VMT)*** for each link to determine the total volume of emissions per day**** for that link.

*Congested speed is a model output that represents a peak period condition along the highway link.

**Emission factors are provided by the NH Department of Environmental Services.

***VMT's are calculated by multiplying the link distance by the daily traffic volumes.

****Converted to kilograms per day.

OTHER ASSUMPTIONS

Most of the non-exempt highway projects are analyzed by coding them into the NRPC traffic model. Several, however, are added as off-model adjustments to the air quality analysis spreadsheet. A description of the manner in which projects were analyzed is provided on the following pages.

PROJECT LISTING FOR AIR QUALITY ANALYSIS

The next step was to determine the list of transportation projects subject to air quality analysis and the projected year in which the projects will come on line.

EXEMPT PROJECTS:

Table 2 lists projects that are exempt from the air quality conformity process. Exempt projects fall into one or more of the defined exempt categories shown in Appendix B and are determined to have either little or no impact upon air emissions, or have beneficial air quality impacts.

TABLE 2: Exempt Project List

Community	Route/Facility	Project Description	Project Number	Exempt Code
Amherst	Town Hall	Town Hall beautification and Safety	14832 (06-01TE)	E-45
Hollis	Ash St/NH130	Construct new sidewalk (1830') extending from Post Office to approximately the intersection of Main St. and Silver Lake Road	13488 (00-40TE)	E-33
Hudson	Melendy Rd.	Bridge Rehab over Hadley Brk.	13353	E-19
Hudson	County Rd.	Bridge Rehab over Second Brk.	13354	E-19
Hudson	NH102	4,000 LF of 5' wide sidewalk and 4,000LF of 4' wide bike lane on east side on NH102 b/t Evergreen Drive and Meghan Drive	13894	E-45
Hudson	Train Depot	Relocate/restore former Hudson Cntr. Train Depot	14408	E-28
Litchfield	Albuquerque Ave.	Complete construction of multi use path	14838 (06-26 TE)	E-33
Lyndeborough	Gulf Rd.	Replace Bridges over Stony Brook	14251	E-19

Community	Route/Facility	Project Description	Project Number	Exempt Code
Merrimack	DW Highway	Town Center sidewalk project	14413 (04-36TE)	E-33
Merrimack	FEE Turnpike	Bridge Rehab (Merrill's Mauraders) over Souhegan River	12105	E-19
Merrimack	McGraw Bridge Rd.	Bridge Replacement over Baboosic Brk	13923	E-19
Merrimack-Nashua	Manchester St.	Bridge replacement over Pennichuck Reservoir	13964	E-19
Milford	NH 101A & NH 13	Improvements @ "Oval" based on ongoing traffic studies	14492, 14492A	E-10
Milford	South Street	Pedestrian improvements/sidewalks/beautification	14837 06-28TE	E-33
Milford	Union St	Reconstruct RR crossings, approaches & signals @ B&M RR USDOT AAR #884-288R	14078	E-1
Milford to Nashua	NH 101A	Roadway improvements from NH 101 to FEE Turnpike (7.5 miles). Construction projects to be determined by corridor study	10136	E-53
Nashua	DW Highway	Bridge rehab over FEE Turnpike North Bound on-ramp	13716	E-19
Nashua	Turnpike	Rehab exit 3 NB ramp bridge	6061	E-19
Nashua	Transit	Bus Equipment	607	E-25
Nashua	Transit	Capital planning program	608	E-21
Nashua	Transit	Capital equipment	3797	E-24
Nashua	Transit	Operating assistance	609	E-21
Nashua	Transit	Preventative Maintenance	3799	E-21
Nashua	NH 130	NH 130 (Broad St) reconstruction from Coburn Ave to Coliseum Ave.	13931	E-53
Nashua to Hooksett	Turnpike	Turnpike resurfacing FY 2009	None	E-10
Pelham	NH 111A	Improvements to 2 intersections; Main St/Nashua Rd & Old Bridge St/Common St	14491 14491A	E-53

NOT EXEMPT PROJECTS:

Table 3 lists projects that are not exempt from the air quality conformity process. Not Exempt projects are determined to have an impact upon air quality and must therefore be included in the appropriate future build scenario. All projects listed in Table 3 are included in the NRPC transportation model.

TABLE 3: Not Exempt Project List (Projects Included in NRPC Traffic Model)

Community	Route/Facility	Project Description	Project No.	Opening Analysis Year
Amherst Milford Wilton	NH101 Improvements	Widening of NH 101 between west end of bypass and Bedford town line to 4-lane access controlled highway. Also includes new section of bypass (2-lane) to run behind Elm Street and end near Wilton-Milford town line. Speed set at 55 mph in model.	13692	2026
Hollis	Rte 130/ Rte 122	4-Corners Intersection Improvements; Addition of turn lanes at the signalized intersection of NH Route 122 and NH Route 130	N/A	2026

Community	Route/ Facility	Project Description	Project No.	Opening Analysis Year
Merrimack	US3	Capacity improvements to improve traffic flow @ intersections as identified in recent studies by Town of Merrimack. Model will reflect increased capacity.	N/A	2026
Nashua - Merrimack	FEE Turnpike	FEE Turnpike to be widened to 3 lanes in each direction b/t Exits 8 & 11. Northbound on and southbound off ramps will be added to Exit 12. Model will reflect increased capacity.	13761	2026
Nashua	FEE Turnpike	Addition of southbound off ramp to Exit 36 just across Massachusetts state line to provide southbound access from Everett Turnpike to the Pheasant Lane Mall. Model will reflect new interchange and capacity.	N/A	2026
Nashua	E. Hollis St.	Reconstruct from Main St. to Hudson T/L to improve capacity	N/A	2017
Nashua	North Merrimack River Crossing	Construct a bridge over the Merrimack River to provide a four lane boulevard roadway connecting US 3, NH 3A, NH 102 and the FEE Turnpike. Exact location of crossing is to be determined.	N/A	2026
Nashua	NH101A	Widen NH 101A from Celina Ave. to Somersett Parkway to 7 lane cross-section. Model will reflect increased capacity.	10136A	2017
Nashua	Broad Street Parkway	2-lane access controlled road connecting West Hollis St to Broad St, providing another east-west connection between downtown Nashua and the Everett Turnpike. Includes a connection to the Millyard near the Pine St Extension. Model will reflect increased capacity. Speed set at 35 mph.	10040 A, G, H, I, J, M, P, S-T,	2017

OFF-MODEL PROJECTS

Off model analysis tools are used to calculate emissions for those projects that cannot be analyzed using the NRPC transportation model. These are usually projects which are not network-based and therefore cannot be coded in the highway network such as transit, park-and-ride and signal coordination projects.

Table 4 contains a list of the off-model projects that were analyzed and updated for the current round of transportation conformity. A description of the projects and tools used in the analysis follows Table 4.

TABLE 4: Off-Model Project List

Community	Route/ Facility	Project Description	Project No.	Opening Analysis Year
Merrimack	FEE Turnpike/US 3	Park'n'Ride, 250 spaces – intermodal facility near RR facility (Commuter rail)	12259 (94-40CM)	2026
Nashua	FEE Turnpike	Construct 1,000-space Park'n'Ride near B&M RR with rail platform. (Commuter rail station)	13117 (98-13CM)	2017
Nashua	Commuter Rail	Purchase commuter rail equipment	13514 (00-12CM)	2017
Nashua	Commuter Rail	Provide 3 year operating support for Lowell to Nashua Commuter rail	13875 (02-22CM)	2017

Community	Route/ Facility	Project Description	Project No.	Opening Analysis Year
Nashua	Various	Traffic signals, expand closed loop system to include additional 30 intersections	14432 (04-30CM)	2010
Nashua	F E E Turnpike/US 3	Inter city bus service Nashua-Boston (Boston Express)	06-28CM	2007
Nashua	Transit	Extend hours of operation of bus service. Project to be implemented after 2007 analysis year. No A/Q credits taken for 2017 & 2025 b/c project will continue after first 3 years only if warranted by rider ship levels.	14815 (06-13CM)	2009

OFF-MODEL ADJUSTMENTS:

The off-model projects for the NRPC region are described briefly below and summarized in the following pages. The details of the projects are provided in Appendix B.

COMMUTER RAIL PROJECT - MANCHESTER TO NASHUA TO LOWELL, MA

Scope of project: This project entails the introduction of commuter rail service in the vicinity of the FE Everett Turnpike/Daniel Webster Exit 1 interchange (South Nashua) in the year 2017. The commuter rail system will be extended to the vicinity of the Manchester-Boston Regional Airport and Downtown Manchester in 2017. Details of all 3 stations are included below. However, NRPC only took air quality credits for the South Nashua station. Southern NH Planning Commission took credit for the Manchester stations.

The Ridership Estimates for Capital Corridor Passenger Rail Service (Boston, Ma to Manchester, NH) study (**Alternative 4**) prepared by PB (Parsons Brinkerhoff) Americas, Inc. study (September 2008) was used in preparing the analysis for this project.

Please refer to Appendix B for details of the analysis.

- 1. Turnpike/Daniel Webster Exit 1 Station:** The proposed station will be in the vicinity of the FE Everett Turnpike Exit 1. Commuters who use the train will no longer drive to the Massachusetts border and beyond. The distance between the Massachusetts State Line and Exit 1 is approximately 1 mile (2 mile round trip). Opening analysis year is 2017.

**TABLE 5: Vehicle Emissions Reduced
South Nashua Station**

			Emission Factor			Light Duty Vehicle Emissions Reduced		
Analysis Year	Speed	VMT	HC	CO	NOX	HC Kg/day	CO Kg/day	NOX Kg/day
2017	60.7	2,466	.259	13.394	.230	0.638	33.028	0.567
2026	60.7	2,697	.171	12.308	.143	0.460	33.193	0.386
2035	60.7	2,950	.168	12.190	.135	0.496	35.955	0.399

- 2. Manchester Airport Station:** The commuter rail line will be extended to the vicinity of the Manchester-Boston Regional Airport in 2017. The distance between the Massachusetts State Line to the toll booths near Exit 12 on the Everett Turnpike in Nashua is 15 miles (30 mile round trip). Opening analysis year is 2017.

**TABLE 6: Vehicle Emissions Reduced
 Manchester-Boston Regional Airport Station**

Analysis Year	Speed	VMT	Emission Factor			Light Duty Vehicle Emissions Reduced		
			HC	CO	NOX	HC Kg/day	CO Kg/day	NOX Kg/day
2017	60.7	28,150	.259	13.394	.230	7.284	377.031	6.474
2026	60.7	33,633	.171	12.308	.143	5.736	413.947	4.811
2035	60.7	40,195	.168	12.190	.135	6.755	489.973	5.431

3. **Downtown Manchester Station** - The distance between the Massachusetts State Line and Exit 5 on I-293 in Manchester is 22 miles (44 round trip). Opening analysis year is 2017.

**TABLE 7: Vehicle Emissions Reduced
 Downtown Manchester Station**

Analysis Year	Speed	VMT	Emission Factor			Light Duty Vehicle Emissions Reduced		
			HC	CO	NOX	HC Kg/day	CO Kg/day	NOX Kg/day
2017	60.7	836	.259	13.394	.230	7.932	410.555	7.050
2026	60.7	33,536	.171	12.308	.143	5.719	412.747	4.797
2035	60.7	36,678	.168	12.190	.135	6.164	447.098	4.955

CITY OF NASHUA - WIRELESS SIGNAL COORDINATION (PROJECT # 04-30CM)

Scope of Project: This project will build a traffic management system for the city, interconnecting all 89 traffic signals to a central station, including 30 signals that are currently off line. This would allow the city to expand its closed loop signal network, creating new timing plans for its major corridors with an emphasis on vehicle progression. The city would also look at developing one or more traffic adaptive closed loop systems using advanced video detection. The entire system would be compatible with future ITS technology.

It was assumed that the greatest amount of emissions benefit from this project would result from the inclusion of the 30 intersections that are currently off-line (not coordinated). The assumption is that if these signals were to be coordinated, delay at these intersections would be improved and therefore emissions would be reduced. It was not possible to gather field data from all of those intersections. Instead, link speeds, link distances and traffic volumes in the vicinity of the 30 signalized intersections for the analysis years 2010, 2017, 2026 and 2035 were obtained from the NRPC traffic model. This data was then used in an off-model calculation.

The off-model calculation assumed a 10% increase in link speeds¹. The results are as follows:

TABLE 8: Air Quality Benefits from Signal Coordination

	VOC (kg/day)	NOx (kg/day)	CO (kg/day)
2010	n/a	n/a	+ 1.333
2017	+ 0.150	+ 0.641	+ 0.110
2026	+ 0.836	+ 0.419	- 0.072

¹ Assumptions are based on CMAQ application CM04-30

2035	+ 0.808	+ 0.427	- 0.089
------	---------	---------	---------

Positive # means that there is an **increase** in that pollutant

NHDOT

INTER CITY (BOSTON EXPRESS) BUS SERVICE 06-28CM

Scope of Project: The NHDOT will initiate commuter bus service from Exit 8 and Exit 6 in Nashua to Boston-South Station and Logan Airport. This project will include the purchase of 4 commuter coaches, provide 9 round trips each weekday, and make capital improvements to the park and ride lot and Welcome Center to provide enhanced security, ticketing facilities and other passenger amenities.

TABLE 9: Air Quality Benefits from Boston Express Bus Service

Analysis Year	VOC (kg/day)	NOx (kg/day)	CO (kg/day)
2009	- 1.117	+ 3.858	n/a
2010	n/a	n/a	- 37.189
2017	- 0.550	+ 1.378	- 29.567
2026	- 0.346	+ 0.094	- 27.314
2035	- 0.341	+ 0.013	- 27.068

Positive # means that there is an **increase** in that pollutant

CITY OF NASHUA, NH-NASHUA TRANSIT SYSTEM CMAQ PROJECT (PROJECT # 06-13CM)

Scope of project: The objective of this project is to increase the frequency of service (decrease "headways") on Citybus Routes 2 and 6. This will increase the total vehicle miles (and associated emissions) traveled by bus in the City, but decrease the number of vehicles miles (and associated emissions) traveled in personal vehicles.

TABLE 10: Air Quality Benefits from increase in Nashua Transit Service hours

Analysis Year	VOC (kg/day)	NOx (kg/day)	CO (kg/day)
2009	0.163	- 4.841	n/a
2010	n/a	n/a	10.847
2017	0.118	- 1.697	9.240
2026	0.036	- 0.295	8.970
2035	0.035	- 0.176	8.914

Negative # means that there is an **increase** in that pollutant

SUMMARY OF AIR QUALITY ANALYSIS RESULTS

Table 11 summarizes the results of the summertime ozone analysis for the NRPC portion of the **Boston/Manchester/Portsmouth (Southeastern NH) Non-Attainment Area for the 8-hour Ozone Standard**. The NRPC region meets air quality conformity requirements based on the summary (as shown in Appendix A) of the air quality analysis for all 4 Metropolitan Planning Organizations (MPOs) in new Hampshire. All data has been adjusted to NHDOT HPMS volumes. The analysis has determined that the critical test of conformity is met for each analysis year. That is, whether the build scenario is less than the established emissions budget. Tables 12-15 detail the manner in which the traffic model output is combined with off-model adjustments to produce emissions totals for each analysis year scenario for the NRPC portion of the non-attainment area.

Table 16 summarizes the results of the wintertime carbon monoxide analysis for City of Nashua. Tables 17-20 detail the manner in which the traffic model output is combined with off-model adjustments to produce emissions (carbon monoxide) totals for each analysis year scenario for the City of Nashua.

The summary of the final finding of air quality conformity can be found in Appendix A.

OZONE ANALYSIS TABLES:

TABLE 11: NRPC Ozone Analysis Summary

YEAR	VMT	VOC kg/day (Summer)	NOx kg/day (Summer)
2009	4,556,495	2,815.908	5,204.858
2017	5,452,768	1,879.758	2,401.252
2026	6,073,098	1,412.720	1,373.656
2035	6,598,257	1,518.462	1,208.398

TABLE 12: 2009 Ozone Analysis

	VMT	VOC (kg/day) (Summer)	NOx (kg/day) (Summer)
Subtotal from NRPC traffic model:	5,010,018	3,091.998	5,709.396
OFF-MODEL ADJUSTMENTS:			
Boston Express Bus service	- 2,296	- 1.117	+ 3.858
Nashua Transit - Increased hours	- 584	- 0.163	+4.841
Nashua Signal Coordination	n/a	+ 3.687	+ 1.530
HPMS Adjustment:	.91	.91	.91
TOTAL – 2009:	4,556,495	2,815.908	5,204.858

TABLE 13: 2017 Ozone Analysis

	VMT	VOC (kg/day) (Summer)	NOx (kg/day) (Summer)
Subtotal from NRPC traffic model:	5,997,693	2,066.825	2,635.590
OFF-MODEL ADJUSTMENTS:			
Commuter Rail (South Nashua station)	- 2,466	- 0.638	- 0.567
Boston Express Bus service	- 2,296	- 0.550	+ 1.378
Nashua Transit - Increased hours	- 879	- 0.118	+ 1.697
Nashua Signal Coordination	n/a	+ 0.150	+ 0.641
HPMS Adjustment:	.91	.91	.91
TOTAL – 2017:	5,452,768	1,879.758	2,401.252

TABLE 14: 2026 Ozone Analysis

	VMT	VOC (kg/day) (Summer)	NOx (kg/day) (Summer)
Subtotal from NRPC traffic model:	6,679,606	1,552.447	1,509.090
OFF-MODEL ADJUSTMENTS:			
Commuter Rail (South Nashua station)	- 2,697	- 0.460	- 0.386
Boston Express Bus service	- 2,296	- 0.346	+ 0.094
Nashua Transit - Increased hours	- 879	- 0.036	+ 0.295
Nashua Signal Coordination	n/a	+ 0.836	+ 0.419
HPMS Adjustment:	.91	.91	.91
TOTAL – 2026:	6,073,098	1,412.720	1,373.656

TABLE 15: 2035 Ozone Analysis

	VMT	VOC (kg/day) (Summer)	NOx (kg/day) (Summer)
Subtotal from NRPC traffic model:	7,290,684	1,668.703	1,327.717
OFF-MODEL ADJUSTMENTS:			
Commuter Rail (South Nashua station)	- 2,950	- 0.496	- 0.399
Boston Express Bus service	- 2,296	- 0.341	- 0.013
Nashua Transit - Increased hours	- 879	- 0.035	+ 0.176
Nashua Signal Coordination	n/a	+ 0.808	+ 0.427
HPMS Adjustment:	.91	.91	.91
TOTAL – 2035:	6,629,668	1,518.462	1,208.398

CARBON MONOXIDE ANALYSIS TABLES:

TABLE 16: Carbon Monoxide Analysis Summary - City of Nashua

YEAR	VMT	CO kg/day (Winter)	CO Budget (kg/day)
2010	1,895,849	28,582.714	54,489
2017	2,042,206	23,726.736	54,489
2026	2,266,471	23,351.057	54,489
2035	2,383,186	23,978.083	54,489

TABLE 17: 2010 Carbon Monoxide Analysis/City of Nashua

	VMT	CO kg/day (Winter)
Subtotal from NRPC traffic model:	2,086,525	31,456.279
OFF-MODEL ADJUSTMENTS:		
Boston Express Bus service	- 2,296	- 37.189
Nashua Transit - Increased hours	- 879	- 10.847
Nashua Signal coordination	n/a	+ 1.333
HPMS Adjustment:	.91	.91
TOTAL – 2010:	1,895,849	28,582.714

TABLE 18: 2017 Carbon Monoxide Analysis/City of Nashua

	VMT	CO kg/day (Winter)
Subtotal from NRPC traffic model:	2,249,824	26,145.060
OFF-MODEL ADJUSTMENTS:		
Commuter Rail (South Nashua station)	- 2,466	- 33.028
Boston Express Bus service	- 2,296	- 29.567
Nashua Transit - Increased hours	- 879	- 9.240
Nashua Signal coordination		+ 0.110
HPMS Adjustment:	.91	.91
TOTAL – 2017:	2,042,206	23,726.736

TABLE 19: 2026 Carbon Monoxide Analysis/City of Nashua

	VMT	CO kg/day (Winter)
Subtotal from NRPC traffic model:	2,496,499	25,730.051
OFF-MODEL ADJUSTMENTS:		
Commuter Rail (South Nashua station)	- 2,697	- 33.193
Boston Express Bus service	- 2,296	- 27.314
Nashua Transit - Increased hours	- 879	- 8.970
Nashua Signal coordination		- 0.072
HPMS Adjustment:	.91	.91
TOTAL – 2026:	2,266,471	23,351.057

TABLE 20: 2035 Carbon Monoxide Analysis/City of Nashua

	VMT	CO kg/day (Winter)
Subtotal from NRPC traffic model:	2,625,010	26,421.569
OFF-MODEL ADJUSTMENTS:		
Commuter Rail (1 Nashua station)	- 2,950	- 35.955
Boston Express Bus service	- 2,296	- 27.068
Nashua Transit - Increased hours	- 879	- 8.914
Nashua Signal coordination		- 0.089
HPMS Adjustment:	.91	.91
TOTAL – 2035:	2,383,186	23,978.083

#300ZZ-82