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Chapter 21: Air Quality

A. INTRODUCTION

Ambient air quality is affected by numerous sources and activities that introduce air contaminants into the atmosphere. There are two broad classifications that are often used to describe these sources. Emissions from motor vehicles are referred to as "mobile source" emissions, while emissions from fixed-location facilities are referred to as "stationary source" emissions.

The Proposed Action would greatly alter traffic and land uses in the study area. Air quality, which is a general term used to describe pollutant levels in the atmosphere, would be affected by these changes. This chapter assesses the following types of potential air quality impacts of the Proposed Action from mobile and stationary sources:

- Potential impacts of increased traffic or changes in traffic patterns on congested intersections of the local street network;
- Potential impacts associated with proposed parking facilities and the relocated Quill Bus Depot, DSNY Maintenance Garage, and NYPD Tow Pound facilities;
- Potential impacts of vehicular emissions from the exhaust ventilation buildings and exit portals of the Lincoln Tunnel;
- Potential impacts of the proposed deck over the Convention Center's truck marshalling facility;
- Potential impacts of emissions from the heating, ventilation, and air conditioning (HVAC) systems of the projected and potential development contemplated by the Proposed Action and;
- Potential impacts on projected and potential developments from emissions generated by existing industrial and manufacturing uses.
- Potential air quality impacts associated with the construction phase of the Proposed Action are reported in Chapter 23, "Construction Impacts." Potential air quality impacts of alternatives to the Proposed Action are presented in Chapter 26, "Alternatives."

B. PRINCIPAL CONCLUSIONS

1. Mobile Source Analysis

The mobile source air quality evaluation builds on the conservative traffic assumptions and conditions presented in Chapter 19, "Traffic and Parking." In addition, the FGEIS air quality analysis utilized the following two levels of analysis:

- A Tier I analysis -- this level of analysis is usually conducted for one or more peak traffic periods with the assumption that the peak hour traffic conditions will persist for each hour of the 8-hour, 24-hour, and annual time periods that correspond to the National Ambient Air Quality Standards (NAAQS) for each pollutant.
- A Tier II analysis -- this level of analysis uses traffic volumes, speeds, vehicular emissions, and signalization data for each hour of the peak 24-hour period (as opposed to the one-hour requirement for the Tier I analysis). The results of the Tier II analysis are a more realistic prediction of likely pollutant concentrations.

The more detailed Tier II analysis was conducted for the Proposed Action at those analysis sites (see Table 21-1 and Figure 21-1) for those pollutants where potential exceedances of either an air quality standard (i.e., PM_{10}) or significant impact threshold (i.e., $PM_{2.5}$) were identified in the DGEIS.

TABLE 21-1
AIR QUALITY ANALYSIS SITES: TIER LEVEL OF ANALYSES

Site Number	Intersection	Tier Level of Analysis
1	Route 9A & West 57th Street	I
2	Route 9A & West 42nd Street	II
3	Route 9A & West 34th Street	II
4	Eleventh Avenue & West 37th Street	I
5	Eleventh Avenue & West 42nd Street	II
6	Eleventh Avenue & West 34th Street	II
7	Tenth Avenue & West 34th Street	II
8	Tenth Avenue & West 39th/West 40th Streets (Lincoln Tunnel access)	II
9	Herald Square (Broadway and West 34th Street)	II
10	Eighth Avenue & West 42nd Street	I
11	Second Avenue & East 36th Street (Queens Midtown Tunnel)	I
12	Route 9A & Canal Street	II
13	Tenth Avenue & West 42nd Street	II
14	Ninth Avenue & West 34th Street	II

a) Microscale Intersection Analysis

The results of the mobile source analysis for the Proposed Action indicate the following:

- **Carbon Monoxide (CO):** The Proposed Action is not predicted to cause any exceedance of the NAAQS for CO or any significant CO impacts of the New York City Department of Environmental Protection (DEP) *de minimis* criteria in either 2010 or 2025.
- **Particulate Matter (PM_{10}):** The Proposed Action is not predicted to cause any exceedances of either the 24-hour or annual NAAQS for PM_{10} in either 2010 or 2025.
- **Fine Particulate Matter ($PM_{2.5}$):** Although background concentrations exceed the annual NAAQS for $PM_{2.5}$ the Proposed Action is not predicted to cause any increases above the DEP 24-hour or annual interim Significant Threshold Value (STV) for $PM_{2.5}$ in either 2010 or 2025.

b) Parking Facilities

Emissions associated with the new parking facilities and the relocated Quill Bus Depot, DSNY Maintenance Garage, and NYPD Tow Pound facilities included in the Proposed Action are not expected to cause an exceedance of any NAAQS or any significant adverse CO, PM_{10}, or $PM_{2.5}$ impacts.

c) Lincoln Tunnel Ventilation Building and Portals

Emissions associated with the Lincoln Tunnel ventilation buildings and portals by themselves would not have any significant CO, PM_{10} or $PM_{2.5}$ impacts or cause any NAAQS exceedances. The results of the cumulative analysis of the impact of the Lincoln Tunnel portals and the intersection of West 39th Street and Tenth Avenue are included in the Microscale Intersection Analysis section.

d) Convention Center Truck Marshalling Facility

Emissions associated with the Convention Center Truck Marshalling Facility would not have any significant CO, PM_{10} or $PM_{2.5}$ impacts or cause any NAAQS exceedances.

2. Stationary Source Analysis

a) HVAC Analysis

The HVAC analysis of combustion exhausts from projected and potential development sites and facilities associated with the Proposed Action demonstrate that these exhausts would not result in any significant air quality impacts in 2010 and 2025. Such impacts would be avoided by placing (E) Designations on properties through the rezoning, where warranted, that would either restrict the stack location or fuel type for HVAC systems of projected and potential developments. In addition, it should be noted that, since the height of HVAC sources would be equal to the proposed building heights, the pollutant concentrations at ground-level receptors would be inconsequential, and therefore would not contribute to predicted ground-level impacts from mobile sources (nor would mobile sources concentrations affect impacts at elevated receptors near the height of HVAC sources).

For both 2010 (existing location) and 2025 (new location), the analysis of receptor sites indicated that sulfur dioxide (SO_2) levels from Quill Bus Depot HVAC emissions could exceed applicable standards, and result in a significant adverse impact. NYCT would implement measures to reduce SO_2 emissions to avoid significant adverse impacts from such emissions in both the 2010 and 2025 scenarios.

b) Air Toxics Analysis

An air toxics analysis of the Proposed Action demonstrates that Projected and Potential Development Sites would not experience significant adverse impacts from existing industrial sources in 2010 and 2025. For 2025, the air toxics analysis indicates that the relocated Quill Bus Depot could have significant adverse impacts on existing receptors near the relocated site, as well as on projected development sites from the West Chelsea rezoning. NYCT would need to apply for a new air permit from the New York State Department of Environmental Conservation for the relocated facility. As part of the permitting process, appropriate emission rates would be established to avoid significant adverse impacts.

C. APPLICABLE POLLUTANTS

1. Criteria Pollutants

The following air pollutants have been identified by the U.S. Environmental Protection Agency (EPA) as being of concern nationwide: carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NO_x), photochemical oxidants, lead (Pb), sulfur dioxide (SO_2), and particulate matter. In New York City, ambient concentrations of CO, HC, and photochemical oxidants are predominantly influenced by motor vehicle activity. NO_x are emitted from both mobile and stationary sources. Emissions of sulfur oxides (SO_x) are associated mainly with stationary sources, and emissions of particulate matter are associated with stationary sources, and to a lesser extent, mobile sources and fugitive dust. Lead emissions, which historically were principally influenced by motor vehicle activity, have been substantially reduced due to the elimination of lead from gasoline.

a) Carbon Monoxide

CO is a colorless and odorless gas that is generated in the urban environment primarily by the incomplete combustion of fossil fuels in motor vehicles. In New York City, more than 80 percent of CO emissions are from motor vehicles. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. CO concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions. Consequently, CO concentrations are predicted on a localized, or microscale, basis.

b) Hydrocarbons, Nitrogen Oxides, and Photochemical Oxidants

Hydrocarbons include a wide variety of volatile organic compounds, emitted principally from the storage, handling, and use of fossil fuels. NO_x constitute a class of compounds that include nitrogen dioxide (NO_2) and nitric oxide, both of which are emitted by motor vehicles and stationary sources. Both hydrocarbons and NO_x are of concern primarily because most of those compounds react in sunlight to form photochemical oxidants, including ozone. This reaction occurs comparatively slowly and ordinarily takes place far downwind from the site of actual pollutant emission. The effects of these pollutants are normally examined on an areawide, or mesoscale, basis.

c) Lead

Lead emissions are principally associated with industrial sources and motor vehicles using gasoline containing lead additives. As the availability of leaded gasoline has decreased, motor vehicle-related lead emissions have decreased, resulting in a significant decline of concentrations of lead. Atmospheric lead concentrations in New York City are well below national standards. Lead concentrations are expected to continually decrease; therefore, an analysis of lead from mobile sources is not warranted.

d) Sulfur Dioxide

High concentrations of SO_2 affect breathing and may aggravate existing respiratory and cardiovascular disease. SO_2 emissions are generated from the combustion of sulfur-containing fuels — oil and coal — largely from stationary sources such as coal and oil-fired power plants, steel mills, refineries, pulp and paper mills, and nonferrous smelters. In urban areas, especially in the winter, smaller stationary sources such as space heating contribute to elevated SO_2 levels.

Although diesel-fueled heavy-duty vehicles also emit SO_2, transportation sources are not considered by the EPA (and other regulatory agencies) to be significant sources of this pollutant that should be quantitatively evaluated in a mobile source impact analysis.

e) Particulate Matter

Particulate matter is a broad class of air pollutants that exist as liquid droplets or solids, with a wide range of sizes and chemical composition. Particulate matter is emitted by a variety of sources, both natural and man-made. Natural sources include the condensed and reacted forms of natural organic vapors, salt particles resulting from the evaporation of sea spray, wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and debris from live and decaying plant and animal life, particles eroded from beaches, desert, soil and rock, and particles from volcanic and geothermal eruptions and forest fires. Major man-made sources of particulate matter include the combustion of fossil fuels such as vehicular exhaust, power generation and home heating, chemical and manufacturing processes, all types of construction (including that from equipment exhaust and re-entrained dust), agricultural activities, and wood-burning fireplaces. Fine particulate matter is also derived from combustion material that has volatilized and then condensed to form primary particulate matter (often after release from a stack or exhaust pipes) or from precursor gases reacting in the atmosphere to form secondary particulate matter. It is also derived from mechanical breakdown of coarse particulate matter, e.g., from building demolition or roadway surface wear.

Of particular health concern are those particles that are smaller than or equal to 10 microns (PM_{10}) in size and 2.5 microns ($PM_{2.5}$) in size. The principal health effects of airborne particulate matter are on the respiratory system.

2. Non-Criteria Pollutants

Toxic air pollutants, also called air toxics, are those pollutants that cause or may cause cancer or other serious health effects. The primary sources of air toxic contaminants are industrial and manufacturing facilities with processes that emit these compounds through stacks or ventilation exhausts.

Examples of toxic air pollutants include benzene, which is found in gasoline; perchloroethlyene, which is emitted from dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries. Examples of other listed air toxics include dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds.

3. Pollutants for Analysis

The air pollutants identified as being of concern are considered as follows:

- CO, PM_{10}, and $PM_{2.5}$ are the pollutants of concern for the mobile source analysis of emissions from motor vehicles;
- PM_{10}, NO_x, and SO_2 are the pollutants of concern for the localized air quality analysis of emissions from the heating systems of project-related developments; and
- Air toxic emissions from existing industrial/manufacturing land uses are considered to determine the potential for significant impacts on projected and potential development sites.

D. AIR QUALITY STANDARDS AND REGULATIONS

1. Standards

NAAQS have been established for six major air pollutants: CO, NO_2, ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), SO_2, and lead (Pb). These standards, which are summarized in Table 21-2, have also been established as the ambient air quality standards for the State of New York. The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

Several years of monitoring and planning will be required before EPA imposes local control measures based on the new air quality standards for O_3 (one-hour) and $PM_{2.5}$. EPA is in the process of determining which areas are in attainment of the standard, and which ones will require new controls. States must submit their revised State Implementation Plans (SIP) for achieving the new standards. These new standards will not require any new local controls until the year 2004 for O_3 and 2005 for $PM_{2.5}$. As the new transitional rules regarding evaluation and requirements for transportation projects have not been established, there are no current requirements for the evaluation of transportation projects with regard to these new standards.

TABLE 21-2
APPLICABLE NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS
APPLICABLE AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Period	National and Primary	NY State Standards Secondary
Ozone	8 Hour	0.08 ppm (157 µg/m^3)	Same as Primary Standard
	1 Hour	0.12 ppm (235 µg/m^3)	
Carbon Monoxide	8 Hour	9 ppm (10 mg/m^3)	Same as Primary Standard
	1 Hour	35 ppm (40 mg/m^3)	Same as Primary Standard
Nitrogen Dioxide	Annual Average	0.053 ppm (100 µg/m^3)	Same as Primary Standard
Sulfur Dioxide	Annual Average	80 µg/m^3 (0.03 ppm)	-
	24 Hour	365 µg/m^3 (0.14 ppm)	-
	3 Hour	-	1300 µg/m^3 (0.5 ppm)
Suspended Particulate Matter (PM_{10})	24 Hour	150 µg/m^3	Same as Primary Standard
	Annual Arithmetic Mean	50 µg/m^3	Same as Primary Standard
Suspended Fine Particulate Matter ($PM_{2.5}$)	24 Hour	65 µg/m^3	Same as Primary Standard
	Annual Arithmetic Mean	15 µg/m^3	Same as Primary Standard
Lead	Calendar Quarter	1.5 µg/m^3	Same as Primary Standard

Source: US Environmental Protection Agency, "National Primary and Secondary Ambient Air Quality Standards" (49 CFR 50). New York Department of Environmental Conservation.
ppm: parts per million
µg/m3: micrograms per cubic meter

2. Impact Criteria

In addition to the federal and State standards, under New York City's Environmental Quality Review (CEQR) guidelines, incremental impact criteria, known as *de minimis* criteria, have been established to measure the impact significance of estimated increments.

a) CO Thresholds

Significant CO increments are characterized as:

- An increase of 0.5 ppm or more for the 8-hour period, when baseline concentrations are above 8.0 ppm; or
- An increase of one-half the difference between the baseline and the standard concentration (9 ppm) for the 8-hour period, when baseline concentrations are below 8 ppm.

Project-related impacts less than these values are not considered to be significant.

b) $PM_{2.5}$ Thresholds

In 1997, the EPA established the NAAQS for fine particulates ($PM_{2.5}$). The annual standard is 15 micrograms per cubic meter, and the 24-hour standard is 65 micrograms per cubic meter. The EPA has been working with the States to collect and analyze air quality monitoring data for $PM_{2.5}$ and the formal designations of non-attainment areas have not yet occurred. Formal designations are expected by the end of 2004, and states with areas so designated will have three years thereafter to revise the State Implementation Plan (SIP) to address fine particulates. Until the NYSDEC proposes a SIP to address compliance with the new $PM_{2.5}$ standards, EPA's Office of Air Quality Planning and Region

II have indicated that the states have no further obligations under the Clean Air Act (CAA) concerning $PM_{2.5}$.

In the absence of standards for the analysis of $PM_{2.5}$ emissions applicable to the New York Metropolitan Area, the values referenced in the NYSDEC Commissioner's Policy (CP-33) (NYSDEC, 2003) and DEP's Interim Guidelines (February 2004) were reviewed. The policy defines certain *de minimis* criteria for evaluating the potential for significant adverse impacts resulting from the emission of fine particulate matter.

These interim significant threshold values (STVs) are as follows:

- Predicted incremental impacts of $PM_{2.5}$ greater than 5 $\mu g/m^3$ averaged over a 24-hour (daily) period at a discrete location of public access, either at ground or elevated levels (microscale analysis);
- Predicted incremental ground-level impacts of $PM_{2.5}$ greater than 0.1 $\mu g/m^3$ on an annual average neighborhood-scale basis.

Based on the last three years of monitored data from the NYSDEC, annual $PM_{2.5}$ levels currently exceed the NAAQS at locations in the vicinity of the project area. Actions that would result in incremental impacts greater than these STVs have the potential to cause significant adverse impacts by exacerbating existing exceedances of the annual $PM_{2.5}$ standard or increasing 24-hour $PM_{2.5}$ contributions. Actions which exceed these thresholds would require an examination of potential measures to reduce or eliminate such potential significant adverse impacts.

c) Non-Criteria Pollutant Thresholds

Non-criteria or toxic air pollutants include hundreds of pollutants, ranging from high to low toxicity. No federal standards have been promulgated for toxic air pollutants. However, the EPA and the NYSDEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure criteria.

The NYSDEC DAR-1 guidance document (also known as "Air Guide-1") presents the allowable ambient concentrations in micrograms per cubic meter for the one-hour and annual average time periods for various air toxic compounds. These values are provided in Table 21-3 for the compounds affecting receptors located at projected and potential development sites. The compounds listed are those emitted by existing sources of air toxics in the area. Receptors are locations where the general public has continuous access, such as sidewalks, parks, property lines of residences, hospitals, schools, etc., and air intakes and operable windows.

In order to evaluate short-term and annual impacts of non-carcinogenic toxic air emissions, the NYSDEC has established short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) for exposure limits, and EPA developed a methodology called the "Hazard Index Approach." The acute hazard index is based on short-term exposure, while the chronic non-carcinogenic hazard index is based on annual exposure limits. If the combined ratio of pollutant concentration divided by its respective SGCs or AGCs value for each of the toxic pollutants is found to be less than 1, no significant air quality impacts are predicted to occur due to these pollutant releases.

In addition, the EPA has developed carcinogenic unit risk factors for toxic pollutants based on their toxicities. The EPA does not consider an overall incremental cancer risk from a proposed action of less than one-in-one million to be significant. Using these factors, the potential cancer risk associated with each carcinogenic pollutant, as well as the total cancer risk of the releases of all of the carcinogenic toxic pollutants combined, can be estimated. If the total incremental cancer risk of all of

the carcinogenic toxic pollutants combined is less than one in one million, no significant air quality impacts are predicted to occur due to these pollutant releases.

TABLE 21-3
INDUSTRIAL SOURCE ANALYSIS: RELEVANT NYSDEC AIR GUIDELINE CONCENTRATIONS

Compound	CAS Registry No.	SGC µg/m^3	AGC µg/m^3	Toxicity Rating
Acetic Acid	00064-19-7	3,700	60	Not Rated
Ammonia	07664-41-7	2,400	100	Low
Antimony	07440-36-0	---	1.2	Moderate
Biphenyl	00092-52-4	---	3.1	Moderate
Butyl Acetate	00123-86-4	95,000	17,000	Low
Carbon Dioxide	00124-38-9	5.4 E-06	21,000	Not Rated
Copper Cyanide	00544-92-3	380	50	High
1,4-Dichlorobenzene[1] (p)	00106-46-7	---	0.09	Moderate
1,2-Dichlorobenzene (o)	00095-50-1	30,000	360	Moderate
Dichloromethane[1] (Methylene Chloride)	00075-09-2	14,000	2.1	Moderate
Dimethyl Ketone (Acetone)	00067-64-1	180,000	28,000	Low
Ethane[6]	00074-84-0	---	110,000	Not Rated
Ethanol	00064-17-5	---	45,000	Low
Ethylene Glycol	00107-21-1	10,000	400	Not Rated
Ethylene Glycol Monobutyl Ether	00111-76-2	420	230	Moderate
Formic Acid	00064-18-6	1,900	22	Moderate
Hydrogen Chloride	07647-01-0	2,100	20	Low
Hydrogen Cyanide	00074-90-8	520	3.0	High
n- Octane	00111-65-9	---	3,300	Not Rated
Isopropyl Alcohol	00067-63-0	98,000	7,000	Moderate
Nitric Acid Mist	07697-37-2	86	12	Moderate
Phosphoric Acid Mist	07664-38-2	300	10	Moderate
Potassium Carbonate[2]	00584-08-7	380	50	Not rated
Sodium Cyanide	00143-33-9	380	50	Moderate
Sodium Hydroxide	01310-73-2	200	---	Not Rated
Sulfuric Acid Mist	07664-93-9	120	1	Moderate
Tetrachloroethylene[1]	00127-18-4	1,000	1	Moderate
Tin	07440-31-5	20	0.24	Not Rated
Toluene	00108-88-3	37,000	400	Low
Trichlorobenzene	00120-82-1	3,700	---	Not Rated
Triethylene Glycol	00112-24-3	620	330	Moderate
Zinc Chloride	07646-85-7	200	2.4	Moderate
Criteria Pollutants:[3]				
Nitrogen Dioxide	10102-44-0	---	NAAQS	
Carbon Monoxide	00630-08-0	14,000	---	
PM_{10}	NY075-00-5	380	NAAQS	
SO_2	07446-09-5	910	NAAQS	
Lead	07439-92-1	---	0.38	

1 Denotes that compound is a carcinogen.

2 Ethane and potassium carbonate had no associated SGC or AGC. Therefore, the guideline for propane was used to represent ethane and the guideline for particulates was used for potassium carbonate.

3 For criteria pollutants, the NAAQS was used for the annual averaging period of NO_2, PM_{10}, and SO_2. Otherwise the DAR-1 equivalent standard was used for compliance. Although a NAAQS value exists for the one-hour CO concentration, DAR-1 recommends using the equivalent standard in lieu of the NAAQS.

E. EXISTING CONDITIONS AND REGULATORY SETTING

1. Study Area Designation

The federal CAA defines non-attainment areas as geographic regions that have been designated as not meeting one or more of the NAAQS. Air quality maintenance areas are regions that have recently attained compliance with the NAAQS. All of the New York City metropolitan area is currently designated as being a severe non-attainment area for the 1-hour ozone standard and moderate non-attainment for the 8-hour ozone standard, and Manhattan is designated as a non-attainment area for PM_{10}. New York City was recently re-designated from a non-attainment area to a maintenance area for CO, after demonstrating compliance with the CO standards. The study area has not been designated for $PM_{2.5}$, although current monitored values currently exceed the $PM_{2.5}$ annual standard. The study area is in attainment for the other pollutants.

2. Conformity Requirements

The CAA requires that a SIP be prepared for each non-attainment area, and a maintenance plan be prepared for each former non-attainment area. A SIP is a state's plan on how it will meet the NAAQS under the deadlines established by the CAA. The EPA's Transportation Conformity Rule requires SIP conformity determinations on transportation plans, programs, and projects before they are approved or adopted.

Conformity to the purpose of an SIP means that transportation activities would not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS. However, under Public Law 107-23 (Stat. 1469), the New York City Metropolitan Area has been provided a temporary waiver from certain transportation conformity requirements and metropolitan transportation planning requirements under the CAA. During this waiver period, interagency consultation procedures have been established to prevent degradation of air quality, discourage transportation project actions that have adverse air quality effects, and encourage those actions that have beneficial air quality effects. An Interagency Consultation Group (ICG) identifies, tracks, and evaluates all new transportation projects that could have an impact on regional air quality levels. The Environmental Analysis Bureau of the New York State Department of Transportation (NYSDOT), a member of the ICG, maintains a database of all new, amended, and deleted transportation projects in the region.

3. Monitored Ambient Air Quality Levels

Ambient air quality monitoring data that have been collected at stations located near the study area are shown in Table 21-4. These data, which are presented to provide an indication of the pollutant levels in the area, were collected by the NYSDEC and compiled in the EPA's Airdata Database for 2003, the latest calendar year for which data are currently available. Monitored levels are representative of the existing conditions in the study area and include both background and local influences. The monitored levels do not exceed national and State ambient air quality standards except for annual $PM_{2.5}$ concentration. Monitored values indicate that current $PM_{2.5}$ annual levels exceed the NAAQS.

The National Air Quality and Emissions Trends Report (2003) indicates that direct $PM_{2.5}$ emissions from man-made sources decreased 17 percent nationally in the last 10 years. The decrease in the air quality levels was only 8 percent nation-wide. This discrepancy is due to the fact that the $PM_{2.5}$ concentrations are formed by direct emissions as well as by the secondary formation as NO_x, SO_2, and other emitted gases react in the atmosphere. The direct man-made sources of $PM_{2.5}$ emissions include industrial processes, fuel combustion and transportation, which account for approximately one-third of the total direct emissions of $PM_{2.5}$. A reduction in vehicular exhaust emissions is expected in the

future as a result of vehicle fleet turnover and the implementation of EPA's more stringent emission controls (including those for construction equipment, heavy-duty vehicles, and marine engines). However, since vehicle miles of travel are expected to increase in the future, it is unclear whether or not $PM_{2.5}$ emissions will decrease from transportation sources.

TABLE 21-4
REPRESENTATIVE AMBIENT AIR QUALITY DATA (2003)

Pollutant	Monitor	Averaging Time	Value	NAAQS
CO	225 East 34th St. (Traffic Site Monitor)	8-hour	3.3 ppm	9 ppm
		1-hour	4.0 ppm	35 ppm
	PS 59 (Rooftop Monitor)	8-hour	2.6 ppm	9 ppm
		1-hour	4.6 ppm	35 ppm
NO_2	PS 59	Annual	0.038 ppm	0.053 ppm
PM_{10}	1 Pace Plaza	Annual	27 $\mu g/m^3$	50 $\mu g/m^3$
		24-hour	81 $\mu g/m^3$	150 $\mu g/m^3$
$PM_{2.5}$	PS 59	Annual	19.6 $\mu g/m^3$	15 $\mu g/m^3$
		24-hour	49 $\mu g/m^3$	65 $\mu g/m^3$
	Post Office, Canal Street	Annual	16.3 $\mu g/m^3$	15 $\mu g/m^3$
		24-hour	46 $\mu g/m^3$	65 $\mu g/m^3$
SO_2	PS 59	3-hour	0.071 ppm	0.50 ppm
		24-hour	0.097 ppm	0.14 ppm
		Annual	0.014 ppm	0.03 ppm

Source: EPA Airdata Database 2003/NYSDEC Data.
Note: Values are the highest pollutant levels recorded during the 2003 calendar year.

4. Background Values

In assuming the total impact of the Proposed Action, it is necessary to include consideration of the background pollutant levels for the study area. The background level is the component of the total concentration not accounted for through the microscale modeling analysis. Applicable background concentrations were added to the modeling results to obtain total pollutant concentrations at each receptor site for each analysis year. Background concentrations were based on monitored values collected by the NYSDEC or values obtained from the DEP. The CO background values were provided by the DEP using the latest NYSDEC procedures based on ambient monitoring data and future decreases in vehicular emissions. The PM_{10} background values were based on the most recent NYSDEC monitoring data and EPA calculation procedures; for consistency with the EPA procedures, monitoring data from the monitoring site having the most recent consecutive years of data, Mabel Dean High School at 240 Second Avenue, was used in the background calculations. Meanwhile, NO_2 and SO_2 background values were obtained from the DEP. These values were added to the modeling results to obtain total pollutant concentrations at each receptor site for each analysis year. The background values used in the mobile and stationary source analyses are provided in Table 21-5.

TABLE 21-5
BACKGROUND CONCENTRATIONS

Pollutant	Averaging Time	Value
CO	8-hour	2.9 ppm
NO_2	Annual	77 $\mu g/m^3$
PM_{10}	Annual	21 $\mu g/m^3$
	24-hour	43 $\mu g/m^3$
SO_2	3-hour	228 $\mu g/m^3$
	24-hour	121 $\mu g/m^3$
	Annual	34 $\mu g/m^3$

F. MOBILE SOURCE-RELATED ANALYSES

1. Microscale Intersection Analysis Methodology

a) Site Selection

A microscale modeling analysis was conducted that estimated CO, PM_{10}, and $PM_{2.5}$ levels near the heavily congested intersections in the study area that are anticipated to be affected by the Proposed Action. Five scenarios were analyzed: Existing Conditions (2003) and Future Conditions With and Without the Proposed Action (2010 and 2025). In order to select these analysis sites, traffic volumes, the traffic levels of service, and travel speeds at the major signalized intersections were evaluated With and Without the Proposed Action. Analysis site selection was based on a screening analysis that was conducted using the *CEQR Technical Manual* screening threshold criteria to determine where the air quality levels would most greatly be affected by the Proposed Action. The screening used total traffic volumes at intersections, changes associated with speeds, and project-generated trips from the traffic analysis to make the final determination on the analysis sites for all pollutants of concern in the microscale intersection analysis. All signalized intersections in the study area were considered in the screening, as well as locations in the secondary study area near congested bridge and tunnel approaches. The intersection sites that were selected for analysis are shown Figure 21-1 and in Table 21-1.

b) Receptors

The locations at which pollutant concentrations are estimated are known as "receptors." Following guidelines established by the EPA, receptors were located where the maximum concentration is likely to occur and where the general public is likely to have access. For this analysis, receptors were distributed along sidewalks near the intersection selected for analysis and surrounding each analysis site.

c) Traffic Data

Traffic data for the air quality analysis were derived from traffic counts and other information developed as part of the traffic study analysis, using CEQR guidelines. Due to the different traffic patterns associated with the various components of the Proposed Action, the following analysis periods were considered—the AM, Midday, and PM peak periods, as well as a weekday evening peak period (8 to 9 PM) and a Sunday peak (4 to 5 PM) to account for traffic from the Multi-Use Facility, and an early morning period (7 to 8 AM) to account for the effect of traffic from the relocated Quill Bus Depot, DSNY Maintenance Garage and NYPD Tow Pound facilities on mobile source emissions. These are the periods when the maximum changes in pollutant concentrations are expected based on overall traffic volumes and anticipated changes in traffic patterns. These were the same periods selected for the traffic analysis.

In addition, for the 10 analysis sites where potential exceedances of either an air quality standard or a significant impact threshold were identified in the DGEIS, traffic conditions were projected for each hour of a peak 24-hour period. The methodology to develop these projections involved the use of 24 hour-by-hour traffic counts and trip generation calculations for new land use components. Traffic assignments during the five peak hours analyzed for traffic (Weekday AM, Midday, and PM, and Weekday evening Special Event and Sunday afternoon Special Event) were used as a basis for the distribution of incremental traffic volumes in other time periods (see Section F.1.f). At each analyzed link, incremental vehicle trips (autos in, autos out, taxis in/out, trucks in, and trucks out) for the peak hours were compared to the ratio of overall vehicle trip generation between the desired hour and a peak hour in order to project incremental vehicle trip generation for these vehicle classes. Traffic volumes for Future Conditions Without the Proposed Action were calculated by increasing the 24-hour existing traffic volume projections by a 0.5% annual background growth factor and adding

incremental vehicle trips associated with Future Without the Proposed Action developments. Traffic volumes for the Future With the Proposed Action were calculated by adding project-generated vehicle trips to the Future Without the Proposed Action.

The *2000 Highway Capacity Manual* and HCS 2000 software were used to develop the traffic data necessary for the air quality analysis. The vehicle classification was determined through field data collection. Existing vehicle speeds were obtained from field measurements for the area, and adjusted to estimate future free flow speeds.

Traffic data used in intersection modeling are summarized in Chapter 19 of this FGEIS.

d) Vehicle Classification Data

Vehicle classification data required to determine composite emission factors were based on traffic survey data for the following categories: light-duty gasoline vehicles (LDGVs), sport utility vehicles (SUVs), medallion taxis, light-duty trucks, heavy-duty trucks, and buses. Light-duty gasoline trucks were divided into four groups (LDGT1 LDGT2, LDGT3 and LDGT4) based on local registration data. Based upon current CEQR guidelines, SUVs were classified as light-duty gasoline trucks with 75 percent of emissions considered as LDGT1 and LDGT2, with the remaining 25 percent as LDGT3 and LDGT4. The split between LDGT1 and 2 and LDGT3 and 4 and heavy-duty gasoline vehicles (HDGVs) and heavy-duty diesel vehicles (HDDVs) was based on NYSDEC's 2003 registration data in MOBILE 6 for each appropriate analysis year. All buses were analyzed using urban transit bus emission factors.

e) Vehicular Emissions

CO emission factors were estimated using the EPA MOBILE 6 mobile emission factor algorithm model released by the EPA on January 29, 2002. This version includes the effects of the new vehicle standards, and covers vehicle turnover. MOBILE 6.2.03 (the most current updated version), which includes emission factors for particulate matter, was released May 2004 and used in this analysis.

The following assumptions were applied in using MOBILE 6.2.03:

- NYSDEC input files with engine operating start and distribution parameters and vehicle miles traveled (VMT) for New York County were used to estimate baseline conditions;
- 2003 New York State registration and diesel sales fraction data;
- For project-generated outbound light-duty vehicles, emission factors with 100 percent cold-start conditions were used;
- For project-generated inbound LDGVs, emission factors with 100 percent hot-stabilized conditions were used;
- 100 percent hot-stabilized LDGV emission factors were used for medallion taxis, with taxi registration and mileage data.
- SUVs were assumed to be LDGTs that have the same engine operating parameters as automobiles;
- An average winter temperature of 52.5 degrees Fahrenheit was used as approved by the DEP and NYSDEC.

PM_{10} and $PM_{2.5}$ emission factors were estimated using EPA's MOBILE 6.2.03 emission model. Exhaust, brake, and tire wear emissions from moving vehicles were estimated for all vehicle types; idle emissions, however, were estimated only for heavy-duty diesel trucks and buses, because this information is estimated only for these vehicles (PM idle emissions from other vehicle types are considered negligible). Emissions of fugitive dust were estimated using the latest AP-42 equation

(dated December 2003) for paved roads. This formula uses empirical data for fugitive dust and has recently been adjusted by the EPA to discount the contribution from exhaust and brake and tire wear emissions. Emissions from fugitive dust are dependent on vehicle weight and the surface silt loading. According to the latest DEP guidelines, the following silt loading factors were used:

- 0.10 for principal and minor arterials with more than 5,000 vpd
- 0.16 for collector roadways
- 0.4 for roadways with fewer than 5,000 vpd
- 0.015 for expressways.

An average vehicle fleet weight of 6,000 pounds was used for most on-street analyses. However, a Manhattan average fleet weight of 5,090 pounds (NYSDEC data as recommended by the DEP) was used to analyze roadways that do not carry a high percentage of heavy-duty trucks and buses.

The MOBILE 6.2.03 model provides urban bus emission factors based on NYSDEC's vehicle age distribution, various engine technologies and mileage accumulation data for the region. As part of its 2000-2004 Capital Program, in 2000 the MTA began installing Continuously Regenerating Technology (CRT) particulate filters as an exhaust after-treatment device on more than 3,000 older diesel buses; the project is expected to be complete in 2005. The remainder of the diesel fleet has newer buses that are already equipped with diesel particulate filters. The MTA has demonstrated that adding CRT along with using ultra-low sulfur fuel can reduce particulate emissions by more than 90 percent. MOBILE 6 bus emission estimates were used to determine 2003 PM_{10} levels. Since the MTA will fully implement the CRT technology on all buses by 2005, the emissions analyses reflect this program for 2010 and 2025.

f) Dispersion Analysis

Mobile source dispersion models are the basic analytical tools used to estimate pollutant concentrations from the emissions generated by motor vehicles as expected under given conditions of traffic, roadway geometry, and meteorology. CAL3QHC Version 2 is a line-source dispersion model that predicts pollutant concentrations near congested intersections and heavily traveled roadways. CAL3QHC input variables include free flow and calculated idle emission factors, roadway geometries, traffic volumes, site characteristics, background pollutant concentrations, signal timing, and meteorological conditions. CAL3QHC predicts inert pollutant concentrations, averaged over a one-hour period near roadways. This model was used to predict concentrations at affected study area intersections.

CAL3QHC predicts peak one-hour pollutant concentrations using assumed meteorology and peak-period traffic conditions. Different emission rates occur when vehicles are stopped (idling), accelerating, decelerating, and moving at different average speeds. CAL3QHC simplifies these different emission rates into the following two components:

- Emissions when vehicles are stopped (idling) during the red phase of a signalized intersection.
- Emissions when vehicles are in motion during the green phase of a signalized intersection.

CAL3QHCR, which is a refinement to CAL3QHC in that it uses actual meteorological data (as opposed to an assumed worst-case set of meteorological conditions), was used in lieu of CAL3QHC in all mobile source analyses. Five years of actual meteorological data from LaGuardia Airport (1998-2002) were used to estimate peak 1-hour and 8-hour CO concentrations, and peak 24-hour and annual average PM_{10} and $PM_{2.5}$ concentrations.

The analyses followed the EPA's Intersection Modeling Guidelines (EPA-454/R-92-005) for CO modeling methodology and receptor placement. All major roadway segments (links) within approximately 1,000 feet from each analysis site (i.e., congested intersection) were considered. A

mixing height of 1,000 meters and a surface roughness factor of 321 centimeters were included in all calculations.

One of two possible levels of analysis was conducted to estimate pollutant concentrations near each analysis site under existing, Future Without the Proposed Action, and Future With the Proposed Action conditions, as follows:

- A Tier I analysis that used one or more peak traffic periods, with the assumption that the peak traffic conditions will persist for each hour of the 8-hour, 24-hour, and annual time periods that correspond to the NAAQS for each pollutant.
- A Tier II analysis that used traffic volumes, speeds, vehicular emissions, and signalization data for each hour of the peak 24-hour period (as opposed to the one-hour requirement for a Tier I analysis).

Tier II analyses result in more realistic predictions of likely pollutant concentrations than the results of a Tier I analysis, which are conservative estimates based on the assumption that peak period traffic conditions persist for the full analysis period. The more detailed Tier II analysis was conducted for those analysis sites and for those pollutants where potential exceedances of either an air quality standard or significant impact threshold were identified in the DGEIS.

The Tier II analysis combined diurnal traffic conditions with the hourly meteorological observations. Diurnal traffic conditions consist of the following parameters:

- 24 hourly baseline traffic volumes;
- 24 hourly project-generated traffic volumes from project uses;
- 24 hourly vehicular classification for every link analyzed;
- 24 hourly intersection operating parameters; and
- 24 hourly vehicular idle and moving emissions on every link.

For analysis sites where the roadway configuration varies by time period (e.g., a traffic lane is added during the peak periods), the configuration that resulted in the highest estimated Tier I pollutant concentrations was used for each hour of the 24-hour analysis period in the Tier II analysis.

g) Results

When reviewing the pollutant concentrations predicted for the various project alternatives and analysis sites, it should be noted that Tier I results cannot be directly compared to Tier II results. This is because the predicted pollutant levels or project impacts estimated using the more detailed, realistic Tier II analysis would be lower than the predicted pollutant levels or impacts estimated using the more conservative Tier I analysis.

Existing Conditions

The results of the Tier I and Tier II mobile source air quality modeling analysis under existing (2003) conditions are provided in Table 21-6. The values shown are the maximum CO and PM_{10} concentrations estimated near each analysis site under the time frames that correspond to the NAAQS.

The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard under a Tier I analysis. The highest estimated concentration (7.1 ppm) would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11) under AM peak period conditions.
- PM_{10} levels would not exceed the 24-hour standard or the annual standard at any of the analysis sites. The highest estimated 24-hour concentration (101.98µg/m^3) under a Tier I analysis would

occur at the intersection of Second Avenue and 36th Street (Analysis Site 11). The highest estimated annual concentration (44.40µg/m^3) would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11).

- The highest estimated PM_{10} 24-hour concentration (93.44µg/m^3) under a Tier II analysis would occur at the intersection of Route 9A and Canal Street (Analysis Site 12). The highest estimated PM_{10} annual concentration (40.72µg/m^3) would occur at the intersection of Tenth Avenue and West 42nd Street (Analysis Site 13).

Representative $PM_{2.5}$ 24-hour and annual levels for 2003 Existing conditions are presented in Table 21-4.

TABLE 21-6
EXISTING CONDITIONS – MAXIMUM 8-HOUR CO, 24-HOUR AND ANNUAL PM_{10} LEVELS

Site #	Analysis Site	CO Results	24-Hour PM_{10} Results		Annual PM_{10} Results	
		8-hour Conc. (ppm) (Peak Time Period) Tier I Level of Analysis	Estimated Conc. (µg/m^3)	Tier Level of Analysis (Peak Time Period)	Estimated Conc. (µg/m^3)	Tier Level of Analysis (Peak Time Period)
1	Route 9A & West 57th St.	5.9 (PM)	91.34	I (AM)	37.17	I (PM)
2	Route 9A & West 42nd St.	6.7 (PM)	79.50	II	34.35	II
3	Route 9A & West 34th St.	6.1 (PM)	81.24	II	36.49	II
4	Eleventh Ave. & West 37th St.	4.3 (MD)	72.76	I (MD)	31.15	I (MD)
5	Eleventh Ave. & West 42nd St.	4.8 (AM)	68.95	II	30.89	II
6	Eleventh Ave. & West 34th St.	4.8 (AM)	68.05	II	29.88	II
7	Tenth Ave. & West 34th St.	5.2 (PM)	79.77	II	33.41	II
8	Tenth Ave. & W. 39th/40th Streets*	6.0 (PM)	84.88	II	35.98	II
9	Herald Square	6.0 (PM)	81.29	II	36.67	II
10	Eighth Ave. & West 42nd St.	6.2 (EV)	80.69	I (EV)	37.41	I (AM)
11	Second Ave. & East 36th St.	7.1 (AM)	101.98	I (AM)	44.40	I (AM)
12	Route 9A & Canal St.	5.9 (AM)	93.44	II	40.65	II
13	Tenth Ave. & West 42nd St.	5.8 (PM)	61.80	II	40.72	II
14	Ninth Ave. & West 34th St.	5.4 (AM)	80.02	II	35.20	II

Notes:

NAAQS:
- CO = 9 ppm
- PM_{10} 24-hr = 150 µg/m^3
- PM_{10} Annual = 50 µg/m

All values are the maximum estimated concentrations under all time periods considered and include the following background concentrations:
- 8-hour CO = 2.9 ppm
- 24-hour PM_{10} = 43 µg/m^3
- Annual PM_{10} = 21 µg/m

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time periods:
- AM - AM peak period (8-9 AM)
- MD - Midday peak period (12-1 PM)
- PM - PM peak period (5-6 PM)
- EV - Evening Special Event peak period (8-9 PM)
- SUN – Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

* Includes impacts from Lincoln Tunnel portal.
** Exceedance of the NAAQS

2010 Future Without the Proposed Action

A summary of the results of the mobile source air quality modeling analysis for the 2010 Future Without the Proposed Action is provided in Table 21-7. The values shown are the maximum CO and PM_{10} concentrations estimated for each analysis site for all time frames that correspond to the NAAQS.

The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard under a Tier I analysis. The highest estimated concentration (5.4 ppm) would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11) under AM peak period conditions.
- PM_{10} levels would not exceed the 24-hour standard or the annual standard at any of the analysis sites. The highest estimated 24-hour concentration (97.60µg/m^3) under a Tier I analysis would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11). The highest estimated annual concentration (42.46µg/m^3) would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11).
- The highest estimated PM_{10} 24-hour concentration (95.22µg/m^3) under a Tier II analysis would occur at the intersection of Route 9A and Canal Street (Analysis Site 12). The highest estimated PM_{10} annual concentration (41.07µg/m^3) would occur at the intersection of Route 9A and Canal Street (Analysis Site 12).

A discussion of $PM_{2.5}$ levels used in the future year 2010 analysis is presented in section E-3 ("Monitored Air Quality Levels").

TABLE 21-7
2010 FUTURE WITHOUT THE PROPOSED ACTION – MAXIMUM 8-HOUR CO, 24-HOUR AND ANNUAL PM_{10} LEVELS

		CO Results	24-Hour PM_{10} Results		Annual PM_{10} Results	
Site #	Analysis Site	8-hour Conc. (ppm) (Peak Time Period) Tier I Level of Analysis	Estimated Conc. (µg/m^3)	Tier Level of Analysis (Peak Time Period)	Estimated Conc. (µg/m^3)	Tier Level of Analysis (Peak Time Period)
1	Route 9A & West 57th St.	4.8 (PM)	94.73	I (PM)	38.65	I (PM)
2	Route 9A & West 42nd St.	5.3 (PM)	80.28	II	34.61	II
3	Route 9A & West 34th St.	5.0 (PM)	81.88	II	36.66	II
4	Eleventh Ave. & West 37th St.	3.7 (MD)	73.33	I (MD)	31.24	I (MD)
5	Eleventh Ave. & West 42nd St.	4.2 (PM)	69.08	II	30.83	II
6	Eleventh Ave. & West 34th St.	4.2 (AM)	68.20	II	29.91	II
7	Tenth Ave. & West 34th St.	4.3 (PM)	80.78	II	33.67	II
8	Tenth Ave. & W. 39th/40th Streets*	4.9 (PM)	76.33	II	33.82	II
9	Herald Square	4.7 (PM)	79.69	II	35.84	II
10	Eighth Ave. & West 42nd St.	5.0 (PM)	78.97	I (EV)	36.54	I (AM)
11	Second Ave. & East 36th St.	5.4 (AM)	97.85	I (PM)	42.46	I (PM)
12	Route 9A & Canal St.	4.7 (AM)	95.22	II	41.07	II
13	Tenth Ave. & West 42nd St.	4.7 (PM)	88.76	II	40.42	I
14	Ninth Ave. & West 34th St.	4.4 (MD)	79.83	II	34.95	II

Notes:

NAAQS:
- CO = 9 ppm
- PM_{10} 24-hr = 150 µg/m^3
- PM_{10} Annual = 50 µg/m

All values are the maximum estimated concentrations under all time periods considered and include the following background concentrations:
- 8-hour CO = 2.9 ppm
- 24-hour PM_{10} = 43 µg/m^3
- Annual PM_{10} = 21 µg/m

* Includes impacts from Lincoln Tunnel portal.

** Exceedance of the NAAQS

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time periods:
- AM - AM peak period (8-9 AM)
- MD - Midday peak period (12-1 PM)
- PM - PM peak period (5-6 PM)
- EV - Evening Special Event peak period (8-9 PM)
- SUN - Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

2010 Future With the Proposed Action without Traffic Mitigation Measures

A summary of the results of the mobile source air quality modeling analysis for the 2010 Future With the Proposed Action without Traffic Mitigation measures is provided in Table 21-8 through Table 21-10. The values shown are the maximum CO, PM_{10}, concentrations, and $PM_{2.5}$ incremental concentrations (With and Without the Proposed Action) estimated for each analysis site.

TABLE 21-8
2010 FUTURE WITH AND WITHOUT THE PROPOSED ACTION WITHOUT TRAFFIC MITIGATION MEASURES: MAXIMUM 8-HOUR CO LEVELS (TIER I ANALYSIS)

Site #	Analysis Site	CO Analysis			
		8-hour CO Level (ppm) (Without PA)	8-hour CO Level (ppm) (With PA)	8-hour CO Increment (ppm)	Tier I Peak Time Period
1	Route 9A & West 57th St.	4.77	4.81	0.04	PM
2	Route 9A & West 42nd St.	5.13	5.23	0.10	SU
3	Route 9A & West 34th St.	4.50	5.06	0.56	SU
4	Eleventh Ave. & West 37th St.	3.70	3.81	0.11	MD
5	Eleventh Ave. & West 42nd St.	4.20	4.36	0.16	PM
6	Eleventh Ave. & West 34th St.	3.72	4.51	0.79	SU
7	Tenth Ave. & West 34th St.	3.97	6.20	2.23	SU
8	Tenth Ave. & West 39th/40th Streets	4.51	5.93	2.02	SU
9	Herald Square	4.54	4.74	0.20	SU
10	Eighth Ave. & West 42nd St.	5.03	5.19	0.16	PM
11	Second Ave. & East 36th St.	5.43	5.43	0.00	AM
12	Route 9A & Canal St.	4.34	4.87	0.53	SU
13	Tenth Ave. & West 42nd St.	4.10	6.53	2.43	SU
14	Ninth Ave. & West 34th St.	3.97	5.97	2.00	SU

Notes:
NAAQS:
CO = 9 ppm
All values are the maximum estimated concentrations under all time periods considered and include the following background concentrations:
8-hour CO = 2.9 ppm
* Includes impacts from Lincoln Tunnel portal.
** Exceedance of the NAAQS

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time periods:
AM - AM peak period (8-9 AM)
MD - Midday peak period (12-1 PM)
PM - PM peak period (5-6 PM)
EV - Evening Special Event peak period (8-9 PM)
SUN - Sunday Special Event peak period (4-5 PM)

TABLE 21-9
2010 FUTURE WITH AND WITHOUT THE PROPOSED ACTION WITHOUT TRAFFIC MITIGATION MEASURES – MAXIMUM 24-HOUR AND ANNUAL PM_{10} LEVELS

Site #	Analysis Site	24-hour Level (µg/m^3) (Without PA)	24-hour Level (µg/m^3) (With PA)	24-hour Increment (µg/m^3)	Tier Level of Analysis	Annual Level (µg/m^3) (Without PA)	Annual Level (µg/m^3) (With PA)	Annual Increment (µg/m^3)	Tier Level of Analysis
1	Route 9A & West 57th St.	94.73	95.31	0.58	I (PM)	38.65	38.88	0.23	I (PM)
2	Route 9A & West 42nd St.	80.28	80.00	-0.28	II	34.61	34.85	0.25	II
3	Route 9A & West 34th St.	81.88	80.51	-1.37	II	36.66	36.57	-0.09	II
4	Eleventh Ave. & West 37th St.	73.33	81.41	8.08	I (MD)	31.20	33.89	2.65	1 (MD)
5	Eleventh Ave. & West 42nd St.	69.08	73.96	4.88	II	30.83	32.53	1.70	II
6	Eleventh Ave. & West 34th St.	68.20	74.17	5.97	II	29.91	32.19	2.28	II
7	Tenth Ave. & West 34th St.	80.78	87.97	7.19	II	33.67	36.25	2.58	II
8	Tenth Ave. & West 39th/40th Streets	76.33	80.01	3.68	II	33.51	34.47	0.96	II
9	Herald Square	79.69	80.08	0.39	II	35.84	36.12	0.28	II
10	Eighth Ave. & West 42nd St.	78.97	80.77	1.80	I (EV)	36.54	37.03	0.49	I (AM)
11	Second Ave. & East 36th St.	97.85	98.43	0.58	I (PM)	42.46	42.66	0.20	I (PM)
12	Route 9A & Canal St.	95.22	97.10	1.88	II	41.07	41.76	0.69	II
13	Tenth Ave. & West 42nd St.	88.76	91.82	3.06	II	40.42	41.63	1.21	II
14	Ninth Ave. & West 34th St.	79.83	83.20	3.37	II	34.95	36.09	1.14	II

Notes:

NAAQS:

PM_{10} 24-hr = 150 µg/m^3

PM_{10} Annual = 50 µg/m

All values are the maximum estimated concentrations under all time periods considered and include the following background concentrations:

24-hour PM_{10} = 43 µg/m^3

Annual PM_{10} = 21 µg/m

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time periods:

AM - AM peak period (8-9 AM)
MD - Midday peak period (12-1 PM)
PM - PM peak period (5-6 PM)
EV - Evening Special Event peak period (8-9 PM)
SUN - Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

* Includes impacts from Lincoln Tunnel portal.

** Exceedance of the NAAQS

TABLE 21-10
2010 FUTURE WITH THE PROPOSED ACTION WITHOUT TRAFFIC MITIGATION MEASURES - MAXIMUM $PM_{2.5}$ INCREMENTAL IMPACTS

Site #	Analysis Site	24-Hour Results		Annual Results	
		24-hour Increment (µg/m3)	Tier Level of Analysis (Peak Time Period)	Annual Increment (µg/m3)	Tier Level of Analysis (Peak Time Period)
1	Route 9A & West 57th St.	0.60	I (PM)	0.050	I (SUN)
2	Route 9A & West 42nd St.	0.17	II	0.008	II
3	Route 9A & West 34th St.	0.47	II	0.019	II
4	Eleventh Ave. & West 37th St.	1.40	I (EV)	0.030	I (AM/PM)
5	Eleventh Ave. & West 42nd St.	0.69	II	0.015	II
6	Eleventh Ave. & West 34th St.	0.76	II	0.022	II
7	Tenth Ave. & West 34th St.	0.99	II	0.028	II
8	Tenth Ave. & W. 39th/40th Sts	0.47	II	0.012	II
9	Herald Square	0.14	II	0.004	II
10	Eighth Ave. & West 42nd St.	0.35	I (EV)	0.020	I (SU)
11	Second Ave. & East 36th St.	0.73	I (SU)	0.020	I (SU)
12	Route 9A & Canal St.	0.25	II	0.007	II
13	Tenth Ave. & West 42nd St.	0.63	II	0.052	II
14	Ninth Ave. & West 34th St.	0.48	II	0.014	II

Notes:
Significant Threshold Values:
24-hour = 5 ug/m3
Annual = 0.1 ug/m3

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis period. Time periods for which concentrations were estimated for Tier I analysis
AM - AM peak period (8-9 AM)
MD - Midday peak period (12-1 PM)
PM - PM peak period (5-6 PM)
EV - Evening Special Event peak period (8-9 PM)
SUN – Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard under a Tier I analysis. The highest estimated concentration (6.53 ppm) would occur at the intersection of Tenth Avenue and West 42nd Street (Analysis Site 13) under Sunday Special Event peak period conditions.
- The DEP CO *de minimis* criteria would not be exceeded at any of the analysis sites, indicating that the Proposed Action would not have the potential to cause CO impacts that are considered to be significant.
- PM_{10} levels would not exceed the 24-hour standard or the annual standard at any of the analysis sites. The highest estimated 24-hour concentration (98.43µg/m^3) under a Tier I analysis would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11). The highest estimated annual concentration (42.66µg/m^3) would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11).
- The highest estimated PM_{10} 24-hour concentration (97.10µg/m^3) under a Tier II analysis would occur at the intersection of Route 9A and Canal Street (Analysis Site 12). The highest estimated PM_{10} annual concentration (41.76µg/m^3) would occur at the intersection of Route 9A and Canal Street (Analysis Site 12).

- The Proposed Action without Traffic Mitigation would not cause increases above the 24-hour $PM_{2.5}$ STV or the annual $PM_{2.5}$ STV and would not result in any significant adverse impacts at any of the analysis sites. The highest estimated 24-hour incremental concentration (1.40µg/m^3) under a Tier I analysis would occur at the intersection of Eleventh Avenue and 37th Street (Analysis Site 4). The highest estimated annual incremental concentration (0.05µg/m^3) would occur at the intersection of Route 9A and 57th Street (Analysis Site 1).
- The highest estimated $PM_{2.5}$ 24-hour concentration (0.99µg/m^3) under a Tier II analysis would occur at the intersection of Tenth Avenue and West 34th Street (Analysis Site 7). The highest estimated $PM_{2.5}$ annual concentration (0.052µg/m^3) would occur at the intersection of Tenth Avenue and West 42nd Street (Analysis Site 13).

Analyses were also conducted to estimate the potential impacts to PM_{10} and $PM_{2.5}$ levels due to the relocation of the Quill Bus Depot, the DSNY Maintenance Garage and the NYPD Tow Pound facilities. Two analysis years were considered, as follows:

- 2010 was selected as the critical analysis year for the $PM_{2.5}$ analysis because exhaust emissions for urban buses are the major contributor to the resulting pollutant levels, and these emissions will decrease significantly between 2010 and 2025 due to fuel composition and emission controls changes required to meet newer federal standards.
- 2025 was selected as the critical analysis year for the PM_{10} analysis because PM_{10} emission factors are primarily based on fugitive road dust emissions which is the major contributor to pollutant levels, and these emissions are directly proportional to vehicle volumes, which are projected to be greater in 2025 than 2010.

The intersection of Tenth Avenue and West 30th Street was selected as the analysis site for these facilities because this intersection would be most affected by the vehicles entering and exiting these facilities. The 7-8 AM hour was selected for evaluation based on the anticipated operations of these facilities, and through recognition that the volumes associated with these facilities during the other hours of the day are below the thresholds that are considered to be significant under CEQR guidelines. The analyses in 2010 indicate that $PM_{2.5}$ 24-hour incremental levels would not exceed the applicable STV value and predicted annual incremental $PM_{2.5}$ levels would not exceed the applicable STV of 0.1 µg/m^3.

An analysis was conducted to estimate the effects on PM_{10} and $PM_{2.5}$ levels in the event that the unused rail right-of-way, which extends from the marshalling area northward beneath Eleventh Avenue and westward between West 40th and West 41st Streets, is not available for use as a truck access connection between the Convention Center and the marshalling facility. In this case, Route 9A would be used as the alternative route for the associated truck traffic. An analysis was conducted for Analysis Site 3 (Route 9A & West 34th Street) to quantify the effects on PM_{10} levels during the peak periods affected by this action. 2010 was selected as the critical analysis year for the $PM_{2.5}$ analysis because exhaust emissions for trucks are the major contributor to the resulting pollutant levels, and these emissions will decrease significantly between 2010 and 2025 due to fuel composition and emission controls changes required to meet newer federal standards. 2025 was selected as the critical analysis year for the PM_{10} analysis because PM_{10} emission factors are primarily based on fugitive road dust emissions which is the major contributor to pollutant levels, and these emissions are directly proportional to vehicle volumes, which are projected to be greater in 2025 than 2010. The results indicate that while there would be slight increases to 24-hour and annual $PM_{2.5}$ levels in 2010, this alternative truck route would not result in any exceedances of the $PM_{2.5}$ significant impact threshold, or additional significant adverse impacts compared to the Proposed Action.

2010 Future With the Proposed Action with Traffic Mitigation Measures

A summary of the results of the mobile source air quality modeling analysis for the 2025 Future Proposed Action with Traffic Mitigation is provided in Table 21-11 through Table 21-13. The values shown are the maximum CO, PM_{10} concentrations and $PM_{2.5}$ incremental concentrations (With and Without the Proposed Action) estimated for each analysis site. The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard under a Tier I analysis. The highest estimated concentration (5.96 ppm) would occur at the intersection of Ninth Avenue and West 34th Street (Analysis Site 14) under Sunday Special Event peak period conditions.
- The DEP CO *de minimis* criteria would not be exceeded at any of the analysis sites, indicating that the Proposed Action would not have the potential to cause CO impacts that are considered to be significant.
- PM_{10} levels would not exceed the 24-hour standard or the annual standard at any of the analysis sites. The highest estimated 24-hour concentration (98.43µg/m^3) under a Tier I analysis would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11). The highest estimated annual concentration (42.66µg/m^3) would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11).
- The highest estimated PM_{10} 24-hour concentration (97.10µg/m^3) under a Tier II analysis would occur at the intersection of Route 9A and Canal Street (Analysis Site 12). The highest estimated PM_{10} annual concentration (41.76µg/m^3) would occur at the intersection of Route 9A and Canal Street (Analysis Site 12).
- The Proposed Action with Traffic Mitigation would not cause increases above the 24-hour $PM_{2.5}$ STV or the annual $PM_{2.5}$ STV and would not result in any significant adverse impacts at any of the analysis sites. The highest estimated 24-hour incremental concentration (1.26µg/m^3) under a Tier I analysis would occur at the intersection of Eleventh Avenue and 37th Street (Analysis Site 4). The highest estimated annual incremental concentration (0.05µg/m^3) would occur at the intersection of Route 9A and 57th Street (Analysis Site 1).
- The highest estimated $PM_{2.5}$ 24-hour concentration (0.99µg/m^3) under a Tier II analysis would occur at the intersection of Tenth Avenue and West 34th Street (Analysis Site 7). The highest estimated $PM_{2.5}$ annual concentration (0.053µg/m^3) would occur at the intersection of Tenth Avenue and West 42nd Street (Analysis Site 13).

TABLE 21-11
2010 FUTURE WITH AND WITHOUT THE PROPOSED ACTION WITH TRAFFIC MITIGATION MEASURES - MAXIMUM 8-HOUR CO CONCENTRATIONS (PPM) (TIER I ANALYSIS)

Site #	Analysis Site	8-hour CO Level (Without PA)	8-hour CO Level (With PA)	8-hour CO Increment	Peak Time Period	8-hour CO Level With Mitigation	8-hour CO Increment	CO *de minimis* Threshold
1	Route 9A & West 57th St.	4.77	4.81	0.04	PM	4.81	0.04	2.11
2	Route 9A & West 42nd St.	5.13	5.23	0.10	SU	5.23	0.10	1.93
3	Route 9A & West 34th St.	5.01	4.91	-0.10	PM	4.90	-0.11	2.0
4	Eleventh Ave. & West 37th St.	3.70	3.81	0.11	MD	3.81	0.11	2.65
5	Eleventh Ave. & West 42nd St.	4.20	4.36	0.16	PM	4.64	0.44	2.40
6	Eleventh Ave. & West 34th St.	3.72	4.51	0.79	SU	4.86	1.14	2.64
7	Tenth Ave. & West 34th St.	3.97	6.20	2.23	SU	5.86	1.89	2.51
8	Tenth Ave. & West 39th/40th Streets	4.51	5.93	2.02	SU	5.13	1.22	2.54
9	Herald Square	4.54	4.74	0.20	SU	4.74	0.20	2.23
10	Eighth Ave. & West 42nd St.	5.03	5.19	0.16	PM	4.93	-0.10	1.98
11	Second Ave. & East 36th St.	5.43	5.43	0.00	AM	5.36	-0.07	1.78
12	Route 9A & Canal St.	4.34	4.87	0.53	SU	4.87	0.53	2.33
13	Tenth Ave. & West 42nd St.	4.10	6.53	2.43	SU	5.27	1.17	2.45
14	Ninth Ave. & West 34th St.	3.97	5.97	2.00	SU	5.96	1.99	2.51

Notes:

NAAQS:

CO = 9 ppm

All values are the maximum estimated concentrations under all time periods considered and include the following background concentrations:

8-hour CO = 2.9 ppm

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time period:

AM - AM peak period (8-9 AM)
MD - Midday peak period (12-1 PM)
PM - PM peak period (5-6 PM)
EV - Evening Special Event peak period (8-9 PM)
SUN - Sunday Special Event peak period (4-5 PM)

* Includes impacts from Lincoln Tunnel portal.

** Exceedance of the NAAQS

TABLE 21-12
2010 FUTURE WITH AND WITHOUT THE PROPOSED ACTION WITH TRAFFIC MITIGATION MEASURES – MAXIMUM 24-HOUR AND ANNUAL PM_{10} LEVELS

Site #	Analysis Site	24-hour Level ($\mu g/m^3$) (Without PA)	24-hour Level ($\mu g/m^3$) (With PA)	24-hour Increment ($\mu g/m^3$)	Tier Level of Analysis	Annual Level ($\mu g/m^3$) (Without PA)	Annual Level ($\mu g/m^3$) (With PA)	Annual Increment ($\mu g/m^3$)	Tier Level of Analysis
1	Route 9A & West 57th St.	94.73	95.30	0.57	I (PM)	38.65	38.88	0.23	I (PM)
2	Route 9A & West 42nd St.	80.28	80.00	-0.28	II	34.61	34.86	0.25	II
3	Route 9A & West 34th St.	81.90	80.51	-1.39	II	36.66	36.57	-0.09	II
4	Eleventh Ave. & West 37th St.	73.33	80.10	6.77	I (MD)	31.24	33.89	2.65	I (MD)
5	Eleventh Ave. & West 42nd St.	69.08	73.96	4.88	II	30.83	32.53	1.70	II
6	Eleventh Ave. & West 34th St.	68.20	74.18	5.98	II	29.91	32.20	2.29	II
7	Tenth Ave. & West 34th St.	80.80	88.00	7.20	II	33.67	36.26	2.59	II
8	Tenth Ave. & West 39th/40th Streets	76.33	79.96	3.63	II	33.82	34.81	0.98	II
9	Herald Square	79.69	80.07	0.38	II	35.84	36.12	0.28	II
10	Eighth Ave. & West 42nd St.	78.97	80.76	1.79	I (EV)	36.54	37.03	0.49	I (AM)
11	Second Ave. & East 36th St.	97.85	98.43	0.58	I (PM)	42.46	42.66	0.20	I (PM)
12	Route 9A & Canal St.	95.22	97.10	1.88	II	41.07	41.76	0.69	II
13	Tenth Ave. & West 42nd St.	88.76	91.83	3.07	II	40.42	41.63	1.21	II
14	Ninth Ave. & West 34th St.	79.83	83.25	3.42	II	34.94	36.10	1.16	II

Notes:

NAAQS:

PM_{10} 24-hr = 150 $\mu g/m^3$

PM_{10} Annual = 50 $\mu g/m$

All values are the maximum estimated concentrations under all time periods considered and include the following background concentrations:

24-hour PM_{10} = 43 $\mu g/m^3$

Annual PM_{10} = 21 $\mu g/m$

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time periods:

AM - AM peak period (8-9 AM)

MD - Midday peak period (12-1 PM)

PM - PM peak period (5-6 PM)

EV - Evening Special Event peak period (8-9 PM)

SUN - Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

* Includes impacts from Lincoln Tunnel portal.

** Exceedance of the NAAQS

TABLE 21-13
2010 FUTURE WITH THE PROPOSED ACTION WITH TRAFFIC MITIGATION MEASURES - MAXIMUM $PM_{2.5}$ INCREMENTAL IMPACTS

Site #	Analysis Site	24-Hour Results		Annual Results	
		24-hour Increment (µg/m3)	Tier Level of Analysis (Peak Time Period)	Annual Increment (µg/m3)	Tier Level of Analysis (Peak Time Period)
1	Route 9A & West 57th St.	0.60	I (SUN)	0.050	I (SUN)
2	Route 9A & West 42nd St.	0.17	II	0.008	II
3	Route 9A & West 34th St.	0.47	II	0.020	II
4	Eleventh Ave. & West 37th St.	1.26	I (EV)	0.030	I (AM/PM)
5	Eleventh Ave. & West 42nd St.	0.68	II	0.016	II
6	Eleventh Ave. & West 34th St.	0.77	II	0.023	II
7	Tenth Ave. & West 34th St.	0.99	II	0.029	II
8	Tenth Ave. & W. 39th/40th Sts	0.48	II	0.012	II
9	Herald Square	0.12	II	0.005	II
10	Eighth Ave. & West 42nd St.	0.34	I (EV)	0.020	I (SUN)
11	Second Ave. & East 36th St.	0.73	I (SUN)	0.020	I (SUN)
12	Route 9A & Canal St.	0.25	II	0.007	II
13	Tenth Ave. & West 42nd St.	0.62	II	0.053	II
14	Ninth Ave. & West 34th St.	0.46	II	0.011	II

Notes:
Significant Threshold Values:
24-hour = 5 ug/m3
Annual = 0.1 ug/m3

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis period. Time periods for which concentrations were estimated for Tier I analysis
AM - AM peak period (8-9 AM)
MD - Midday peak period (12-1 PM)
PM - PM peak period (5-6 PM)
EV - Evening Special Event peak period (8-9 PM)
SUN - Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

2025 Future Without the Proposed Action

A summary of the results of the mobile source air quality modeling analysis for the 2025 Future Without the Proposed Action is provided in Table 21-14. The values shown are the maximum CO and PM_{10} concentrations estimated for each analysis site for all time frames that correspond to the NAAQS.

The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard under a Tier I analysis. The highest estimated concentration (5.0 ppm) would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11) under AM peak period conditions and the intersection of Route 9A and West 42nd Street under PM peak period conditions.
- PM_{10} levels would not exceed the 24-hour standard or the annual standard at any of the analysis sites. The highest estimated 24-hour concentration (102.59µg/m^3) under a Tier I analysis would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11). The highest estimated annual concentration (44.3µg/m^3) would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11).
- The highest estimated PM_{10} 24-hour concentration (99.35µg/m^3) under a Tier II analysis would occur at the intersection of Route 9A and Canal Street (Analysis Site 12). The highest estimated

PM_{10} annual concentration (42.64µg/m^3) would occur at the intersection of Route 9A and Canal Street (Analysis Site 12).

A discussion of $PM_{2.5}$ levels used in the future year 2025 analysis is presented in section E-3 ("Monitored Air Quality Levels").

TABLE 21-14
2025 FUTURE WITHOUT THE PROPOSED ACTION – MAXIMUM 8-HOUR CO, 24-HOUR AND ANNUAL PM_{10} LEVELS

Site #	Analysis Site	CO Results	24-Hour PM_{10} Results		Annual PM_{10} Results	
		8-hour Conc. (ppm) (Peak Time Period) Tier I Level of Analysis	Estimated Conc. (µg/m^3)	Tier Level of Analysis (Peak Time Period)	Estimated Conc. (µg/m^3)	Tier Level of Analysis (Peak Time Period)
1	Route 9A & West 57th St.	4.5 (PM)	99.13	I (PM)	40.15	I (PM)
2	Route 9A & West 42nd St.	5.0 (PM)	83.31	II	35.71	II
3	Route 9A & West 34th St.	4.9 (PM)	84.93	II	37.90	II
4	Eleventh Ave. & West 37th St.	3.6 (MD)	76.17	I (MD)	32.19	I (MD)
5	Eleventh Ave. & West 42nd St.	3.9 (PM)	71.28	II	31.63	II
6	Eleventh Ave. & West 34th St.	3.9 (AM)	70.34	II	30.67	II
7	Tenth Ave. & West 34th St.	4.1 (PM)	84.28	II	34.89	II
8	Tenth Ave. & W. 39th/40th Streets*	4.6 (PM)	79.00	II	34.83	II
9	Herald Square	4.4 (PM)	82.50	II	37.03	II
10	Eighth Ave. & West 42nd St.	4.6 (PM)	82.57	I (EV)	37.74	I (AM)
11	Second Ave. & East 36th St.	5.0 (AM)	102.59	I (PM)	44.30	I (PM)
12	Route 9A & Canal St.	4.4 (AM)	99.35	II	42.64	II
13	Tenth Ave. & West 42nd St.	4.5 (PM)	92.42	II	41.95	II
14	Ninth Ave. & West 34th St.	4.1 (MD)	83.52	II	36.22	II

Notes:
NAAQS:
CO = 9 ppm
PM_{10} 24-hr = 150 µg/m^3
PM_{10} Annual = 50 µg/m

All values are the maximum estimated concentrations under all time periods considered and include the following background concentrations:
8-hour CO = 2.9 ppm
24-hour PM_{10} = 43 µg/m^3
Annual PM_{10} = 21 µg/m

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time periods:
AM - AM peak period (8-9 AM)
MD - Midday peak period (12-1 PM)
PM - PM peak period (5-6 PM)
EV - Evening Special Event peak period (8-9 PM)
SUN - Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

* Includes impacts from Lincoln Tunnel portal.
** Exceedance of the NAAQS

2025 Future With the Proposed Action without Traffic Mitigation Measures

A summary of the results of the mobile source air quality modeling analysis for the 2025 Future With the Proposed Action is provided in Table 21-15 through Table 21-17. The values shown are the maximum CO, PM_{10} concentrations estimated for each analysis site for all time frames that correspond to the NAAQS and $PM_{2.5}$ incremental concentrations (2025 Future With the Proposed Action over 2025 Future Without the Proposed Action).

The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard under a Tier I analysis. The highest estimated concentration (6.37 ppm) would occur at the intersection of Tenth Avenue and 39th Street (Analysis Site 8) under PM peak period conditions.

- The DEP CO *de minimis* criteria would not be exceeded at any of the analysis sites, indicating that the Proposed Action would not have the potential to cause CO impacts that are considered to be significant.
- PM_{10} levels would not exceed the 24-hour standard or the annual standard at any of the analysis sites. The highest estimated 24-hour concentration (109.01µg/m^3) under a Tier I analysis would occur at the intersection of Second Avenue and East 36th Street (Analysis Site 11). The highest estimated annual concentration (46.57µg/m^3) would occur at the intersection of Second Avenue and East 36th Street (Analysis Site 11).
- The highest estimated PM_{10} 24-hour concentration (102.83µg/m^3) under a Tier II analysis would occur at the intersection of Route 9A and Canal Street (Analysis Site 12). The highest estimated PM_{10} annual concentration (44.11µg/m^3) would occur at the intersection of Tenth Avenue and West 42nd Street (Analysis Site 13).
- The Proposed Action without Traffic Mitigation would not cause increases above the 24-hour $PM_{2.5}$ STV or the annual $PM_{2.5}$ STV and would not result in any significant adverse impacts at any of the analysis sites. The highest estimated 24-hour incremental concentration (3.41µg/m^3) under a Tier I analysis would occur at the intersection of Eleventh Avenue and 37th Street (Analysis Site 4). The highest estimated annual incremental concentration (0.09µg/m^3) would occur at the intersection of Eleventh Avenue and 37th Street (Analysis Site 4).
- The highest estimated $PM_{2.5}$ 24-hour concentration (1.27µg/m^3) under a Tier II analysis would occur at the intersection of Eleventh Avenue and West 34th Street (Analysis Site 6). The highest estimated $PM_{2.5}$ annual concentration (0.034µg/m^3) would occur at the intersections of Route 9A and West 34th Street (Analysis Site 3) and Eleventh Avenue and West 34th Street (Analysis Site 6).
- Analyses were conducted to estimate the potential impacts to PM_{10} and $PM_{2.5}$ levels due to the relocation of the Quill Bus Depot, the DSNY Maintenance Garage and the NYPD Tow Pound facilities at the intersection of Tenth Avenue and West 30th Street during the 7-8 AM peak hour. Analysis year 2025 was selected as the critical year for the PM_{10} analysis (see discussion in 2010 Future with Proposed Action.) The results indicate that predicted PM_{10} 24-hour and annual levels would not exceed the applicable ambient air quality standards and would not cause exceedances of the DEP's interim 24-hour and annual STV's for $PM_{2.5}$.
- An analysis was conducted to estimate the effects on PM_{10} and $PM_{2.5}$ levels in the event that the unused rail right-of-way, which extends from the Convention Center truck marshalling area northward beneath Eleventh Avenue and westward between West 40th and West 41st Streets, is not available for use as a truck access connection between the Convention Center and the marshalling facility. In this case, Route 9A would be used as the alternative route for the associated truck traffic. An analysis was conducted for Analysis Site 3 (Route 9A & West 34th Street) to quantify the effects on PM_{10} levels during the peak periods affected by this action. 2010 was selected as the critical analysis year for the $PM_{2.5}$ analysis because exhaust emissions for trucks are the major contributor to the resulting pollutant levels, and these emissions will decrease significantly between 2010 and 2025 due to fuel composition and emission controls changes required to meet newer federal standards. 2025 was selected as the critical analysis year for the PM_{10} analysis because PM_{10} emission factors are primarily based on fugitive road dust emissions which is the major contributor to pollutant levels, and these emissions are directly proportional to vehicle volumes, which are projected to be greater in 2025 than 2010. The results indicate, that while there would be slight increases to 24-hour and annual PM_{10} and $PM_{2.5}$ levels, this alternative truck route would not result in any exceedances of the NAAQS, or the $PM_{2.5}$ significant impact threshold, nor in any additional significant adverse impacts as compared to the Proposed Action.

TABLE 21-15
2025 FUTURE WITH AND WITHOUT THE PROPOSED ACTION WITHOUT TRAFFIC MITIGATION MEASURES: MAXIMUM 8-HOUR CO LEVELS

Site #	Analysis Site	CO Analysis			
		8-hour CO Level (ppm) (Without PA)	8-hour CO Level (ppm) (With PA)	8-hour CO Increment (ppm)	Tier I Peak Time Period
1	Route 9A & West 57th St.	4.50	4.76	0.26	PM
2	Route 9A & West 42nd St.	5.01	5.20	0.19	PM
3	Route 9A & West 34th St.	4.94	5.13	0.19	PM
4	Eleventh Ave. & West 37th St.	3.50	4.91	1.41	PM
5	Eleventh Ave. & West 42nd St.	3.91	4.36	0.45	PM
6	Eleventh Ave. & West 34th St.	3.53	4.64	1.11	SU
7	Tenth Ave. & West 34th St.	3.71	5.50	1.79	EV
8	Tenth Ave. & West 39th/40th Streets	4.59	6.37	1.78	PM
9	Herald Square	4.43	4.71	0.28	PM
10	Eighth Ave. & West 42nd St.	4.64	5.31	0.67	PM
11	Second Ave. & East 36th St.	4.72	5.13	0.41	PM
12	Route 9A & Canal St.	4.03	4.53	0.50	SU
13	Tenth Ave. & West 42nd St.	4.46	6.27	1.81	PM
14	Ninth Ave. & West 34th St.	3.83	5.27	1.44	SU

Notes:

NAAQS:

CO = 9 ppm

All values are the maximum estimated concentrations under all timeperiods considered and include the following background concentrations:

8-hour CO = 2.9 ppm

* Includes impacts from Lincoln Tunnel portal.

** Exceedance of the NAAQS

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time periods:

AM - AM peak period (8-9 AM)

MD - Midday peak period (12-1 PM)

PM - PM peak period (5-6 PM)

EV - Evening Special Event peak period (8-9 PM)

SUN - Sunday Special Event peak period (4-5 PM)

TABLE 21-16
2025 FUTURE WITH AND WITHOUT THE PROPOSED ACTION WITHOUT TRAFFIC MITIGATION MEASURES – MAXIMUM 24-HOUR AND ANNUAL PM_{10} LEVELS

Site #	Analysis Site	24-hour Level (µg/m^3) (Without PA)	24-hour Level (µg/m^3) (With PA)	24-hour Increment (µg/m^3)	Tier Level of Analysis	Annual Level (µg/m^3) (Without PA)	Annual Level (µg/m^3) (With PA)	Annual Increment (µg/m^3)	Tier Level of Analysis
1	Route 9A & West 57th St.	99.13	102.91	3.78	I (PM)	40.15	42.21	2.06	I (PM)
2	Route 9A & West 42nd St.	83.31	84.45	1.1	II	35.71	36.44	0.73	II
3	Route 9A & West 34th St.	84.93	84.62	-0.3	II	37.90	38.43	0.53	II
4	Eleventh Ave. & West 37th St.	72.36	97.46	25.10	I (PM)	30.25	39.09	8.84	I (PM)
5	Eleventh Ave. & West 42nd St.	71.28	80.02	8.7	II	31.63	34.53	2.90	II
6	Eleventh Ave. & West 34th St.	70.34	80.20	9.9	II	30.67	34.43	3.76	II
7	Tenth Ave. & West 34th St.	84.28	92.81	9.6	II	34.89	38.17	3.29	II
8	Tenth Ave. & West 39th/40th Streets	79.00	85.89	7.40	II	34.83	36.79	1.95	II
9	Herald Square	82.50	84.00	1.50	II	37.03	37.91	0.88	II
10	Eighth Ave. & West 42nd St.	79.85	87.00	7.15	I (PM)	37.74	39.54	1.80	I (AM)
11	Second Ave. & East 36th St.	102.59	109.01	6.42	I (PM)	44.30	46.57	2.27	I (PM)
12	Route 9A & Canal St.	99.35	102.83	3.5	II	42.64	43.99	1.35	II
13	Tenth Ave. & West 42nd St.	92.42	98.85	5.8	II	41.95	44.11	2.16	II
14	Ninth Ave. & West 34th St.	83.52	88.96	7.2	II	36.22	38.59	2.37	II

Notes:

NAAQS:

PM_{10} 24-hr = 150 µg/m^3

PM_{10} Annual = 50 µg/m

All values are the maximum estimated concentrations under all time periods considered and include the following background concentrations:

24-hour PM_{10} = 43 µg/m^3

Annual PM_{10} = 21 µg/m

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time periods:

AM - AM peak period (8-9 AM)
MD - Midday peak period (12-1 PM)
PM - PM peak period (5-6 PM)
EV - Evening Special Event peak period (8-9 PM)
SUN - Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

* Includes impacts from Lincoln Tunnel portal.

** Exceedance of the NAAQS

TABLE 21-17
2025 FUTURE WITH THE PROPOSED ACTION WITHOUT TRAFFIC MITIGATION MEASURES - MAXIMUM $PM_{2.5}$ INCREMENTAL IMPACTS

Site #	Analysis Site	24-Hour Results		Annual Results	
		24-hour Increment (µg/m3)	Tier Level of Analysis (Peak Time Period)	Annual Increment (µg/m3)	Tier Level of Analysis (Peak Time Period)
1	Route 9A & West 57th St.	0.650	I (SUN)	0.050	I (SUN)
2	Route 9A & West 42nd St.	0.430	II	0.010	II
3	Route 9A & West 34th St.	0.790	II	0.034	II
4	Eleventh Ave. & West 37th St.	3.410	I (PM)	0.090	I (PM)
5	Eleventh Ave. & West 42nd St.	1.160	II	0.026	II
6	Eleventh Ave. & West 34th St.	1.270	II	0.034	II
7	Tenth Ave. & West 34th St.	1.130	II	0.033	II
8	Tenth Ave. & W. 39th/40th Sts	0.850	II	0.020	II
9	Herald Square	0.420	II	0.012	II
10	Eighth Ave. & West 42nd St.	0.760	I (PM)	0.030	I (PM)
11	Second Ave. & East 36th St.	1.120	I (PM)	0.030	I (PM)
12	Route 9A & Canal St.	0.480	II	0.015	II
13	Tenth Ave. & West 42nd St.	0.730	II	0.020	II
14	Ninth Ave. & West 34th St.	0.970	II	0.024	II

Notes:
Significant Threshold Values:
24-hour = 5 ug/m3
Annual = 0.1 ug/m3

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis period. Time periods for which concentrations were estimated for Tier I analysis
AM - AM peak period (8-9 AM)
MD - Midday peak period (12-1 PM)
PM - PM peak period (5-6 PM)
EV - Evening Special Event peak period (8-9 PM)
SUN - Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

2025 Future With the Proposed Action with Traffic Mitigation Measures

A summary of the results of the mobile source air quality modeling analysis for the 2025 Future Proposed Action with Traffic Mitigation is provided in Table 21-18 through Table 21-20. The values shown are the maximum CO, PM_{10} concentrations estimated for each analysis site for all time frames that correspond to the NAAQS and $PM_{2.5}$ incremental concentrations (2025 Future With the Proposed Action over 2025 Future Without the Proposed Action).

The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard under a Tier I analysis. The highest estimated concentration (5.93 ppm) would occur at the intersection of Tenth Avenue and West 42nd Street (Analysis Site 13) under PM peak period conditions.
- The DEP CO *de minimis* criteria would not be exceeded at any of the analysis sites, indicating that the Proposed Action would not have the potential to cause CO impacts that are considered to be significant.
- PM_{10} levels would not exceed the 24-hour standard or the annual standard at any of the analysis sites. The highest estimated 24-hour concentration (109.04µg/m^3) under a Tier I analysis would occur at the intersection of Second Avenue and East 36th Street (Analysis Site 11). The highest

estimated annual concentration (46.57µg/m^3) would occur at the intersection of Second Avenue and 36th Street (Analysis Site 11).

- The highest estimated PM_{10} 24-hour concentration (102.83µg/m^3) under a Tier II analysis would occur at the intersection of Route 9A and Canal Street (Analysis Site 12). The highest estimated PM_{10} annual concentration (44.13µg/m^3) would occur at the intersection of Tenth Avenue and West 42nd Street (Analysis Site 13).
- The Proposed Action with Traffic Mitigation would not cause increases above the 24-hour $PM_{2.5}$ STV or the annual $PM_{2.5}$ STV and would not result in any significant adverse impacts at any of the analysis sites. The highest estimated 24-hour incremental concentration (3.29µg/m^3) under a Tier I analysis would occur at the intersection of Eleventh Avenue and West 37th Street (Analysis Site 4). The highest estimated annual incremental concentration (0.09µg/m^3) would occur at the intersection of Eleventh Avenue and 37th Street (Analysis Site 4).
- The highest estimated $PM_{2.5}$ 24-hour concentration (1.26µg/m^3) under a Tier II analysis would occur at the intersection of Eleventh Avenue and West 34th Street (Analysis Site 6). The highest estimated $PM_{2.5}$ annual concentration (0.035µg/m^3) would occur at the intersection of Route 9A and West 34th Street (Analysis Site 3).

TABLE 21-18
2025 FUTURE WITH AND WITHOUT THE PROPOSED ACTION WITH TRAFFIC MITIGATION MEASURES - MAXIMUM 8-HOUR CO CONCENTRATIONS (PPM) (TIER I ANALYSIS)

Site #	Analysis Site	8-hour CO Level (Without PA)	8-hour CO Level (With PA)	8-hour CO Increment	Peak Time Period	8-hour CO Level With Mitigation	8-hour CO Increment	CO *de minimis* Threshold
1	Route 9A & West 57th St.	4.50	4.76	0.26	PM	4.66	0.16	2.25
2	Route 9A & West 42nd St.	5.01	5.20	0.19	PM	4.87	-0.14	1.99
3	Route 9A & West 34th St.	4.94	5.13	0.19	PM	4.66	-0.28	2.03
4	Eleventh Ave. & West 37th St.	3.50	4.91	1.41	PM	4.53	1.03	2.75
5	Eleventh Ave. & West 42nd St.	3.91	4.36	0.45	PM	4.40	0.49	2.54
6	Eleventh Ave. & West 34th St.	3.53	4.64	1.11	SU	4.60	1.07	2.73
7	Tenth Ave. & West 34th St.	3.71	5.50	1.79	EV	4.17	0.46	2.64
8	Tenth Ave. & West 39th/40th Streets	4.73	6.37	1.78	PM	5.86	1.27	2.20
9	Herald Square	4.43	4.71	0.28	PM	4.73	0.30	2.28
10	Eighth Ave. & West 42nd St.	4.64	5.31	0.67	PM	4.80	0.16	2.18
11	Second Ave. & East 36th St.	4.72	5.13	0.41	PM	5.22	0.50	2.14
12	Route 9A & Canal St.	4.03	4.53	0.50	SU	4.53	0.50	2.48
13	Tenth Ave. & West 42nd St.	4.46	6.27	1.81	PM	5.93	1.47	2.27
14	Ninth Ave. & West 34th St.	3.83	5.27	1.44	SU	5.41	1.58	2.58

Notes:

NAAQS:
CO = 9 ppm

All values are the maximum estimated concentrations under all time periods considered and include the following background concentrations:
8-hour CO = 2.9 ppm

* Includes impacts from Lincoln Tunnel portal.
** Exceedance of the NAAQS

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time period:
AM - AM peak period (8-9 AM)
MD - Midday peak period (12-1 PM)
PM - PM peak period (5-6 PM)
EV - Evening Special Event peak period (8-9 PM)
SUN - Sunday Special Event peak period (4-5 PM)

TABLE 21-19
2025 FUTURE WITH AND WITHOUT THE PROPOSED ACTION WITH TRAFFIC MITIGATION MEASURES – MAXIMUM 24-HOUR AND ANNUAL PM_{10} LEVELS

Site #	Analysis Site	24-hour Level ($\mu g/m^3$) (Without PA)	24-hour Level ($\mu g/m^3$) (With PA)	24-hour Increment ($\mu g/m^3$)	Tier Level of Analysis	Annual Level ($\mu g/m^3$) (Without PA)	Annual Level ($\mu g/m^3$) (With PA)	Annual Increment ($\mu g/m^3$)	Tier Level of Analysis
1	Route 9A & West 57th St.	99.13	102.91	3.78	I (PM)	40.15	42.21	2.06	I (PM)
2	Route 9A & West 42nd St.	83.31	84.45	1.14	II	35.71	36.46	0.74	II
3	Route 9A & West 34th St.	84.93	84.65	-0.28	II	37.90	38.43	0.53	II
4	Eleventh Ave. & West 37th St.	72.36	96.30	23.94	I (PM)	30.25	39.02	8.77	I (PM)
5	Eleventh Ave. & West 42nd St.	71.28	80.02	8.74	II	31.63	34.53	2.90	II
6	Eleventh Ave. & West 34th St.	70.34	80.20	9.86	II	30.67	34.43	3.76	II
7	Tenth Ave. & West 34th St.	84.28	92.81	8.53	II	34.89	37.28	2.39	II
8	Tenth Ave. & West 39th/40th Streets	79.00	85.89	6.89	II	34.83	36.79	1.96	II
9	Herald Square	82.50	84.00	1.50	II	37.03	37.91	0.88	II
10	Eighth Ave. & West 42nd St.	79.85	88.47	8.62	I (PM)	37.74	39.93	2.19	I (AM)
11	Second Ave. & East 36th St.	102.59	109.04	6.42	I (PM)	44.30	46.57	2.27	I (PM)
12	Route 9A & Canal St.	99.35	102.83	3.48	II	42.64	43.99	1.35	II
13	Tenth Ave. & West 42nd St.	92.42	98.35	5.93	II	41.95	44.13	2.19	II
14	Ninth Ave. & West 34th St.	83.52	88.96	5.44	II	36.22	37.99	1.77	II

Notes:

NAAQS:

PM_{10} 24-hr = 150 $\mu g/m^3$

PM_{10} Annual = 50 $\mu g/m$

All values are the maximum estimated concentrations under all time periods considered and include the following background concentrations:

24-hour PM_{10} = 43 $\mu g/m^3$

Annual PM_{10} = 21 $\mu g/m$

* Includes impacts from Lincoln Tunnel portal.

** Exceedance of the NAAQS

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis periods. Concentrations were estimated for the following time periods:

AM - AM peak period (8-9 AM)

MD - Midday peak period (12-1 PM)

PM - PM peak period (5-6 PM)

EV - Evening Special Event peak period (8-9 PM)

SUN - Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

TABLE 21-20
2025 FUTURE WITH THE PROPOSED ACTION WITH TRAFFIC MITIGATION MEASURES - MAXIMUM $PM_{2.5}$ INCREMENTAL IMPACTS

Site #	Analysis Site	24-Hour Results		Annual Results	
		24-hour Increment (µg/m3)	Tier Level of Analysis (Peak Time Period)	Annual Increment (µg/m3)	Tier Level of Analysis (Peak Time Period)
1	Route 9A & West 57th St.	0.64	I (SUN)	0.050	I (SUN)
2	Route 9A & West 42nd St.	0.44	II	0.010	II
3	Route 9A & West 34th St.	0.78	II	0.035	II
4	Eleventh Ave. & West 37th St.	3.29	I (PM)	0.090	I (PM)
5	Eleventh Ave. & West 42nd St.	1.17	II	0.026	II
6	Eleventh Ave. & West 34th St.	1.26	II	0.034	II
7	Tenth Ave. & West 34th St.	1.19	II	0.031	II
8	Tenth Ave. & W. 39th/40th Sts	0.84	II	0.020	II
9	Herald Square	0.39	II	0.011	II
10	Eighth Ave. & West 42nd St.	0.95	I (PM)	0.040	I (AM)
11	Second Ave. & East 36th St.	1.12	I (PM)	0.030	I (PM)
12	Route 9A & Canal St.	0.48	II	0.014	II
13	Tenth Ave. & West 42nd St.	0.73	II	0.021	II
14	Ninth Ave. & West 34th St.	0.73	II	0.020	II

Notes:
Significant Threshold Values:
24-hour = 5 ug/m3
Annual = 0.1 ug/m3

Tier I analyses assume peak period traffic conditions occur every hour of the 24-hour and annual analysis period. Time periods for which concentrations were estimated for Tier I analysis
AM - AM peak period (8-9 AM)
MD - Midday peak period (12-1 PM)
PM - PM peak period (5-6 PM)
EV - Evening Special Event peak period (8-9 PM)
SUN - Sunday Special Event peak period (4-5 PM)

Tier II analyses utilize hour-by-hour traffic over 24-hour period.

2. Parking Facilities Analysis

Pollutant concentrations could be affected near the new parking facilities that would be associated with the Proposed Action. To estimate the potential impacts from the emissions of these facilities, the three largest proposed underground, multilevel parking garages were selected for detailed analysis. The largest facility would be a 1,117-space parking garage located at West 33rd Street and Tenth Avenue; the other two facilities would be located near the Midblock Park and Boulevard System (950 spaces) and at West 35th Street and Tenth Avenue (914 spaces).

Because the garages would be used almost exclusively by gasoline-powered automobiles and not diesel-fueled trucks, CO was the only pollutant considered for this analysis. PM_{10} and $PM_{2.5}$ concentrations would not be materially affected by these facilities.

CO concentrations near each of these facilities were estimated following the CEQR guidelines for the mechanically ventilated, enclosed garage. Pollutant concentrations were estimated at receptors located at 5 and 50 feet from the exhaust vents, located a minimum of 12 feet above street level. Contributions from emissions generated by street traffic were added to these estimated concentrations to estimate the cumulative impacts of these garages and their corresponding street contribution.

This analysis was conducted for the 2025 analysis year, when these facilities are anticipated to be in operation, for the PM peak period, when estimated garage emissions would be greatest because all of the exiting vehicles would be operating in the higher-polluting, cold-start mode.

Cumulative impacts from any smaller parking facilities that would be located near each other would be less than the analyzed scenario. Therefore, the analyzed condition represents the worst case.

a) Results

The maximum total 8-hour CO concentration (i.e., including background levels and street traffic contributions) estimated for any of the receptor sites considered for the three garage analyses is 4.0 ppm. The impacts of garage emissions, therefore, are not estimated to cause or exacerbate the NAAQS of 9.0 ppm.

3. Lincoln Tunnel Ventilation Building Analysis

a) Methodology

Increased traffic through the Lincoln Tunnel due to the Proposed Action would cause an increase in emissions from the ventilation buildings serving the tunnel. Emissions released through the Lincoln Tunnel Ventilation Buildings in Manhattan were analyzed to determine the potential impacts of these emissions on nearby existing and proposed sensitive land uses. The purpose of the analyses was to estimate the anticipated impacts that would result from the Proposed Action. The potential impacts of these ventilation buildings emissions on the proposed developments associated with the Proposed Action were also considered.

b) Sensitive Receptors

Following the EPA guidelines, analysis receptors were placed at locations where the general public would likely have access. Receptors were also placed at-grade at locations surrounding the ventilation buildings, at operable windows of existing and proposed residential buildings, and at the walkway in the proposed roof garden of the Convention Center.

c) Traffic Data

Traffic conditions for each tube of the Lincoln Tunnel were estimated using traffic volume, vehicle classification and speed data collected for this analysis. Twenty-four hour-by-hour traffic volumes were developed for future conditions based on the base year traffic volumes, projected growth rates, and tunnel capacity. Project-generated volumes were estimated for each hour of the 24-hour analysis period.

d) Vehicular Emissions

Emission factors were estimated using MOBILE 6.2.03 with the same parameters used in the microscale mobile source analysis for expressways. The pollutants analyzed were CO, PM_{10}, and $PM_{2.5}$.

e) Emissions through Exhaust Stacks

Hourly emission rates and exit velocities for each of the three ventilation buildings were estimated based on estimated traffic conditions, vehicular emissions, and the design parameters of the Lincoln Tunnel ventilation system.

f) Dispersion Analysis

A detailed modeling analysis was performed using the Industrial Source Complex Short-Term (ISC3) dispersion model developed by the EPA (version 02035) and described in *User's Guide for the Industrial Source Complex (ISC3) Dispersion Models* (EPA-454/B-95-003a). The basis of the ISC3 model, which can be used to estimate the combined impacts from multiple emissions sources, is the straight-line, steady state Gaussian plume equation. The model can be used as a point source from

stacks. Emissions from stacks could experience the effects of aerodynamic downwash due to nearby buildings, isolated vents, multiple vents, storage piles, conveyor belts, and the like.

Ventilation building stacks were modeled for their actual locations with actual parameters (dimensions, exit velocities, hourly emission rates). Impacts were estimated assuming stack tip downwash, buoyancy-induced dispersion, gradual plume rise, urban dispersion coefficients, wind profile exponents, and no collapsing of stable stability classes, with and without building downwash and the elimination of calms. The most recent available LaGuardia Airport hourly meteorological observations for a five-year period (1998-2002) were used.

Two analyses were conducted. The first was a direct plume analysis that assumed the exhaust plume would directly impact each receptor without regard to building downwash. The second included these effects (with building downwash).

g) Results

The results of the analyses, with and without downwash effects, are provided in Table 21-21 and Table 21-22. The results show no exceedances of the NAAQS or the $PM_{2.5}$ STVs at any sensitive land use. The impacts of the Lincoln Tunnel ventilation buildings at the sidewalk receptors were predicted to be minimal and would not change the mobile source results. Therefore, analysis of cumulative impacts from this source and street traffic at the sidewalks was not warranted.

TABLE 21-21
2010 AND 2025 FUTURE WITH THE PROPOSED ACTION - MAXIMUM ESTIMATED CO AND PM_{10} CONCENTRATIONS NEAR THE LINCOLN TUNNEL VENTILATION BUILDINGS

Pollutant	Unit	Time Period	2010	2025	NAAQS
CO	ppm	8-hour	4.04	4.77	4
PM_{10}	$\mu g/m^3$	24-hour	50.82	55.74	150
		Annual	22.52	22.66	50

TABLE 21-22
2010 AND 2025 FUTURE WITH THE PROPOSED ACTION - MAXIMUM ESTIMATED $PM_{2.5}$ CONCENTRATIONS FROM THE LINCOLN TUNNEL VENTILATION BUILDINGS

	2010			2025			
Time Period	Future With PA ($\mu g/m^3$)	Future Without PA ($\mu g/m^3$)	Increment ($\mu g/m^3$)	Future With PA ($\mu g/m^3$)	Future Without PA ($\mu g/m^3$)	Increment ($\mu g/m^3$)	STV ($\mu g/m^3$)
24 Hour	0.48	0.43	0.05	1.03	0.957	0.07	5
Annual	0.057	0.053	0.02	0.1924	0.1835	0.009	0.1

Notes:
Annual neighborhood $PM_{2.5}$ impacts were estimated by averaging concentrations over a 1 kilometer by 1 kilometer grid centered around the location with the highest estimated concentration (as per the DEP's Interim Guidance).
PA - Proposed Action.

4. Lincoln Tunnel Portal Analysis

a) Methodology

Overview

The purpose of this analysis is to estimate the impacts of the increased traffic due to the Proposed Action through the Lincoln Tunnel and its entrance/exit ramps on air quality at the receptors near the intersection of Tenth Avenue and West 39th Street (Analysis Site 8) and at the receptors along West 38th and 39th Streets between Ninth and Tenth Avenues.

CO, PM_{10}, and $PM_{2.5}$ concentrations were estimated using a methodology specifically developed for this type of emission source based on wind tunnel tests (primarily the Central Artery/Tunnel Project in Boston), and procedures that have been accepted by regulatory agencies in the U.S. and elsewhere. In New York City, this approach was applied to air quality analysis used in EISs for NYSDOT's proposed Route 9A Relocation Project (between West 57th Street and West 72nd Street).

The following tubes of the Lincoln Tunnel were considered for this analysis -- the south tube portal, which is exclusively an exit portal; the north tube portal, which is exclusively an entrance portal; and the center tube portal, which alternates between an exit, entrance, and a mixed use (i.e., one lane in each direction) portal, depending on the time period. Emissions from each of the exit portals were estimated. Analysis of pollutant levels at each of the receptor locations considered the following components:

- Hour-by-hour emissions (over a 24-hour period) exhausted out of the tunnel portals;
- Hour-by hour emissions released from the vehicles traveling on tunnel ramps downstream of the exit portals or approaching the entrance portals;
- Emissions released from street traffic near the intersection of West 39th Street/Tenth Avenue; and
- Background levels appropriate for the study area.

The total pollutant levels estimated at the nearby receptors from all of these sources combined were compared with the appropriate air quality standards. The methodology that was used to estimate the potential impacts from the tunnel portals is discussed separately.

Releases from Tunnel Portals

The approach that was used for the analysis of tunnel-portal releases is based on the assumption that the jet of air exiting the tunnel portal maintains its integrity for a finite distance along the roadway after exiting the portal. This assumption is based on observations made by researchers that show that air emitted from a vehicular-tunnel portal forms a plume that is both pushed out of the tunnel by vehicles prior to their exiting the tunnel (and, if applicable, mechanical ventilation systems) and dragged out of the portal by these same vehicles as they move downstream of the portal. Also, the stream of moving cars exiting a tunnel portal creates a continuous source of momentum that maintains a jet of air with a finite length, width, and height, and the individual cars in the stream create a turbulence that mixes the air uniformly within this region.

Although there is no methodology currently available for mathematically estimating the configuration of the jet or its concentration gradients, there are several factors that were used to rationally estimate its size and shape. These include the speed of the vehicles passing through the tunnel, atmospheric wind speed and direction, the topography of the area immediately surrounding the tunnel portal, the type of the portal (i.e., whether it is one-way or two-way), the geometry of the portal (i.e., its height and physical configuration, and the type of ventilation used in the tunnel (i.e., natural or mechanical and, if mechanical, either longitudinal or transverse). In general, higher tunnel exhaust velocity (either from a naturally or mechanically ventilated tunnel) and lower atmospheric wind speed in the direction opposite the traffic flow would result in a longer length of the jet. In addition, faster speed of the vehicles exiting the portals would result in a higher tunnel exhaust velocity.

On the basis of wind tunnel studies conducted for similar roadway types, a scenario that divides the overall jet into separate finite regions, with each region having its own unique (and uniform) set of emission rates, was developed for this analysis. The portal jet properties that were assumed for estimating the impacts on the Proposed Action development were based on the following assumptions:

- Each tunnel exit portal has two lanes of traffic.
- The depressed roadway sections are 40 feet below ground level.
- The jets from the outbound portals are located in depressed sections of roadway downstream of the exit portals along the downstream traffic lanes. The width of each jet is the width of each existing roadway.
- The height of the jets is 12 feet. This value is based on the turbulence created by the high percentage of buses and trucks exiting the portals, and the geometrical configuration of the areas downstream of the portals.
- The length of each jet was estimated based on hourly vehicular speeds and portal release exit flow rates, and the geometrical alignment of the portal area.
- Based on a review of wind tunnel studies, it was assumed that the total emissions released through the tunnel portals would be dispersed into the atmosphere via three jet sections of equal length. The distribution of emissions within them is based on the results of wind tunnel studies for similar tunnel portals and is dependant on the hourly vehicular speeds of the exiting vehicles.

b) Sensitive Receptors

Worst-case pollutant levels were estimated for the sensitive receptors that were considered in the microscale analysis for the intersection of West 39th and West 40th Streets and Tenth Avenue. Additional receptors were placed at the residential buildings and at sidewalks along West 38th and West 39th Streets, at the CEQR-required distances from the intersections.

Following DEP's "Interim Guidance for $PM_{2.5}$," concentrations estimated at mid-sidewalk receptors were considered for comparison with the 24-hour impact thresholds. Neighborhood receptors, which are located 15 meters from the edge of the roadways, were considered for comparison with the annual impact thresholds.

c) Traffic Data

Traffic conditions for each tube of the Lincoln Tunnel were estimated using traffic volume vehicle classification and speed data collected for this analysis. Twenty-four hour-by-hour traffic volumes were developed for future conditions based on the base year traffic volumes, projected growth rates, and tunnel capacity. Project-generated volumes were estimated for each hour of the 24-hour analysis period.

d) Vehicular Emissions

The same methodology and assumptions used in the mobile source intersection analysis (including the use of MOBILE 6.2.03) were used to estimate vehicular emission rates. Values for expressways were applied.

e) Portal Emissions

Hour-by-hour portal emissions were estimated based on the total emissions produced in the tunnel and the piston effect action of the vehicles moving in the tunnel's exit tubes. The higher speeds of the vehicles in the exit stream would generate higher piston action with higher emissions out of the tunnel exit portals (and lower emissions released through the tunnel exhaust stacks). These values accounted for the effects of mechanical ventilation by the tunnel's ventilation system under each hourly set of traffic conditions.

f) Dispersion Analysis

The ISC3 model was used to estimate pollutant concentrations, as follows:

- The portal jet emissions were modeled as a string of volume sources, as described above in the Methodology section;
- Emissions from the traffic on ramps downstream of or approaching the portals were also modeled as a string of volume sources with uniform emission rates;
- Jet emissions were added to ramp emissions where appropriate (depending on the length of the jet) to obtain total emission rates for each of these volume sources; and
- The width of each volume source within each string of sources was assumed to be the width of each roadway, and the heights of the volume sources were assumed to be the same as the portal jet heights.

g) Total Concentrations Near Tunnel Portals

The total CO, PM_{10}, and $PM_{2.5}$ concentrations at each receptor location were estimated by adding the impacts of the portal and ramp emissions to the impacts estimated from the local street traffic (from the mobile source intersection analysis), where applicable, with the appropriate background values. This approach is conservative, because the maximum contributions from the portals and ramps and the intersection traffic were combined without regard to the wind angles (or other meteorological factors) that would cause these conditions. Since the portals are below street level, their impact at street-level sidewalk receptors would be minimal.

h) Results

The results of this analysis at the receptors at the intersection of West 39th Street and Tenth Avenue are included in Table 21-6 through Table 21-20 (for Site 8) in the Microscale Intersection Analysis section. The total estimated impacts are primarily due to the impacts of the street traffic contribution and not the impacts of the portal and ramp emissions, which are one order-of-magnitude lower than the street traffic impacts.

5. Convention Center Truck Marshalling Facility Analysis

The Convention Center Truck Marshalling Facility is currently an open, at-grade parking lot, located between Eleventh and Twelfth Avenues and West 34th and West 33rd Streets, that is used by trucks servicing the Convention Center. In the future, this facility would become a multi-level, enclosed parking facility with a mechanical ventilation system that would take in the fresh air from the Eleventh Avenue side of the building and exhaust facility air from the Twelfth Avenue (Route 9A) side, according to the conceptual design. An analysis was conducted to estimate the potential air quality impacts of the existing and the proposed facility. It was conservatively assumed that the trucks idle at all times while parked at the Marshalling Facility.

The existing open, at-grade parking lot, with 22 trucks idling, was modeled using the ISC3 dispersion model area source algorithm. Receptors were placed at the sidewalks along Route 9A at 6 feet above grade. CO and PM_{10} concentrations were estimated for the appropriate averaging periods, using actual meteorological data from LaGuardia Airport for the most recent five years.

The predicted impacts from the Marshalling Facility emissions were added to the project's traffic impacts, estimated for the receptors located on the sidewalk along Route 9A considered in the mobile source analysis near the intersection between West 34th Street and Route 9A, and to the applicable background values. Existing and Future Without the Proposed Action conditions were considered, even though the number of trucks and configuration of the yards would be the same. The resultant total concentrations would be below the appropriate NAAQS.

For estimating Future With the Proposed Action conditions, a dispersion modeling analysis of two exhaust vents of the enclosed facility using the ISC3 dispersion model point source algorithm was

performed. The number of trucks that would use the facility under the Proposed Action was estimated based on the projected event schedule at the Convention Center. CO and PM_{10} concentrations and $PM_{2.5}$ impacts over Future Without the Proposed Action conditions were estimated.

The impacts from the Marshalling Facility emissions were added to the estimated results of the intersection analysis at the Route 9A receptor locations (which already include background concentrations) with the Proposed Action. The total estimated concentrations would all be within the relevant NAAQS. In addition, the differences between the estimated Future Conditions With the Proposed Action and the Future Without the Proposed Action concentrations would all be below DEP's significant threshold values.

6. Truck Marshalling Path

The unused rail right-of-way that is going to be used as a truck marshalling path connects the Marshalling Facility on West 34th Street and Route 9A and the Convention Center loading docks located along Route 9A inside the property line. The tunnel is approximately 2000 feet (700 meters) long. This tunnel would be used only under the Future With the Proposed Action conditions. The number of trucks that would use the tunnel is limited by the tunnel capacity, the number of loading docks, the delivery time restrictions, number of shows per year, etc. It is anticipated that no more than 30 trucks would be moving through the tunnel at any given time.

The proposed ventilation scheme for the marshalling path is longitudinal which would force the air in the direction of truck traffic towards the Convention Center. The air would be exhausted through the exit portal of the tunnel. The exit portal is located inside the Convention Center property line on the corner of West 41st Street and Route 9A. In addition, the Convention Center property is separated from the Route 9A sidewalk by a 40-foot high wall. The area inside the Convention Center is not accessible to the general public and therefore is not considered an ambient air quality receptor. As a result, the marshalling tunnel truck emissions would not affect air quality at any publicly accessible area.

7. Quill Bus Depot, DSNY Maintenance Facility and NYPD Tow Pound Facility

- Concentrations of CO, PM_{10}, and $PM_{2.5}$ near the Quill Bus Depot, DSNY Maintenance facility and the NYPD Tow Pound were predicted following the modeling guidelines for mechanically ventilated, enclosed garages.
- CO pollutant concentrations were predicted following CEQR Guidelines for receptors located at 5 and 50 feet from the exhaust vents, located a minimum of 12 feet above street level.
- PM_{10} and $PM_{2.5}$ levels were predicted for sidewalk receptors along West 30th Street.
- Contributions from emissions generated by street traffic were added to these predicted concentrations to determine the cumulative impacts of these garages and their corresponding street contribution.

The contributions of the emissions from these enclosed facilities were not added to the predicted concentrations at the mobile source receptors because the potential effects of these emissions would not influence the results at those receptors.

This analysis was conducted for the 2010 analysis year, when these facilities are anticipated to be in operation, and for the 7 to 8 AM peak period, when these facilities' estimated emissions would be the greatest. The following traffic data were used in the analysis: ninety buses exit the Quill Bus Depot, 36 sanitation trucks and 4 automobiles exit the DSNY facility, and 8 tow trucks and 12 automobiles exit the Tow Pound.

The results of this analysis are as follows:

- The maximum predicted CO concentrations are below the NAAQS of 9.0 ppm, and project-generated impacts are below the levels that are considered to be significant.
- The maximum predicted PM_{10} levels are below the 24-hour and the annual NAAQS.
- The maximum project-generated impacts are below the CO *de minimis* levels and $PM_{2.5}$ STVs.

G. STATIONARY SOURCE ANALYSIS

1. HVAC Analysis

a) Methodology

The primary issues with regard to fuel combustion sources associated with HVAC systems include (1) the impact of HVAC systems from proposed (i.e., projected and potential) development sites on existing residential buildings; (2) the impact of HVAC systems from proposed development sites on other proposed development sites with residential use; (3) the impact of existing commercial, institutional, manufacturing, or large-scale residential developments on proposed development sites with residential use; (4) the impact of relocated or additional sources resulting from the Proposed Action on proposed development sites with residential use; and (5) the impact of HVAC systems from proposed development sites on future developments not related to the Proposed Action.

With regard to item 1, since all of the projected development associated with the Proposed Action would be taller than existing buildings in the area, no potentially significant adverse impacts on the existing buildings are expected, and therefore no analysis of impacts on existing buildings was necessary in accordance with the *CEQR Technical Manual* screening procedure. The potential air quality impacts associated with items 2, 4, and 5 above were addressed using screening analysis and/or refined modeling procedures discussed in greater detail below. With regard to item 3, a survey of existing buildings' HVAC systems determined that no significant combustion sources are located within the study area.

HVAC Source Screening Analysis

A screening analysis was performed to assess air quality impacts associated with emissions from the HVAC system of each proposed development site. The methodology described in the *CEQR Technical Manual* was used for the analysis and considered impacts on sensitive uses. The CEQR methodology determines the threshold of development size below which the action would not have a significant impact. The screening procedures utilize information regarding the type of fuel to be burned, the maximum development size, and the HVAC exhaust stack height, to evaluate whether a significant impact is likely. Based on the distance from the development to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size in the *CEQR Technical Manual*, there is the potential for significant air quality impacts, and a refined dispersion modeling analysis would be required. Otherwise, the source passes the screening analysis, and no further analysis is required.

Each proposed development site was evaluated and any nearby projected or potential residential development of similar or greater height was analyzed as a potential receptor. The maximum development floor areas of the sites were used as input for the screening analysis. It was assumed that either natural gas or No. 2 fuel oil would be used in the HVAC systems, and that the stacks would be located 3 feet above roof height (as per the *CEQR Technical Manual*). If a source did not pass any of the screening analyses (oil or gas) using the *CEQR Technical Manual* procedures, the ISC3 atmospheric dispersion model would be applied. For buildings with different tier configurations

(provided in the conceptual design), the analysis assumed that the HVAC stack would be installed on the highest tier.

An additional HVAC source screening analysis was performed in order to assess air quality impacts on future development not related to the Proposed Action (i.e., soft sites). The following future residential developments not related to the Proposed Action were identified within a 400-foot radius of a proposed development site:

- 627 West 42nd Street
- Ivy Tower — 345 West 42nd Street between Eighth and Ninth Avenues
- Unnamed — 360 West 43rd Street
- Unnamed – between West 42nd and West 43 Streets at the location of Potential Development Site 18

Since only the development location was known, it was necessary to assume that the building heights of these developments would be equal to the height of the closest projected development. All other aspects of the screening analysis were performed as described above.

Cumulative Impacts from HVAC Sources

As discussed above, a conservative impact assessment using CEQR screening procedures for individual HVAC sources was performed. In addition to the individual source analysis, "clusters" of HVAC sources with similar stack heights were analyzed. In order to address the cumulative impacts of multiple sources within these clusters, an analysis for the proposed sites was performed.

The first identified cluster is between West 35th and West 39th Streets and Ninth and Tenth Avenues. These projected development sites (numbered 21, 24, 26, and 28) are approximately 135 feet high, but are either mid-block or close to the west side of Ninth Avenue. A second cluster of three sites was identified on the east side of Tenth Avenue from West 34th Street to West 37th Street (Projected Development Sites 25, 27, and 29, each 393 feet high). However, the only locations that could be directly affected would be west across Tenth Avenue. A third cluster includes Projected Development Sites 9 and 11 (each 473 feet) on the west side of Tenth Avenue between West 36th and West 38th Streets. A fourth cluster is located in the areas bound by Eighth and Ninth Avenues between West 39th and West 39th Street and includes Projected Development Sites 37, 38, 39, and 41 (each 250 feet).

The screening analysis used to assess HVAC emissions from individual sites was used to assess each cluster.

Additional Sources of Interest

A survey of large institutional, commercial, and industrial sources of combustion-related air pollutants was conducted within a 400-foot radius of the rezoning area. An additional review included a check for "large emission sources" (e.g., cogeneration facilities, power plants, etc.) within 1,000 feet of the project boundaries of the Proposed Action, as recommended in the *CEQR Technical Manual*. No such sources were identified. However, the 59th Street Con Edison facility, which is located approximately 0.75 miles north of the proposed rezoning area, was determined to be a potentially significant source.

Other sources of interest evaluated in the HVAC analysis were the Quill Bus Depot (both at the existing site and the relocated site), the Multi-Use Facility, the relocated DSNY Garage and NYPD Tow Pound facilities, and the expanded Convention Center. The potential air quality impacts associated with these additional sources of interest were determined using the EPA's refined ISC3 atmospheric dispersion model or CEQR screening analysis.

Emission rates and stack/exhaust parameters for the Con Edison facility were obtained from a report titled "*Berrians Turbine Project – Cumulative Air Quality Analysis*," dated August 2003. The relocated Quill Bus Depot was assumed to be a structure of similar size to the existing Quill Bus Depot with similar combustion unit operations and spray booth emissions. Therefore, the most current air permit data were obtained for the existing facility and used as input to model potential emissions of the relocated facility.

b) Results

2010 Future Without the Proposed Action

In the 2010 Future Without the Proposed Action, existing zoning provisions would remain. HVAC exhausts would be anticipated to be comparable to existing conditions, and fewer commercial and residential uses would be developed as compared to the Future With the Proposed Action. As air quality regulations mandated by the CAA are anticipated to maintain or improve air quality, it can be expected that air quality conditions in the year 2010 would be no worse than those that currently exist.

2010 Future With the Proposed Action

The analysis indicates that no significant air quality impacts from the Proposed Action are expected in the year 2010 development scenario. A potential exceedance of the NAAQS for SO_2 at the Convention Center Hotel from Quill Bus Depot HVAC emissions would be avoided either by reducing the fuel-oil sulfur content; by exclusive use of natural gas; or by limiting the quantity of fuel oil used in the operating cycles of the boiler system (or some combination thereof). For specific details of the CEQR screening and ISC3 modeling results, refer to the discussions provided below for the year 2025 scenario.

2025 Future Without the Proposed Action

In the 2025 Future Without the Proposed Action, the existing zoning provisions would remain. Industrial uses would be anticipated to be comparable to existing conditions, and fewer commercial and residential uses would be developed as compared to the Future With the Proposed Action. Since air quality regulations mandated by the CAA are anticipated to maintain or improve air quality, it can be expected that air quality conditions in the year 2025 would be no worse than those that presently exist.

2025 Future With the Proposed Action

Air quality analyses were performed in order to determine impacts from the Proposed Action. Receptors and projected developments of both the year 2010 scenario and year 2025 scenario were modeled together in the impact analyses presented below. A potential exceedance of the NAAQS for SO_2 at receptors near the relocated Quill Bus Depot HVAC emissions would be avoided, e.g., through adoption of one or more of the measures described above for the existing facility under the 2010 Future With the Proposed Action.

(a) HVAC Source Impact Analysis: Projected and Potential Development Sites

With regard to the scenario in which both Projected and Potential Development Sites are considered and to ensure that there would be no significant air quality impact from HVAC sources, the Proposed Action would result in (E) Designations at the following 32 Projected and Potential Development Sites: 6, 7, 21, 23, 28, 32, 34, 38, 39, 40, 41, 42, 44, 46, 53, 54, 55, 56, 57, 58, 70, 75, 76, 79, 80, 81, 83, 84, 85, 86, 90, and 91. This is a conservative analysis assuming all Projected and Potential Development Sites are built, thereby increasing the proximity of an HVAC system to an adjacent building in most cases. As noted in Chapter 3, "Analytical Framework," it is anticipated that Potential Development Sites are unlikely to get fully built-out in a cumulative manner, particularly if Projected Development Sites are built.

These designations would specify the type of fuel to be used (natural gas) or the distance that the vent stack on the building roof must be from its edge. The specifications set forth in the (E) Designation have been developed using CEQR Screening and ISC3 modeling of the HVAC systems at all Projected and Potential Development Sites. As shown in Table 21-23 (in columns two and three), the initial CEQR screening, which is a very conservative analysis method, was undertaken for all sites for No. 2 fuel oil and for natural gas as the type of fuel to be used in the HVAC system. In all cases, the HVAC stack was assumed to be placed at the edge of the roof closest to the nearest building. The analysis found that 62 of the sites would exceed threshold screening levels using No. 2 fuel oil (with 53 of the 62 failing using natural gas). Nineteen of the 62 sites exceeded threshold screening levels because the sites (i.e., sources and receptors) were immediately adjacent to each other. For these sites, the minimum distance required to pass the screening process (based on CEQR monographs) is presented in Table 21-23 (columns two and three for No. 2 fuel oil and natural gas, respectively).

TABLE 21-23
RESULTS OF HVAC SOURCE IMPACT ANALYSIS
PROJECTED AND POTENTIAL SITES

HVAC Source Identification	CEQR Screening Results for No. 2 Fuel Oil	CEQR Screening Results for Natural Gas	ISC3 Modeling Results for No.2 Fuel Oil[1]	ISC3 Modeling Results for Natural Gas[1]
Site 1	Pass	Pass	---	---
Site 2	Fail	Fail	Pass	Pass
Site 3	Pass	Pass	---	---
Site 4	Pass	Pass	---	---
Site 5	Pass	Pass	---	---
Site 6	Fail	Fail	20 feet[3]	Pass
Site 7	Fail	Fail	10 feet[3]	Pass
Site 8	Pass	Pass	---	---
Site 9	Fail	Fail	Pass	Pass
Site 10	Fail	Fail	Pass	Pass
Site 11	Fail	Fail	Pass	Pass
Site 12	Pass	Pass	---	---
Site 13	Fail	Fail	Pass	Pass
Site 14	Pass	Pass	---	---
Site 15	Fail	Fail	Pass	Pass
Site 16	Fail	Pass	Pass	---
Site 17	Fail	Fail	Pass	Pass
Site 18	Fail	Fail	Pass	Pass
Site 19	Fail	Pass	Pass	---
Site 20	Pass	Pass	---	---
Site 21	130 feet[1]	100 feet[1]	N/A	N/A
Site 22	Fail	Pass	Pass	---
Site 23	Fail	Fail	10 feet[3]	Pass
Site 24	Pass	Pass	---	---
Site 25	Fail	Fail	Pass	Pass
Site 26	Fail	Fail	Pass	Pass
Site 27	Fail	Fail	Pass	Pass
Site 28	96 feet[1]	73 feet[1]	N/A	N/A
Site 29	Pass	Pass	---	---
Site 30	Pass	Pass	---	---
Site 31	Pass	Pass	---	---
Site 32	Fail	Fail	10 feet[3]	Pass
Site 33	Fail	Fail	Pass	Pass
Site 34	Fail	Fail	100 feet[3]	Pass
Site 35	Pass	Pass	---	---
Site 36	Pass	Pass	---	---
Site 37	Fail	Fail	Pass	Pass
Site 38	44 feet[1]	33 feet[1]	N/A	N/A
Site 39	Fail	Fail	40 feet[3]	Pass
Site 40	54 feet[1]	42 feet[1]	N/A	N/A
Site 41	138 feet[1]	110 feet[1]	N/A	N/A

TABLE 21-23 (CONTINUED)
RESULTS OF HVAC SOURCE IMPACT ANALYSIS
PROJECTED AND POTENTIAL SITES

HVAC Source Identification	CEQR Screening Results for No. 2 Fuel Oil	CEQR Screening Results for Natural Gas	ISC3 Modeling Results for No.2 Fuel Oil[1]	ISC3 Modeling Results for Natural Gas[1]
Site 42	Fail	Fail	20 feet[3]	Pass
Site 43	Pass	Pass	---	---
Site 44	59 feet[1]	48 feet[1]	N/A	N/A
Site 45	Pass	Pass	---	---
Site 46-potential	Fail	Fail	80 feet[3]	Pass
Conv. Ctr. Hotel	Pass	Pass	---	---
Site 47	Fail	Fail	Pass	Pass
Site 48	Fail	Fail	Pass	Pass
Site 49	Pass	Pass	---	---
Site 50	Pass	Pass	---	---
Site 51	Pass	Pass	---	---
Site 52	Pass	Pass	---	---
Site 53	Fail	Fail	35 feet[3]	Pass
Site 54	Fail	Fail	5 feet[3]	Pass
Site 55	Fail	Fail	15 feet[3]	Pass
Site 56	71 feet[1]	57 feet[1]	N/A	N/A
Site 57	63 feet[1]	50 feet[1]	N/A	N/A
Site 58	Fail	Fail	5 feet[3]	Pass
Site 59	Fail	Pass	Pass	---
Site 60	Pass	Pass	---	---
Site 61	Pass	Pass	---	---
Site 62	Fail	Pass	Pass	---
Site 63	Fail	Pass	Pass	---
Site 64	Pass	Pass	---	---
Site 65	Pass	Pass	---	---
Site 66	Pass	Pass	---	---
Site 67	Pass	Pass	---	---
Site 68	Pass	Pass	---	---
Site 69	Fail	Pass	Pass	---
Site 70	Fail	Fail	15 feet[3]	Pass
Site 71	Fail	Fail	Pass	Pass
Site 72	Fail	Fail	Pass	Pass
Site 73	Pass	Pass	---	---
Site 74	Pass	Pass	---	---
Site 75	64 feet[1]	53 feet[1]	N/A	N/A
Site 76	41 feet[1]	30 feet[1]	N/A	N/A
Site 77	Fail	Fail	Pass	Pass
Site 78	Fail	Pass	Pass	---
Site 79	57 feet[1]	46 feet[1]	N/A	N/A
Site 80	64 feet[1]	53 feet[1]	N/A	N/A
Site 81	51 feet[1]	40 feet[1]	N/A	N/A
Site 82	Fail	Pass	Pass	---
Site 83	54 feet[1]	42 feet[1]	N/A	N/A
Site 84	57 feet[1]	46 feet[1]	N/A	N/A
Site 85	58 feet[1]	47 feet[1]	N/A	N/A
Site 86	54 feet[1]	43 feet[1]	N/A	N/A
Site 87	Fail	Fail	Pass	Pass
Site 88	Fail	Fail	Pass	Pass
Site 89	Pass	Pass	---	---
Site 90	55 feet[1]	42 feet[1]	N/A	N/A
Site 91	65 feet[1]	57 feet[1]	N/A	N/A
Site 92	Fail	Fail	Pass	Pass
Site 93	Pass	Pass	---	---
Site 94	Pass	Pass	---	---
Site 95	Pass	Pass	---	---
Site 96	Pass	Pass	---	---

TABLE 21-23 (CONTINUED)
RESULTS OF HVAC SOURCE IMPACT ANALYSIS
PROJECTED AND POTENTIAL SITES

HVAC Source Identification	CEQR Screening Results for No. 2 Fuel Oil	CEQR Screening Results for Natural Gas	ISC3 Modeling Results for No.2 Fuel Oil(1)	ISC3 Modeling Results for Natural Gas(1)
Site 97	Pass	Pass	---	---
Site 98	Pass	Pass	---	---
Site 99	Pass	Pass	---	---

Notes:
1 Some sites are immediately adjacent to each other and the analysis could not be further refined without additional design data; therefore the minimum distance for which the source would pass the CEQR screening procedures was provided for these sites using CEQR monographs. The following (E) designation would be placed on these development sites: Any new development on the property must locate the HVAC stack no closer to the edge of roof than indicated.
2 For site analyses that failed using the CEQR screening procedures, a refined ISC3 modeling analysis was performed.
3 The following (E) designation would be placed on these development sites: Unless authorized by the DEP as the result of further modeling, any new development on the property must either locate the HVAC stack no closer than the distance indicated to the wall of an adjacent building or use natural gas as the type of fuel for the HVAC systems.

The remaining 43 sites of the 62 sites that exceeded threshold screening levels were subjected to a more detailed analysis, using the ISC3 model. That analysis found that no sites would result in a significant adverse air quality impact using natural gas (see Table 21-23). However, 13 sites would not pass if No. 2 fuel oil were used in the HVAC system and the HVAC stacks were placed at the edge of the roof. In each of these cases, use of natural gas would be required to avoid the impact, or the stack would have to be moved away from the edge of the roof. As shown on Table 21-23 (in column four), most minimum distances from the edge would range from 5 to 100 feet.

In conclusion, the Proposed Action, with its (E) Designation, would cause no violations of the NAAQS and would have no significant adverse environmental impacts on air quality. To preclude the potential for significant adverse air quality impacts, an (E) Designation will be placed on the following sites with the specified requirements:

- Requires a minimum offset distance for the stack locations for either natural gas or No. 2 fuel oil as specified in Table 21-24 (columns two and three):
  - Block 736; Lots 1, 73; Site 21
  - Block 733; Lots 25, 28, 30, 31; Site 28
  - Block 762; Lot 61; Site 38
  - Block 761; Lot 62; Site 40
  - Block 761; Lots 10, 13, 20, 43; Site 41
  - Block 754; Lot 44; Site 44
  - Block 733; Lots 59 through 66; Site 56
  - Block 733; Lots 8, 9, 58; Site 57
  - Block 761; Lots 5, 7, 9; Site 75
  - Block 761; Lot 41; Site 76
  - Block 760; Lot 63; Site 79
  - Block 760; Lots 58 through 62; Site 80
  - Block 760; Lot 55; Site 81
  - Block 760; Lot 12; Site 83
  - Block 760; Lot 16, 18, 20; Site 84
  - Block 760; Lot 21; Site 85
  - Block 759; Lot 14; Site 86
  - Block 754; Lot 63; Site 90
  - Block 754; Lot 51; Site 91

- Requires the exclusive use of natural gas or a minimum offset distance for the stack locations as specified in Table 21-24 (column four):
  - Block 707; Lots 1, 13, 56; Site 6
  - Block 707; Lots 20, 26, 31, 39, 41, 45, 51; Site 7
  - Block 735; Lots 1, 6, 7, 8, 9, 65; Site 23
  - Block 729; Lot 60; Site 32
  - Block 729; Lots 50, 60, 163; Site 34
  - Block 762; Lots 13, 14, 16, 17, 60; Site 39
  - Block 760; Lot 7; Site 42
  - Block 1069; Lot 1; Site 46
  - Block 735; Lots 11, 12, 13, 17, 55, 57 through 61; Site 53
  - Block 734; Lots 6, 7, 8, 62; Site 54
  - Block 734; Lots 9, 10, 13; Site 55
  - Block 733; Lots 23, 24, 43 through 47; Site 58
  - Block 763; Lots 28, 45, 46, 47; Site 70

It should be noted that the use of Con Edison steam for heating in lieu of an onsite HVAC boiler would also preclude the potential for significant adverse air quality impacts.

c) HVAC Source Screening Analysis: Project Development Site Clusters

Four HVAC site clusters (HVAC sources in close proximity with similar stack heights) were identified and a quantitative analysis was performed to determine the potential impact from those clusters on proposed development sites. The analysis was performed in the same manner described for the individual HVAC sites except that for each cluster, the total floor area of the individual sites was summarized and a single representative stack was placed in the approximate geographic center of the cluster. The four clusters consisted of the following Projected Development Sites:

- Projected Development Sites 21, 24, 26 and 28 – comprising a total floor area of 1,171,618 square feet with a stack height at 135 feet;
- Projected Development Sites 25, 27, and 29 – comprising a total floor area of 675,376 square feet with a stack height of 393 feet;
- Projected Development Sites 9 and 11 – comprising a total floor area of 1,497,000 square feet with a stack height of 473 feet; and
- Projected Development Sites 37, 38, 39, and 41 with a total floor area of 1,306,899 square feet with a stack height of 250 feet.

The results of the analysis indicated that there would be no additional significant impacts using either natural gas or No. 2 fuel oil due to the clustering of HVAC sources.

d) Analysis of Additional HVAC Sources of Interest

The four additional sources that were modeled using EPA's ISC3 dispersion model include the 59th Street Con Edison facility, the Quill Bus Depot (at existing site and relocated site), the Multi-Use Facility, and the expanded Convention Center. A discussion of the maximum predicted impacts of each source is provided below.

(i) Con Edison Facility

The results of the refined modeling analysis for the Con Edison facility demonstrate compliance with the NAAQS. The maximum predicted concentrations (including background) of NO_x, SO_2, and PM_{10} are provided in Table 21-24. As indicated in the table, the maximum predicted total concentration of

each pollutant is less than the corresponding NAAQS. Compliance with the NAAQS indicates that the impacts would not be significant at the boundary of the study area closest to the facility.

TABLE 21-24
AIR QUALITY IMPACTS - 59TH STREET CON EDISON FACILITY: SUMMARY OF MAXIMUM PREDICTED CONCENTRATIONS

Pollutants	Averaging Period	Background Concentration ($\mu g/m^3$)	Predicted Concentration ($\mu g/m^3$)	Maximum Predicted Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Nitrogen Dioxide (NO_2)	Annual	77	0.218	77.2	100
Sulfur Dioxide (SO_2)	3-hour	228	253.617	481.9	1300
	24-hour	121	53.553	174.7	365
	Annual	34	0.475	34.4	80
Particulate Matter (PM_{10})	24-hour	43	8.009	51.0	150
	Annual	22	0.040	22.0	50

(ii) Quill Bus Depot

A refined modeling analysis was conducted for the Quill Bus Depot using the USEPA's ISC3 dispersion model. In order to derive the most conservative results for elevated receptors, the model was applied without the building downwash option. As it is expected that the depot would not be moved prior to the 2010 analysis year, it was modeled for its present location for 2010 and for its proposed location for the 2025 analysis year.

The receptors analyzed in the 2010 Future With the Proposed Action comprise new receptors that would be located in the vicinity of the existing Quill Bus Depot facility. The receptors analyzed in the 2025 Future With the Proposed Action comprise projected development sites associated with the Proposed West Chelsea Rezoning in the vicinity of the relocated site of the Quill Bus Depot. For the 2025 analysis scenario receptors it was assumed that all proposed buildings would be at least as tall as the stacks on the Quill Bus Depot, as information on building heights was not available.

Air emissions from the Quill Bus Depot include criteria pollutants (NO_x, SO_2, and PM_{10}) from three large boilers. Emission rates and stack information were obtained from the most current facility air permit.

As indicated in Table 21-25, the results of the modeling analysis for the existing Quill Bus Depot in the 2010 analysis year indicate that there could be exceedances of the NAAQS for SO_2 (all averaging periods) at the proposed Convention Center Hotel, which would be a significant adverse impact. However, measures would be implemented by NYCT to avoid this exceedance. These measures would entail either operating the facility's HVAC systems with natural gas only (rather than as a dual-fuel natural gas-fuel oil system); reducing the sulfur content of fuel oil used in the HVAC systems (e.g., a reduction of the fuel oil sulfur content from 0.2 percent to 0.05 percent would eliminate the SO_2 NAAQS exceedance); modifying the HVAC system's operating cycles to reduce the quantity of fuel oil used; or some combination of these measures. With these measures in place, there will not be an exceedance of the SO_2 NAAQS and, therefore, no significant adverse impact from such emission.

The results of the 2025 modeling analysis indicate that there could be exceedances of the NAAQS for SO_2 (24-hour standard) at two receptors in the proposed West Chelsea rezoning area from the relocated Quill Bus Depot's HVAC emissions (Table 21-16). However, those measures described above for reducing SO_2 concentrations in 2010 for the existing facility would also be implemented in 2025 for the relocated facility. With these measures in place, there will not be an exceedance of the SO_2 NAAQS and, therefore, no significant adverse impact from such emission.

TABLE 21-25
AIR QUALITY IMPACTS - QUILL BUS DEPOT BOILER UNITS: SUMMARY OF MAXIMUM PREDICTED CONCENTRATIONS FOR 2010

Pollutants	Averaging Period	Background Concentration ($\mu g/m^3$)	Predicted Concentration ($\mu g/m^3$)	Total Maximum Predicted Concentration Without Mitigation ($\mu g/m^3$)	Total Maximum Predicted Concentration	NAAQS ($\mu g/m^3$)
Nitrogen Dioxide (NO_2)	Annual	77	22.2	99.2	99.2	100
Sulfur Dioxide (SO_2)	3-hour	228	1,895.2	2,123.4	701.8	1,300
	24-hour	121	540.3	661.3	256.1	365
	Annual	34	48.3	82.3	46.1	80
Particulate Matter (PM_{10})	24-hour	43	38.0	81.0	81.0	150
	Annual	22	3.5	25.5	25.5	50

TABLE 21-26
AIR QUALITY IMPACTS: QUILL BUS DEPOT BOILER UNITS - SUMMARY OF MAXIMUM PREDICTED CONCENTRATIONS FOR 2025

Pollutants	Averaging Period	Background Concentration ($\mu g/m^3$)	Predicted Concentration ($\mu g/m^3$)	Total Maximum Predicted Concentration Without Mitigation ($\mu g/m^3$)	Total Maximum Predicted Concentration With Mitigation ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Nitrogen Dioxide (NO_2)	Annual	77	13.4	90.4	90.4	100
Sulfur Dioxide (SO_2)	3-hour	228	683.0	911.0	398.8	1,300
	24-hour	121	347.9	468.9	208	365
	Annual	34	29.1	63.1	41.3	80
Particulate Matter (PM_{10})	24-hour	43	105.7	148.7	148.7	150
	Annual	22	2.7	24.7	24.7	50

Note: Particulate matter impacts included spray booth emissions in the modeling analysis.

(iii) Multi-Use Facility

CEQR screening procedures were used to estimate impacts of the Multi-Use Facility heating and hot water systems on projected development sites located between West 30th and West 34th Streets between Tenth and Eleventh Avenues. Impacts were estimated based on anticipated fuel types, stack height, square footage of the facility, and the minimum distance of this facility to the nearest building of the same or greater height.

The screen analysis assumes that the HVAC system would be operated at full capacity with either No. 2 fuel oil or natural gas. In addition, it is anticipated that the heating system would operate at full capacity only for 1,040 hours during the season, and would be used only to prevent freezing within the building at other times. Energy requirements for the hot water system would be minimized through the use of a solar energy system that would use natural gas as backup.

The result of the conservative screening indicated that the Multi-Use Facility's HVAC system would not significantly affect nearby sensitive land uses. In addition, the impacts of the elevated HVAC emissions source would be minimal at the street level receptors, and therefore, the cumulative impacts from this source and street traffic at the sidewalks were not analyzed. There would be no significant adverse stationary source air quality impacts caused by the Multi-Use Facility.

(iv) Expanded Convention Center

A new central refrigeration and heating plant, located along the Route 9A side of the Convention Center (near the truck loading docks), is proposed for the existing expanded Convention Center,

Plenary Conference Hall, and the Convention Hotel. The heating plant is anticipated to be a dual-fuel system, using both No. 2 fuel oil and natural gas.

The screening analysis showed that firing of either fuel would not produce a significant impact on the proposed hotel, the existing residential building on West 41st Street and Route 9A, or on the proposed residential development along Eleventh Avenue between West 34th and West 42nd Streets.

(v) Relocated DSNY Garage and NYPD Tow Pound Facilities

An HVAC Screening Analysis was performed in accordance with the procedures outlined in the *CEQR Technical Manual* to determine air quality impacts associated with the relocated DSNY Garage and NYPD Tow Pound facilities. The screening analysis indicated that there would be no significant adverse impacts associated with emissions from HVAC systems at these relocated facilities.

2. Air Toxics Analysis

a) Methodology

Overview

The primary issue with regard to air toxic contaminants is the potential impact of nearby industrial/manufacturing sources on proposed development sites with residential/or mixed use. The potential air quality impacts associated with industrial sources were addressed using the refined modeling procedures discussed below. A refined model approach was performed to determine the impact of each air toxic contaminants of concern and the cumulative impacts of multiple air toxic contaminants.

In order to perform an air quality assessment, it was necessary to collect information regarding the types of air pollutant emission sources that could affect potentially sensitive receptors in the study area. Data necessary to perform an air quality analysis for existing sources were provided from regulatory agencies (e.g., air permits). Relevant information regarding future developments was obtained. Specific data needed to perform the study included air emission rates, stack/exhaust parameters, and source locations.

All industrial air pollutant emission sources within 400 feet of the rezoning area boundaries and within the rezoning area were considered for inclusion in the air quality impact analyses. These boundaries were used to identify the extent of the study area for determining air quality impacts associated with the Proposed Action.

Data Sources

Information regarding the release of air pollutants from existing combustion and industrial sources was requested from the DEP and NYSDEC on March 27, 2003 and March 28, 2003, respectively. The information provided was compiled into a database of source locations, air emission rates, and other pertinent data, and was used to determine source impacts. The information was based on the most current air permit data available from the DEP and NYSDEC.

A comprehensive search was also performed to identify NYSDEC air quality permits and permits listed in the EPA Envirofacts database. In addition, a field survey was conducted on January 6 and 7, 2004, to identify and validate existing and potential sites not identified by the database search.

Industrial Source Analysis

The industrial source analysis was performed by modeling the potential ambient air concentrations of air toxic compounds emitted by specified sources within the study area. The specified sources analyzed included those that were within 400 feet of any projected/potential development sites with residential use. Industrial sources within the 400-foot distance of each site were located using

geographical information system (GIS) software, and data regarding their emission rates of air contaminants and source stack parameters were obtained from the air permits database. For the refined analysis, these data were input to the EPA Industrial Source Complex (ISC3) model (described in Section F.3), entitled "Refined Modeling Procedures," to determine ambient air concentrations at the residential development sites. The modeling analysis predicted worst case impacts by determining maximum cumulative short-term (1-hour) and annual impacts for each air toxic compound. The final step compared the predicted ambient concentrations of each air toxic compound for each projected residential development with the guideline concentrations provided in NYSDEC Air Guide-1 and EPA criteria.

Health Risk Assessment of Emissions from Industrial Sources

As the cumulative impacts of multiple air toxics from multiple sources could also pose a potential health risk to proposed development of the Proposed Action, a cumulative impact analysis for industrial sources was performed. Potential cumulative impacts were determined based on the EPA's Hazard Index Approach for non-carcinogenic compounds and using the EPA's Unit Risk Factors for carcinogenic compounds. These methods are based on equations that use EPA health risk information (established for individual compounds with known health effects) to determine the level of health risk posed by an expected ambient concentration of that compound at a potentially sensitive receptor. The derived values of health risk are additive and can be used to determine the total risk posed by multiple air contaminants.

(a) Carcinogens

Public health risk estimates for inhalation of carcinogenic compounds are based on the following calculation:

$$\text{Incremental Risk} = C \times URF$$

Where:

C = annual average ambient air concentration of the compound in $\mu g/m^3$

URF = compound-specific inhalation unit risk factor in $(\mu g/m^3)^{-1}$

Once the incremental risk of each compound is established, they are summed together. If the total risk is less than or equal to one in one million (1.0 E-06), the carcinogenic risk is considered negligible.

(b) Non-Carcinogens

Public health risk estimates for inhalation of non-carcinogenic compounds are based on the following calculation:

$$\text{Hazard Quotient} = C/RfC$$

Where:

C = annual average ambient air concentration of compound in $\mu g/m^3$

RfC = compound-specific inhalation reference concentration in $\mu g/m^3$

Once the hazard quotient of each compound is established, they are summed together. If the total hazard index is less than or equal to one, then the non-carcinogenic risk is considered negligible.

The EPA reference concentrations and unit risk factors for specific air toxic compounds that could affect potentially sensitive receptors in the study area are provided in Table 21-26. The unit risk factors and reference concentrations presented in Table 21-27 were established to address documented and known health risks posed by specific compounds for which peer-reviewed health study data have been published, and therefore do not apply for all the compounds modeled in this

analysis. In order to address the cumulative impacts of all compounds emitted by industrial sources in the refined analysis, the NYSDEC DAR-1 annual guideline concentrations (AGCs) were equated to the RfCs provided by the EPA. For any compound without an established EPA RfC, the AGC is used as an equivalent RfC in the analysis of combined impacts. Therefore, the Hazard Quotient discussed above includes the combined impacts of all modeled non-carcinogens. This approach, however, is considered highly conservative.

TABLE 21-27
INDUSTRIAL SOURCE ANALYSIS - CUMULATIVE IMPACTS FROM AIR TOXIC COMPOUNDS: REFERENCE CONCENTRATIONS AND UNIT RISK FACTORS

Compound	CAS Registry No.	RfC µg/m^3	URF µg/m^3	Source[1]
Ammonia	07664-41-7	100	N/A	IRIS
1,4-Dichlorobenzene	00106-46-7	800	1.1E-05	IRIS/NYSDEC
1,2-Dichlorobenzene	00095-50-1	200	N/A	HEAST
Dichloromethane (Methylene Chloride)	00075-09-2	3,000	4.7E-07	HEAST/IRIS
Ethylene Glycol Monobutyl Ether	00111-76-2	13,000	N/A	IRIS
Hydrogen Chloride	07647-01-0	20	N/A	IRIS
Hydrogen Cyanide	00074-90-8	3.0	N/A	IRIS
Phosphoric Acid Mist	07664-38-2	10	N/A	IRIS
Sulfuric Acid Mist	07664-93-9	70	N/A	HEAST
Tetrachloroethylene	00127-18-4	81	1.4E-05	NESCAUM
Toluene	00108-88-3	400	N/A	IRIS
Trichlorobenzene	00120-82-1	9	N/A	HEAST

1 References for health risk data are provided:
IRIS – EPA Integrated Risk Information System, March 10, 2003.
HEAST – EPA Health Effects Assessment Summary Tables, July 1997.
NESCAUM – Northeast States for Coordinated Air Use Management, Air Toxics Committee, Health Evaluation Document for Tetrachloroethylene, 1986.
NYSDEC – New York State Department of Environmental Conservation, DAR-1 Tables, December 22, 2003 (derived from AGC, which is based on one in one million risk factor).

Refined Modeling Procedures

The refined modeling analyses were performed using the Industrial Source Complex Short-Term (ISC3) dispersion model developed by the EPA (version 02035) and described in *User's Guide for the Industrial Source Complex (ISC3) Dispersion Models* (EPA-454/B-95-003a). The ISC3 model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability of calculating pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. Computations with the ISC3 model to determine impacts from exhaust stacks were made assuming stack tip downwash, buoyancy-induced dispersion, gradual plume rise, urban dispersion coefficients and wind profile exponents, no collapsing of stable stability classes, with and without building downwash, and elimination of calms. However, since worst-case impacts would occur on elevated receptors, the ISC3 model was run without downwash.

Each of the modeling analyses performed for the project are discussed below. The analyses were performed using the most recent meteorological years available for LaGuardia Airport (1998 through 2002), assuming flat terrain. Receptors and source data were identified. Receptors were placed along the perimeter on residential/commercial site developments at various heights to represent the building façades.

Industrial Source Modeling

The industrial source modeling analysis was performed using input data from permit information received from the DEP, for the facilities presented in Table 21-28 and Figure 21-2. In the permits, some of the air toxic contaminants were registered as compound groups (e.g., aliphatic hydrocarbons). Because there are no guideline concentrations for these compound groups, it was

necessary to use a substitute contaminant that was representative of the compound group, so that a comparison to the guidelines could be made for the analysis. In these instances, the type of source operation was considered when making these assumptions. For example, if aliphatic hydrocarbons were registered in a permit for a printing operation, then isopropyl alcohol (an aliphatic hydrocarbon) was used as a substitute, as this compound was the predominant one found in most other permits for printing operations in the database.

An additional assumption regarding the input data was necessary in order to account for industrial sources with horizontal exhausts (e.g., wall fans). The ISC3 dispersion model incorporates the effects of rising plumes that exit a vertical stack. This effect can be negated in the model by using a minimal value (near zero) for the stack flow rate. Therefore, when it was determined that a source had a horizontal stack, a stack velocity of 0.001 meters per second was used to replace the actual stack velocity as per CEQR guidance.

TABLE 21-28
INDUSTRIAL SOURCE ANALYSIS - FACILITY LIST OF INDUSTRIAL SOURCES WITHIN 400 FEET OF A PROJECTED RESIDENTIAL DEVELOPMENT

Source[1]	Facility Name	Facility Address	Type of Business
1	A. Allard Inc.	259 West 30th Street	Jewelry Cleaning
2	Aladdin Laminating Inc.	438 West 37th Street	Film Laminating
3	Albert H Vela Co. Inc.	406 West 31st Street	Offset Printing
4	Allied Lettercraft Co. Inc.	307 West 36th Street	Offset Printing
5	Apollo Reproduction Inc.	315 West 35thStreet	Photocopying
6	Benkay Jewelry Co. Inc.	259 West 30th Street	Jewelry Cleaning
7	Burt Trimmings/Benjamin Woda	519 Eighth Avenue	Button Dying
8	Burton-Quaker Corp.	406 West 31st Street	Printing Press
9	Buttons & Novelty Company Inc.	519 Eighth Avenue	Button Dying
10	C&C Planting Co.	347 West 36th Street	Metal Plating
11	Caltone Lithograph	406 West 31st Street	Printing Press
12	Castco Inc.	236 West 30th Street	Wax Burnout
13	Contemporaries	236 West 30th Street	Wax Burnout
14	Diamaic, Nicholas	234 West 30th Street	Jewelry Polishing
15	Foremost Casting Co. Inc.	330 West 34th Street	Jewelry Polishing
16	Goldworks, Inc.	236 West 30th Street	Jewelry Manufacturing
17	Hi-Tech Jewelry Inc.	580 Eighth Ave	Jewelry Plating/Polishing
18	Hyan Cho	236 West 30th Street	Jewelry Manufacturing
19	Jolee Buttons, Inc.	519 Eighth Avenue	Button Dying
20	Kagan-Lerer Associates	259 West 30th Street	Jewelry Manufacturing
21	KOS Trading Corp.	236 West 30th Street	Jewelry Manufacturing
22	MDL Jewelry Contracting	242 West 30th Street	Jewelry Grinding
23	Mercedes-Benz Manhattan, Inc.	536 West 41st Street	Automobile Repair
24	Merchandising Workshop Inc.	550 West 43rd Street	Film Processing/Printing
25	Michael Breslof Inc.	460 West 34th Street	Wax Burnout
26	Midtown Neon Sign Corp.	550 West 30th Street	Paint Spray Booth
27	Millrock Press	406 West 31st Street	Printing
28	Nicholas Di Maio	234 West 30th Street	Metal Plating
29	Noah Block	314 Eleventh Avenue	Paint Spray Booth
30	Omni Cleaners	595 Tenth Avenue	Dry Cleaning
31	Precision Coloring & Dying Inc.	327 West 36th Street	Button Dying
32	Preferred Casting Co. Inc.	259 West 30th Street	Jewelry polishing
33	Quality Venus Belt Co. Inc.	580 Eighth Avenue	Spray Booth
34	R & G Button Co/Ginsberg, R.	270 West 38th Street	Button Dying
35	Reliable Finishing Co. Ltd.	236 West 30th Street	Jewelry Polishing
36	S & S Graphics Inc.	406 West 31st Street	Offset Printing
37	S J Botkin & Co. Inc.	259 West 30th Street	Jewelry Cleaning
38	SO Accurate Group Inc.	SO Accurate Group	Gold Precipitation
39	Stan-Tone Graphic Inc.	424 West 33rd Street	Offset Printing
40	Stuart Dean Co. Inc.	366 Tenth Avenue	Spray Booth
41	Synari Fashions Co.	270 West 38th Street	Blue Printing
42	T & T Fashions Co.	302 West 37th Street	Screen Printing

TABLE 21-28 (CONTINUED)
INDUSTRIAL SOURCE ANALYSIS - FACILITY LIST OF INDUSTRIAL SOURCES WITHIN 400 FEET OF A PROJECTED RESIDENTIAL DEVELOPMENT

Source[1]	Facility Name	Facility Address	Type of Business
43	The Thomas Group	406 West 31st Street	Offset Printing
44	Unimold, Ltd.	236 W 30th Street	Wax burnout
45	Venture Graphics	406 West 31st Street	Offset Printing
46	Versacolor & Walbern Inc.	406 West 31st Street	Offset Printing
47	W & W Jewelry, Inc.	259 West 30th Street	Jewelry Cleaning

1 See Figure 21-2.

Refined Modeling of the Quill Bus Depot

Permit data were obtained for the existing facility and used to model the relocated facility, as well as to model the existing facility under the interim Convention Center Expansion scenario. For the relocated facility, the facility stacks (air emission points) were modeled in the center of the new facility. Receptors used in the analysis were similar to those identified in the industrial source analysis with the addition of Existing and Future Without the Proposed Action developments to the south and east of the relocated facility.

b) Results

2010 Future Without the Proposed Action

In the 2010 Future Without the Proposed Action, the existing zoning provisions would remain. Industrial uses are anticipated to be comparable to the existing conditions, and fewer commercial and residential uses would be developed as compared to the Future With the Proposed Action. Since air quality regulations mandated by the Clean Air Act (CAA) are anticipated to maintain or improve air quality, it can be expected that air quality conditions in the year 2010 would be no worse than those that presently exist.

2010 Future With the Proposed Action

The analysis indicates that no significant air quality impacts are expected in the year 2010. For specific details of the CEQR screening and ISC3 modeling results, refer to the discussions provided below for the year 2025 scenario.

2025 Future Without the Proposed Action

In the 2025 Future Without the Proposed Action, the existing zoning provisions would remain. Industrial uses are anticipated to be comparable to the existing conditions, and fewer commercial and residential uses would be developed as compared to the Future With the Proposed Action. As air quality regulations mandated by the CAA are anticipated to maintain or improve air quality, it can be expected that air quality conditions in the year 2025 would be no worse than those that presently exist.

2025 Future With the Proposed Action

Air quality analyses were performed in order to determine impacts from the Proposed Action. Receptors at proposed development sites for both the 2010 and 2025 scenarios were modeled together in the impact analyses presented below. The analysis includes sources that would be replaced by proposed developments by 2025 and is, therefore, conservative.

(a) Industrial Source Analysis

The industrial source air quality analyses demonstrated that the impact from nearby industrial sources on proposed developments containing residential/or mixed use would not be significant for any

Projected and Potential Development Site. This would be true for both the 2010 and 2025 analysis years. As indicated in Table 21-28, the predicted maximum concentrations for each potential air toxic contaminant would be below the NYSDEC short-term guideline concentrations (SGC) and annual guideline concentrations (AGC). Most predicted concentrations would be several orders of magnitude below the corresponding SGC and AGC. Table 21-29 presents a numerical source ID for each industrial source, for each compound emitted by sources in the modeling study. The source IDs correspond to the locations of each source presented in Figure 21-2.

TABLE 21-29
INDUSTRIAL SOURCE ANALYSIS - INDUSTRIAL SOURCE LOCATIONS BY COMPOUND EMITTED

Compound	Toxicity Rating	Source(s)
Acetic Acid	Not Rated	19
Ammonia	Low	2,5,6,17,47
Antimony	Moderate	10
Biphenyl	Moderate	19
Butyl Acetate	Low	29
Carbon Dioxide	Not Rated	2
Copper Cyanide	High	10
1,4-Dichlorobenzene (p)	Moderate	19
1,2-Dichlorobenzene (o)	Moderate	19
Dichloromethane	Moderate	3,45
Dimethyl Ketone (Acetone)	Low	29,36
Ethane	Not Rated	12,21,32,44
Ethanol	Low	40
Ethylene Glycol	Not Rated	46
Ethylene Glycol Mbutyl Ether	Moderate	7,19,40,46
Formic Acid	Moderate	31
Hydrogen Chloride	Low	38
Hydrogen Cyanide	High	6,16
n- Octane	Not Rated	23
Isopropyl Alcohol	Moderate	3,4,11,24,27,29,36,39,45
Nitric Acid Mist	Moderate	38
Phosphoric Acid Mist	Moderate	45
Potassium Carbonate	Not Rated	24
Sodium Cyanide	Moderate	1,6,10,16,17,28,38,47
Sodium Hydroxide	Not Rated	1,37
Sulfuric Acid Mist	Moderate	21,47
Tetrachloroethylene	Moderate	30
Tin	Not Rated	10
Toluene	Low	26, 29
Trichlorobenzene	Not Rated	7, 19
Triethylene Glycol	Moderate	24
Zinc Chloride	Moderate	20
Criteria Pollutants		
Nitrogen Dioxide		9, 10, 23, 25, 31, 34, 38
Carbon Monoxide		2,9,13,23,25,31,34,47
PM_{10}		(a)
SO_2		9,10,13,25,31,34
Lead		10,20,38

See Figure 21-2 for source locations.
(a) Particulate matter is emitted by 33 source locations.

(b) Health Risk Assessment of Emissions from Industrial Sources

The industrial source analysis included a risk assessment for cumulative impacts posed by multiple contaminants affecting individual receptors. As described in the methodology section, established EPA procedures were used to estimate the combined health risk of multiple contaminants. As indicated in Table 21-30, the predicted indices for cumulative health risk would be below the EPA criteria for projected or potential site developments. The incremental risk for carcinogenic

compounds would be well below the EPA acceptable risk value of one in one million (i.e., 1.0 E-06). The hazard quotient for non-carcinogens would also be below the EPA hazard index of one. Therefore, the industrial source air quality analysis has demonstrated that the cumulative health risk posed by multiple air toxic contaminants affecting projected and potential residential developments would not be significant. This would be true for both the 2010 and 2025 analysis years.

TABLE 21-30
INDUSTRIAL SOURCE ANALYSIS-SUMMARY OF MAXIMUM PREDICTED CONCENTRATIONS
PROJECTED AND POTENTIAL DEVELOPMENT SITES

Compound	Short-Term Conc. µg/m^3	Annual Average Conc. µg/m^3	NYSDEC SGC µg/m^3	NYSDEC AGC µg/m^3	Toxicity Rating
Acetic Acid	1.53	0.00515	3,700	60	Not Rated
Ammonia	296.95	1.88723	2,400	100	Low
Antimony	2.00	0.00661	---	1.2	Moderate
Biphenyl	0.51	0.00169	---	3.1	Moderate
Butyl Acetate	23.90	0.01521	95,000	17,000	Low
Carbon Dioxide	4.65	0.01971	5,400,000	21,000	Not Rated
Copper Cyanide	1.75	0.00617	380	50	High
1,4-Dichlorobenzene1 (p)	0.26	0.00084	---	0.09	Moderate
1,2-Dichlorobenzene (o)	0.28	0.00093	30,000	360	Moderate
Dichloromethane1	0.63	0.00027	14,000	2.1	Moderate
Dimethyl Ketone (Acetone)	23.9	0.01521	180,000	28,000	Low
Ethane2	17.46	0.03926	---	110,000	Not Rated
Ethanol	13.27	0.02326	---	45,000	Low
Ethylene Glycol	0.11	0.00650	10,000	400	Not Rated
Ethylene Glycol Mbutyl Ether	53.74	0.11925	420	230	Moderate
Formic Acid	0.51	0.00186	1,900	22	Moderate
Hydrogen Chloride	0.76	0.00069	2,100	20	Low
Hydrogen Cyanide	0.41	0.00021	520	3.0	High
n- Octane	85.11	0.15543	---	3,300	Not Rated
Isopropyl Alcohol	36,480.10	44.88445	98,000	7,000	Moderate
Nitric Acid Mist	10.42	0.01953	86	12	Moderate
Phosphoric Acid Mist	0.02	0.00011	300	10	Moderate
Potassium Carbonate2	0.52	0.00202	380	50	Not Rated
Sodium Cyanide	3.54	0.00636	380	50	Moderate
Sodium Hydroxide	0.67	0.00244	200	---	Not Rated
Sulfuric Acid Mist	1.77	0.00620	120	1	Moderate
Tetrachloroethylene1	0.25	0.00380	1,000	1	Moderate
Tin	2.00	0.00661	20	0.24	Not Rated
Toluene	132.56	0.16640	37,000	400	Low
Trichlorobenzene	1.54	0.00511	3,700	---	Not Rated
Triethylene Glycol	0.52	0.00202	620	330	Moderate
Zinc Chloride	0.09	0.00064	200	2.4	Moderate
Criteria Pollutants3					
Nitrogen Dioxide	42.99	0.11309		100 (NAAQS)	
Carbon Monoxide	1160.23	0.46306	14,000		
PM10	252.17	0.23121	380	50 (NAAQS)	
SO2	2.00	0.00211	910	80 (NAAQS)	
Lead	16.07	0.04736		0.38	

1. Denotes that compound is a carcinogen.
2. Ethane and potassium carbonate had no associated SGC or AGC. Therefore, the guideline for propane was used to represent ethane and the guideline for particulates was used for potassium carbonate.
3. For criteria pollutants, the NAAQS was used for the annual averaging period of NO2, PM10, and SO2. Otherwise the DAR-1 equivalent standard was used for compliance. Although a NAAQS value exists for the one hour CO concentration, DAR-1 recommends using the equivalent standard in lieu of the NAAQS

TABLE 21-31
INDUSTRIAL SOURCE ANALYSIS-SUMMARY OF MAXIMUM PREDICTED CUMULATIVE IMPACTS FOR HEALTH RISK

Meteorological Analysis Year	Carcinogenic Compounds Incremental Risk[1]	EPA Acceptable Carcinogenic Risk Value	Non-Carcinogenic Compounds Hazard Quotient	EPA Acceptable Hazard Quotient
1998	5.02 E-08	<1.0 E-06	0.0955	1.0
1999	5.39 E-08	<1.0 E-06	0.0976	1.0
2000	4.39 E-08	<1.0 E-06	0.1267	1.0
2001	4.32 E-08	<1.0 E-06	0.1066	1.0
2002	3.33 E-08	<1.0 E-06	0.0927	1.0

1. The incremental risk exceeds the EPA criteria but only for Site 93. The incremental risk at all other receptors are below the EPA criterion.

(c) Quill Bus Depot

For 2010, air toxics concentrations at the proposed Convention Center Hotel from the existing Quill Bus Depot were analyzed. For 2025, the air toxics analysis for the relocated facility evaluated impacts on three sets of receptors, specifically, (1) existing residential developments; (2) projected site development under the Proposed Action with the residential use in 2025;and (3) the Future Without the Proposed Action developments associated with the West Chelsea Rezoning in 2025.

Air toxic emissions from the facility include those from a spray paint booth operation. The air toxics include 1, 2, 4-trimethylbenzene, ethylbenzene, methyl ethyl ketone, xylene, and 1, 6-hexamethylene diisocyanate. Emission rates and stack information were obtained from the existing facility's air permit.

As indicated in Table 21-32, the results of the modeling analysis for the 2010 analysis year indicate that there would be no significant adverse impacts associated with air toxics emissions. Concentrations would be less than both the short-term and annual NYSDEC guidance criteria at the proposed Convention Center Hotel (the maximum predicted concentration receptor).

The results of the modeling analysis in 2025 with the relocated Quill Bus Depot indicate that there could be significant adverse impacts associated with certain existing receptors in the vicinity of the relocated facility and projected developments in the West Chelsea Rezoning. The highest predicted levels (Table 21-33) would occur at several receptor locations in the West Chelsea rezoning area. As indicated in the table, exceedances of the annual NYSDEC guidance criteria are predicted for 1,6-hexamethylene diisocyanate based on an emission rate specified in the air permit from NYSDEC for the existing facility. The relocated facility would need to obtain a new air permit from NYSDEC, and as part of that permit application, NYCT will commit to measures that would avoid exceedance of the guidance criteria, thus eliminating any significant adverse impact from such emission.

TABLE 21-32
QUILL BUS DEPOT—SPRAY BOOTH OPERATIONS: SUMMARY OF MAXIMUM PREDICTED CONCENTRATIONS FOR 2010

Pollutants	Averaging Period	Maximum Predicted Concentration (µg/m^3)	SGC/AGC (µg/m^3)
1,2,4-trimethylbenzene	1-hour	148.2	N/A
	Annual	0.056	290
Ethylbenzene	1-hour	440.2	54,000
	Annual	0.015	1,000
Methyl Ethyl Ketone	1-hour	824.6	59,000
	Annual	0.13	5,000
Xylene	1-hour	2.87	4,300
	Annual	0.077	100
1,6-hexamethylene diisocyanate	1-hour	3.8	14
	Annual	0.0072	0.01

TABLE 21-33
QUILL BUS DEPOT—SPRAY BOOTH OPERATIONS: SUMMARY OF MAXIMUM PREDICTED CONCENTRATIONS FOR 2025

Pollutants	Averaging Period	Maximum Predicted Concentration (µg/m^3)	SGC/AGC (µg/m^3)
1,2,4-trimethylbenzene	1-hour	277.5	N/A
	Annual	0.52	290
Ethylbenzene	1-hour	824.3	54,000
	Annual	0.14	1,000
Methyl Ethyl Ketone	1-hour	1,544.3	59,000
	Annual	1.18	5,000
Xylene	1-hour	2,379.0	4,300
	Annual	0.71	100
1,6-hexamethylene diisocyanate	1-hour	7.08	14
	Annual	0.067[1]	0.01

1 This exceedance would be eliminated by NYCT commitments to be incorporated in the air permit for the relocated bus depot.

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