A. INTRODUCTION

This chapter examines potential air quality impacts of the proposed project. Ambient air quality is affected by numerous sources and activities that introduce air pollutants into the atmosphere. Air quality impacts can be either direct or indirect. Direct effects stem from emissions generated by stationary sources such as emissions from fuel burned on site for heating, ventilation, and air conditioning (HVAC) systems. Indirect effects include emissions from motor vehicles ("mobile sources") traveling to and from the project.

Fossil fuel-fired HVAC systems would be required to provide heating and cooling to the proposed project. Electrical power would be obtained from existing utilities in the area. This chapter assesses the impacts of the HVAC systems on the surrounding community and the environment.

The proposed project would increase traffic in the vicinity of the project site and along feeder streets to and from the project study area. This chapter includes a mobile source analysis to assess the potential impacts from this increase in traffic. In addition, the proposed project would include parking facilities, including temporary surface parking and permanent underground garages. Emissions from vehicles using these parking facilities could potentially result in increases in carbon monoxide (CO) concentrations adjacent to the facilities. Therefore, this chapter includes an analysis that evaluates potential future CO concentrations from the proposed parking facilities. This chapter also includes a cumulative impact analysis of parking and the mobile source analysis.

This chapter presents the air quality impacts from the future operation of the proposed project. Chapter 17, "Construction Impacts," presents a cumulative analysis of the air quality impacts from operations in the 2010 analysis year and construction activities.

PRINCIPAL CONCLUSIONS

CO, PM_{10}, and $PM_{2.5}$ concentrations due to project-generated traffic would not result in any violations of National Ambient Air Quality Standards (NAAQS) or any significant adverse air quality impacts. It was also determined that CO impacts would not exceed CEQR *de minimis* criteria, while $PM_{2.5}$ increments relating to mobile source emissions would not exceed the City's interim guidance criteria.

The proposed project would likely be required to obtain a state facility permit from the New York State Department of Environmental Conservation (NYSDEC) and permits to construct from the New York City Department of Environmental Protection (DEP) for the proposed project's stationary sources of emissions. Analyses of the emissions and dispersion of NO_2, CO, PM_{10}, and SO_2 from the proposed project's stationary sources indicate that such emissions would not result in the violations of NAAQS or in significant adverse air quality impacts. Because of the proposed project's low particulate matter emissions, the impacts of its $PM_{2.5}$ emissions would be insignificant under the NYSDEC policy guidance on $PM_{2.5}$. Nevertheless, a $PM_{2.5}$ analysis was conducted, which identified a limited number of receptors on upper floors of project buildings that would exceed the NYSDEC annual $PM_{2.5}$ threshold for determining potential significance. However, these exceedances would not result in significant adverse impacts. The maximum annual emissions of PM_{10} would be below the NYSDEC applicability threshold of 15 tons per year for assessing impacts of $PM_{2.5}$ from stationary sources. The potential exposure to $PM_{2.5}$ at these locations would be limited since occupants would not be expected to have their windows open continuously and be exposed to outdoor concentrations throughout the year (boiler emissions are highest in the winter when windows would least likely be opened). In addition, the maximum predicted $PM_{2.5}$ concentration levels are comparable to ambient levels of $PM_{2.5}$ measured at various locations in New York City over the past several years. On a neighborhood scale, $PM_{2.5}$ annual average impacts were below the City's interim guidance criterion. No off-site impacts were projected to exceed the NYSDEC criteria for potentially significant $PM_{2.5}$ impacts. Therefore, no significant adverse air quality impacts are anticipated from the proposed project's stationary sources.

The results of the industrial source analysis demonstrate that there would be no significant adverse air quality impacts on the proposed project from nearby industrial sources.

B. POLLUTANTS FOR ANALYSIS

Ambient air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Typically, ambient concentrations of CO are predominantly influenced by mobile source emissions. Particulate matter (PM), volatile organic compounds (VOCs) and nitrogen oxides (NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. The formation of such secondary PM takes hours or days to occur and thus has no measurable effect on air quality in the immediate vicinity of the source. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources and sources using non-road diesel fuel, such as diesel trains, marine engines, and construction equipment engines; but diesel-powered vehicles, primarily heavy duty trucks and buses, also contribute somewhat to these emissions. However, diesel fuel regulations that will begin to take effect in 2006 will reduce SO_2 emissions from mobile sources to extremely low levels. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs, emitted mainly from industrial processes and mobile sources.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. Since CO is a reactive gas that does not persist in the atmosphere, CO concentrations can vary greatly over relatively short distances. Elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be predicted on a local, or microscale, basis.

The proposed project would increase traffic volumes on feeder streets to and from the project study area as well as within the project site itself. Therefore, a mobile source analysis was conducted to evaluate future CO concentrations with and without the proposed project. A parking analysis was also conducted to evaluate future CO concentrations with the operation of the proposed parking facilities. A detailed analysis of the potential CO impacts from the proposed project's HVAC systems was also performed.

NITROGEN OXIDES, VOC, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow, and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions; the change in regional mobile source emissions of these pollutants would be related to the total vehicle miles traveled added or subtracted on various roadway types throughout the New York metropolitan area, which is designated as a moderate non-attainment area for ozone by the United States Environmental Protection Agency (EPA).

The proposed project would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels would result. An analysis of project-related emissions of these pollutants from mobile sources is therefore not warranted. A detailed analysis of the potential NO_2 impacts from the proposed project's HVAC systems was performed.

LEAD

Airborne lead is principally associated with industrial sources and motor vehicles that use gasoline containing lead additives. Most U.S. vehicles produced since 1975, and all produced after 1980, are designed to use unleaded fuel. As these newer vehicles have replaced the older ones, motor vehicle-related lead emissions have decreased. As a result, ambient concentrations of lead have declined significantly. Nationally, the average measured atmospheric lead level in 1985 was only about one-quarter the level in 1975.

In 1985, EPA announced new rules that drastically reduced the amount of lead permitted in leaded gasoline. The maximum allowable lead level in leaded gasoline was reduced from the previous limit of 1.1 to 0.5 grams per gallon effective July 1, 1985, and to 0.1 grams per gallon effective January 1, 1986. Monitoring results indicate that this action has been effective in significantly reducing atmospheric lead concentrations. Effective January 1, 1996, the Clean Air Act (CAA) banned the sale of the small amount of leaded fuel that was still available in some parts of the country for use in on-road vehicles, concluding the 25-year effort to phase out lead in gasoline. Even at locations in the New York City area where traffic volumes are very high, atmospheric lead concentrations are far below the national standard of 1.5 micrograms per cubic meter (3-month average).

No significant sources of lead are associated with the proposed project and, therefore, an analysis of this pollutant from stationary or mobile sources is not warranted.

PARTICULATE MATTER—TSP, PM_{10} AND $PM_{2.5}$

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating); chemical and manufacturing processes; construction and agricultural activities; and, wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers, or $PM_{2.5}$, and particles with an aerodynamic diameter of less than or equal to 10 micrometers, or PM_{10}, which includes the smaller $PM_{2.5}$. $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds adsorbed to the surfaces of the particles, and is also persistent in the atmosphere. $PM_{2.5}$ is mainly emitted by combustion sources (primary PM) and also forms in the atmosphere from precursor gases such SO_2, NO_x, and ammonia.

There is also a New York standard for total suspended particulate matter (TSP), which represents both coarse and fine particles. However, NYSDEC no longer conducts monitoring for this pollutant.

An analysis was conducted to assess the worst-case PM impacts due to the increased traffic associated with the proposed project, and from the proposed project's HVAC systems.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels: oil and coal. Due to the federal restrictions on the sulfur content in diesel fuel for on-road vehicles, no significant quantities are emitted from vehicular sources. Monitored SO_2 concentrations in New York City are below national standards. Vehicular sources of SO_2 are not significant, and therefore, an analysis of this pollutant from mobile sources is not warranted.

The boilers, which would be used for heating and hot water, would exclusively burn natural gas. Natural gas contains a very low fuel sulfur content; however, as part of the proposed project, No. 2 fuel would be burned in the proposed project's emergency generator. Therefore, an analysis was performed to estimate the potential for SO_2 impacts.

AIR TOXICS

In addition to the criteria pollutants discussed above, toxic air pollutants, also called air toxics, are also regulated. Air toxics are those pollutants that are known or suspected to cause serious health effects in small doses. Air toxics are emitted by a wide range of man-made and naturally occurring sources. Emissions of air toxics from industries are regulated by the EPA. Federal ambient air quality standards do not exist for air toxics; however, NYSDEC has issued standards for certain compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. NYSDEC has also developed ambient guideline concentrations for numerous air toxic compounds. The NYSDEC guidance document DAR-1 (December 2003) contains a compilation of annual and short-term (1-hour) guideline concentrations for these compounds. The NYSDEC guidance thresholds represent ambient levels that are considered safe for public exposure.

The project site is adjacent to existing industrial/manufacturing uses. Therefore, an analysis was performed to examine the potential for impacts to the proposed project from existing industrial emissions.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards are intended to protect public health, allowing an adequate margin of safety. 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 environment. The primary and secondary standards are the same for NO_2, ozone, lead, and PM; there is no secondary standard for CO. The standards for these pollutants are presented in Table 14-1.

The NAAQS for CO, NO_2, and SO_2 standards have also been adopted as the ambient air quality standards for New York State, but are defined on a running 12-month basis rather than for calendar years only. New York State also has standards for total suspended particulate matter (TSP) and photochemical oxidants which correspond to federal standards which have since been revoked or replaced, and for settleable particulates, non-methane hydrocarbons, beryllium, fluoride, and hydrogen sulfide (H_2S). These pollutants with New York State standards were not analyzed since they would be either emitted in negligible quantities by the proposed project, or the federal standards and guidance criteria for the criteria pollutants that were analyzed are more stringent than the corresponding New York State standards.

Since the DEIS was published, EPA has revised the NAAQS for PM, effective December 18, 2006. The revision included lowering the level of the 24-hour $PM_{2.5}$ standard from the current level of 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ and retaining the level of the annual standard at 15 $\mu g/m^3$. The PM_{10} 24-hour average standard was retained and the annual average PM_{10} standard was revoked.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS (SIP)

The CAA, as amended in 1990, defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment by EPA, the state is required to develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA.

EPA has designated New York City as in attainment for the NO_2, SO_2, and lead NAAQS, and has re-designated New York City as in attainment for CO. The CAA requires that a maintenance plan ensure continued compliance with the CO NAAQS for former non-attainment areas. New

Table 14–1
National Ambient Air Quality Standards

Pollutant	Primary		Secondary	
	ppm	µg/m[3]	ppm	µg/m[3]
Carbon Monoxide (CO)				
Maximum 8-Hour Concentration[1]	9	10,000	None	
Maximum 1-Hour Concentration[1]	35	40,000		
Lead				
Maximum Arithmetic Mean Averaged Over 3 Consecutive Months	NA	1.5	NA	1.5
Nitrogen Dioxide (NO_2)				
Annual Arithmetic Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average[2]	0.08	157	0.08	157
Respirable Particulate Matter (PM_{10})				
Average of Three Annual Arithmetic Means revoked, effective December 18, 2006	NA	50	NA	50
24-Hour Concentration[1]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Average of Three Annual Arithmetic Means	NA	15	NA	15
24-Hour Concentration[3, 4]	NA	35	NA	35
Sulfur Dioxide (SO_2)				
Annual Arithmetic Mean	0.03	80	NA	NA
Maximum 24-Hour Concentration[1]	0.14	365	NA	NA
Maximum 3-Hour Concentration[1]	NA	NA	0.50	1,300

Notes:
[1] Not to be exceeded more than once a year.
[2] Three-year average of the annual fourth highest daily maximum 8-hr average concentration.
[3] Not to be exceeded by the 98th percentile averaged over 3 years.
[4] EPA has reduced these standards down from 65 µg/m[3], effective December 18, 2006.

ppm – parts per million
µg/m[3] – micrograms per cubic meter
NA – not applicable
Particulate matter concentrations are in µg/m[3]. Concentrations of all gaseous pollutants are defined in ppm — approximately equivalent concentrations in µg/m[3] are presented.

Sources: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards;

York City is also committed to implementing site-specific control measures throughout New York City to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period.

Manhattan has been designated as a moderate non-attainment for PM_{10}; however, Brooklyn and the rest of New York City are designated as in attainment with the PM_{10} NAAQS. On December

17, 2004, EPA took final action in designating the five boroughs of New York City, as well as Nassau, Suffolk, Rockland, Westchester, and Orange counties, as $PM_{2.5}$ non-attainment areas under the CAA. New York State is required to develop a $PM_{2.5}$ SIP for the 1997 $PM_{2.5}$ NAAQS by early 2008, which will be designed to meet the standards by 2010. The SIP outlines the state's plan to bring nonattainment areas into compliance. To prepare the SIP, NYSDEC will review the sources of $PM_{2.5}$ and their effects on ambient concentrations, and projections of future changes in emissions due to regional growth. NYSDEC will evaluate the effectiveness of the current and proposed future regulations in achieving compliance, and where necessary, may propose new regulations to provide additional reductions in $PM_{2.5}$ emissions (and/or $PM_{2.5}$ precursor emissions) from mobile and stationary sources.

As described above, EPA has revised the PM standards. $PM_{2.5}$ attainment designations under the new standards would be effective by April, 2010, $PM_{2.5}$ SIPs would be due by April, 2013, and would be designed to meet the $PM_{2.5}$ standards by April, 2015, although this may be extended in some cases up to April, 2020.

Nassau, Rockland, Suffolk, Westchester, and the five counties of New York City had been designated as severe non-attainment for the ozone 1-hour standard. In November 1998, New York State submitted its *Phase II Alternative Attainment Demonstration for Ozone*, which was finalized and approved by EPA effective March 6, 2002, addressing attainment of the 1-hour ozone NAAQS by 2007. New York State has recently submitted revisions to the SIP. These SIP revisions included additional emission reductions that EPA requested to demonstrate attainment of the standard, and an update of the SIP estimates using the latest versions of the mobile source emissions model, MOBILE6.2, and the non-road emissions model, NONROAD—which have been updated to reflect current knowledge of engine emissions—and the latest mobile and non-road engine emissions regulations. On April 15, 2004, EPA designated these same counties as moderate non–attainment for the new 8–hour ozone standard which became effective as of June 15, 2004. EPA revoked the 1-hour ozone standard on June 15, 2005; however, the specific control measures for the 1-hour standard included in the SIP will be required to stay in place until the 8-hour standard is attained. The discretionary emissions reductions in the SIP will also remain but could be revised or dropped based on modeling. A new SIP for ozone will be adopted by the state no later than June 15, 2007, with a target attainment deadline of June 15, 2010.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the *CEQR Technical Manual* state that the significance of a likely consequence (i.e., whether it is material, substantial, large, or important) should be assessed in connection with:

- Its setting (e.g., urban or rural)
- Its probability of occurrence
- Its duration
- Its irreversibility
- Its geographic scope
- Its magnitude
- The number of people affected

In terms of the magnitude of air quality impacts (bullet 6 above), any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see Table 14-1) would be deemed to have a potential significant adverse impact. In addition, to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations will not be significantly increased in non-attainment areas, threshold levels have been defined for certain pollutants. Any action predicted to increase the concentrations of these pollutants above the thresholds would be deemed to have a potential significant adverse impact, even in cases where violations of the NAAQS are not predicted, requiring a detailed analysis of air quality impacts for that pollutant.

DE MINIMIS CRITERIA REGARDING CO IMPACTS

New York City has developed *de minimis* criteria to assess the significance of the incremental increase in CO concentrations that would result from proposed projects or actions, as set forth in the 2001 *CEQR Technical Manual*. These criteria set the minimum increase in CO concentration that would be considered a significant adverse environmental impact. Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 parts per million (ppm) or more in the maximum 8-hour average CO concentration at a location where the predicted No Build 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than one half the difference between baseline (i.e., No Build) concentrations and the 8-hour standard (9 ppm), when No Build concentrations are below 8.0 ppm.

EPA SIGNIFICANT IMPACT LEVELS

EPA has defined significant impact levels (SILs) for certain criteria pollutants that are used to evaluate impacts from proposed stationary source projects subject to the federal Prevention of Significant Deterioration (PSD) or Non-Attainment New Source Review (NANSR) programs. The SILs are a small percentage of the NAAQS, and are used to determine whether further analysis is necessary to assess whether impacts from a proposed project would potentially cause a violation of a NAAQS or a PSD increment. Projects exceeding a SIL that are subject to these permitting programs must perform an additional dispersion analysis to assess impacts from the proposed project as well as impacts from nearby sources of emissions.

Based on the proposed project's potential to emit (PTE) pollutant emissions regulated under the PSD and NANSR programs, the PSD and NANSR regulations do not apply. The SILs were used, however, as benchmarks for comparison since impacts below SILs are considered to have an insignificant impact on air quality.

INTERIM GUIDANCE CRITERIA REGARDING $PM_{2.5}$ IMPACTS

NYSDEC has published a policy to provide interim direction for evaluating $PM_{2.5}$ impacts[1]. This policy would apply only to facilities applying for permits or major permit modifications that emit 15 or more tons of PM_{10} annually. The policy states that such a project will be deemed to have a potential for significant adverse impacts, requiring preparation of an Environmental Impact Statement (EIS), if the project's maximum impacts are predicted to increase $PM_{2.5}$ concentrations by more than 0.3 $\mu g/m^3$ averaged annually, or more than 5 $\mu g/m^3$ on a 24-hour basis.

---

[1] CP-33, Assessing and Mitigating Impacts of Fine Particulate Matter Emissions, NYSDEC, December 29, 2003.

In addition, the DEP is currently employing interim guidance criteria for evaluating potential $PM_{2.5}$ impacts from DEP projects subject to CEQR. The interim guidance criteria reference the NYSDEC policy guidance thresholds and include a "neighborhood-scale" threshold to assess $PM_{2.5}$ impacts over a wider area. The interim guidance currently employed by DEP for determination of potential significant adverse impacts from $PM_{2.5}$ are as follows:

- Predicted 24-hour (daily) average increase in $PM_{2.5}$ concentrations greater than 5 $\mu g/m^3$ at a discrete location of public access, either at ground or elevated levels (microscale analysis);
- Predicted annual average increase in ground-level $PM_{2.5}$ concentrations greater than 0.1 $\mu g/m^3$ on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating background monitoring stations); and
- Predicted annual average increase in $PM_{2.5}$ concentrations greater than 0.3 $\mu g/m^3$ at ground or elevated levels (applicable to stationary sources only).

The thresholds are used to indicate whether further review and analysis is necessary as opposed to levels that cannot be exceeded by a proposed project. Projects that are subject to the NYSDEC guidance and which exceed either the annual or 24-hour NYSDEC thresholds would be required to prepare an EIS to assess the severity of the impacts, to evaluate alternatives, and to employ reasonable and necessary mitigation measures to minimize the $PM_{2.5}$ impacts of the source to the maximum extent practicable. Actions under CEQR that would increase $PM_{2.5}$ concentrations by more than the DEP interim guidance criteria will be considered to have a potential significant adverse impact. DEP recommends that project actions subject to CEQR that are predicted to exceed the interim guidance criteria prepare an EIS and examine potential measures to reduce or eliminate such potential significant adverse impacts. Under both the NYSDEC and DEP's guidance, $PM_{2.5}$ impacts below these thresholds are considered to be insignificant.

The proposed project's annual emissions of PM_{10} are estimated to be well below the 15 ton per year threshold under NYSDEC's $PM_{2.5}$ policy guidance. Nevertheless, both the NYSDEC and DEP interim guidance criteria have been used for the purpose of evaluating the potential significance of predicted impacts of the proposed project on $PM_{2.5}$ concentrations, and to determine the need to minimize PM emissions from the proposed project.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

The prediction of vehicle-generated CO and PM concentrations and their dispersion in an urban environment incorporates meteorological phenomena, traffic conditions, and physical configurations. Air pollutant dispersion models mathematically simulate how traffic, meteorology, and geometry combine to affect pollutant concentrations. The mathematical expressions and formulations contained in the various models attempt to describe an extremely complex physical phenomenon as closely as possible. However, because all models contain simplifications and approximations of actual conditions and interactions, and because it is necessary to predict the reasonable worst-case condition, most of these dispersion models predict conservatively high concentrations of pollutants.

The mobile source analyses for the proposed project employ models approved by EPA that have been widely used for evaluating air quality impacts of projects in New York City, other parts of New York State, and throughout the country. The modeling approach includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels resulting in a conservatively high estimate of expected pollutant concentrations that could result with the proposed project. The PM analysis is based on the latest $PM_{2.5}$ interim guidance developed by the DEP.

DISPERSION MODELS FOR MICROSCALE ANALYSES

Maximum CO concentrations adjacent to streets near the project site, resulting from vehicle emissions, were predicted using the CAL3QHC model Version 2.0.[1] The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes algorithms for estimating vehicular queue emissions at signalized intersections. CAL3QHC predicts emissions and dispersion of CO from idling and moving vehicles. The queuing algorithm includes site-specific traffic parameters, such as signal timing and delay calculations (from the 2000 *Highway Capacity Manual* traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to accurately predict the number of idling vehicles. The CAL3QHC model has been updated with an extended module, CAL3QHCR, which allows for the incorporation of hourly meteorological data into the modeling, instead of worst-case assumptions regarding meteorological parameters. This refined version of the model, CAL3QHCR, is employed if maximum predicted future CO concentrations are greater than the applicable ambient air quality standards, or when *de minimis* thresholds are exceeded using the first-level CAL3QHC modeling. It was also used to calculate PM mobile source impacts since it is more appropriate for calculating 24-hour and annual average concentrations.

METEOROLOGY

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the accumulation of pollutants at a particular prediction location (receptor), and atmospheric stability accounts for the effects of vertical mixing in the atmosphere.

Tier I Analyses—CAL3QHC

CO calculations were performed using the CAL3QHC model. In applying the CAL3QHC model, the wind angle was varied to determine the wind direction resulting in the maximum concentrations at each receptor.

---

[1] *User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections,* Office of Air Quality, Planning Standards, EPA, Research Triangle Park, North Carolina, Publication EPA-454/R-92-006.

Following the EPA guidelines[1], CO computations were performed using a wind speed of 1 meter per second and the neutral stability class D. The 8-hour average CO concentrations were estimated by multiplying the predicted 1-hour average CO concentrations by a factor of 0.81 to account for persistence of meteorological conditions and fluctuations in traffic volumes. A surface roughness of 3.21 meters was chosen. At each receptor location, concentrations were calculated for all wind directions, and the highest predicted concentration was reported, regardless of frequency of occurrence. These assumptions ensured that worst-case meteorology was used to estimate impacts.

Tier II Analyses—CAL3QHCR

A Tier II analysis using the CAL3QHCR model, which includes the modeling of hour-by-hour concentrations based on hourly traffic data and 5 years of monitored hourly meteorological data, was performed to predict maximum 24-hour and annual average PM levels. The data consists of surface data collected at La Guardia Airport and concurrent upper air data collected at Brookhaven, New York, for the period 2000-2004. All hours were modeled, and the highest resulting concentration for each averaging period presented.

ANALYSIS YEAR

The microscale analyses were performed for existing conditions, a Phase I analysis year of 2010, and a Phase II analysis year of 2016, the year in which the full build-out of the proposed project is expected to be completed. The future analysis was performed both without the proposed project (the No Build condition) and with the proposed project (the Build condition).

VEHICLE EMISSIONS DATA

Vehicular CO and PM emission factors were computed using the EPA mobile source emissions model, MOBILE6.2[2]. This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, number of starts per day, and engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. The inputs and use of MOBILE6.2 incorporates the most current guidance available from NYSDEC and DEP.

Appropriate credits were used to accurately reflect the New York State inspection and maintenance program, which requires inspections of automobiles and light trucks to determine if pollutant emissions from the vehicles' exhaust systems are below emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.

---

[1] *Guidelines for Modeling Carbon Monoxide from Roadway Intersections*, EPA Office of Air Quality Planning and Standards, Publication EPA-454/R-92-005.

[2] EPA, User's Guide to MOBILE6.1 and MOBILE6.2: Mobile Source Emission Factor Model, EPA420-R-03-010, August 2003.

Vehicle classification data were based on field studies. The general categories of vehicle types for specific roadways were further categorized into subcategories based on their relative fleet-wide breakdown.[1]

An ambient temperature of 43°F was used. The use of this temperature is recommended in the *CEQR Technical Manual* for the Borough of Brooklyn and is consistent with current DEP guidance.

Road Dust

The PM_{10} estimates include both vehicle exhaust and re-entrained road dust. Road dust emission factors were calculated according to the latest procedure delineated by EPA.[2] In accordance with DEP interim guidance criteria, $PM_{2.5}$ emission rates were determined with fugitive road dust to account for their impacts in local microscale analyses. However, consistent with DEP guidance, the $PM_{2.5}$ component of the fugitive road dust was not included in the neighborhood scale $PM_{2.5}$ microscale analysis, since it is considered to be an insignificant contribution on that scale.

TRAFFIC DATA

Traffic data for the air quality analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the proposed project (see Chapter 12, "Traffic and Parking"). Traffic data for the future without and with the proposed project were employed in the respective air quality modeling scenarios. The weekday 5-6 PM, weekday 7-8 PM pre-event, and weekend 4-5 PM post-event peak periods were analyzed. These time periods were selected for the mobile source analysis because they produce the maximum anticipated project-generated and future build traffic and, therefore, have the greatest potential for significant air quality impacts.

Since the PM analysis requires hourly traffic data over an entire 24-hour period, it was necessary to estimate this information for the non-peak traffic periods. The projected weekday and weekend peak no build traffic volumes were used as a baseline. No build traffic volumes for other hours were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected for the project. Project-generated traffic volumes were determined over the 24-hour period by using the 24-hour parking accumulation data used in the traffic analysis. 24-hour PM impacts were determined by using the 24-hour distribution associated with the highest total daily vehicle count. For annual impacts, average weekday and weekend 24-hour distributions were used to more accurately simulate traffic patterns over longer periods.

---

[1] The MOBILE6.2 emissions model utilizes 28 vehicle categories by size and fuel. Traffic counts and predictions are based on broader size categories and then broken down according to the fleet-wide distribution of subcategories and fuel types (diesel, gasoline, or alternative).

[2] AP-42, Fifth Edition, Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Chapter 13.2.1, EPA, December 2003, http://www.epa.gov ttn/chief/ap42.

BACKGROUND CONCENTRATIONS

Background concentrations are those pollutant levels not directly accounted for through the modeling analysis, which must be added to modeling results to obtain total pollutant concentrations at a study site.

The 8-hour average CO background concentration used in this analysis was 2.5 ppm, which is based on the second-highest 8-hour measurements over the most recent three year period for which complete monitoring data is available (2003-2005), based on measurements obtained at the NYSDEC PS 59 monitoring station, located in Manhattan. The 1-hour CO background employed in the analysis was 4.0 ppm.

The nearest NYSDEC monitoring site at JHS 126 in Brooklyn was used for PM_{10} and $PM_{2.5}$ background concentrations. The PM_{10} annual and 24-hour background concentrations were based on the highest and second-highest concentrations, respectively, measured over the most recent three-year period for which complete data are available (2002-2004). As with PM_{10}, the $PM_{2.5}$ annual background concentration was based on the highest measured value over the most recent three-year period, while the 24-hour background concentration was derived from the highest 98th percentile value measured over the same period. For the proposed project, the background concentrations for the PM_{10} annual and 24-hour periods are 21 $\mu g/m^3$ and 50 $\mu g/m^3$, respectively. For $PM_{2.5}$, the annual and 24-hour background concentrations are 15.3 $\mu g/m^3$ and 40.8 $\mu g/m^3$, respectively.

The background concentrations of CO, $PM_{10,}$ and $PM_{2.5}$ were used to determine predicted total concentrations with the proposed project for the 2010 and 2016 analysis years. Since the CAA was passed, there has been a consistent trend toward lower ambient concentrations measured in New York City due to the successful implementations of pollution controls requirements, regional planning measures, and other factors. Therefore, since the background concentrations used do not account for future benefits anticipated in the State's implementation plan, the background concentrations used for this analysis are considered to be conservative.

ANALYSIS SITES

A total of seven intersection locations were selected for microscale analysis (see Table 14-2 and Figure 14-1). These intersections were selected because they are the locations in the study area where the largest levels of project-generated traffic are expected and, therefore, where the maximum changes in the concentrations would be expected and the highest potential for air quality impacts would occur. Multiple receptors (i.e., precise locations at which concentrations are predicted) were modeled at each of the selected sites. Receptors were placed along the approach and departure links at spaced intervals. The receptors were placed at sidewalk or roadside locations near intersections with continuous public access.

Table 14-2
Mobile Source Analysis Intersection Locations

Analysis Site	Location
1	Atlantic Avenue/Flatbush Avenue/4th Avenue
2	Atlantic Avenue and 6th Avenue
3	Atlantic Avenue and Carlton Avenue
4	Atlantic Avenue and Vanderbilt Avenue
5	Dean Street and 6th Avenue
6	Dean Street and Vanderbilt Avenue
7	Tillary Street and Flatbush Avenue

Each of these intersections was analyzed for CO. For the PM_{10} and $PM_{2.5}$ analyses, two intersections were chosen. Based on review of existing traffic volumes and estimated project-generated traffic, the intersection at Atlantic Avenue/Flatbush Avenue/4th Avenue was selected since it has the highest Build traffic volumes and would therefore result in the highest predicted PM_{10} impacts. The intersection of Dean Street and 6th Avenue was chosen since it has the highest overall project trip increment in both the 2010 and 2016 analysis years and, therefore, the greatest potential for maximum changes in $PM_{2.5}$ concentrations. Each of these intersections was analyzed for PM_{10} and $PM_{2.5}$.

RECEPTOR LOCATIONS

Multiple receptors (i.e., precise locations at which concentrations are predicted) were modeled at each of the selected sites; receptors were placed along the approach and departure links at spaced intervals. Local model receptors were placed at sidewalk or roadside locations near intersections with continuous public access and at residential locations. Receptors in the annual $PM_{2.5}$ neighborhood scale models were placed at a distance of 15 meters, from the nearest moving lane, based on the DEP procedure for neighborhood scale corridor $PM_{2.5}$ modeling.

PARKING FACILITIES

The project site would include parking at various locations. By 2010, the underground parking garages for the arena block and Site 5 would be completed. Temporary parking facilities would also be constructed to accommodate residents and visitors to the project site, as well as construction workers. The largest of these facilities would be a surface lot at Block 1129, which would have a maximum capacity of approximately 944 spaces. By 2016, the temporary parking lot would be replaced with a permanent underground parking facility with a capacity of approximately 1,930 spaces.

Emissions from vehicles using the parking areas could potentially affect ambient levels of CO at intersections analyzed in the future Build conditions and at other receptor sites nearest to the project site. Because cold-starting automobiles leaving a parking facility would emit far higher levels of CO than hot-stabilized vehicles entering a facility, the impact from a parking facility would be greatest during those periods that averaged the largest number of departing vehicles. An analysis was performed using the methodology set forth in the *CEQR Technical Manual* to calculate pollutant levels.

Emissions from vehicles entering, parking, and exiting the parking facilities were estimated using the EPA MOBILE6.2 mobile source emission model and an ambient temperature of 43°F. For all arriving and departing vehicles, an average speed of 5 miles per hour was conservatively assumed for travel within the parking facilities. In addition, all departing vehicles were assumed to idle for 1 minute before proceeding to the exit.

For parking garages, the concentration of CO within the garage was calculated assuming a minimum ventilation rate, based on New York City Building Code requirements, of 1 cubic foot per minute of fresh air per gross square foot of garage area. To determine pollutant concentrations, the outlet vents were analyzed as a "virtual point source" using the methodology in EPA's *Workbook of Atmospheric Dispersion Estimates, AP-26*. This methodology estimates CO concentrations at various distances from an outlet vent by assuming that the concentration in the garage is equal to the concentration leaving the vent, and determining the appropriate initial horizontal and vertical dispersion coefficients at the vent faces. The temporary parking lot at

Block 1129 was modeled as additional line sources and included in the CAL3QHC modeling for the 2010 analysis year.

To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period. The CO concentrations were determined for the time periods when overall parking usage would be the highest, considering the hours when the greatest number of vehicles would exit the facilities. Departing vehicles were assumed to be operating in a “cold-start” mode, emitting higher levels of CO than arriving vehicles. Maximum emissions would result in the highest CO levels and the greatest potential impacts. Traffic data for the parking analysis were derived from the trip generation analysis described in Chapter 12, “Traffic and Parking.”

Because there are currently no specific garage designs on which the modeling of emissions could be based, worst-case assumptions were made regarding the design of the garages’ mechanical ventilation systems. The exhaust from the proposed parking garages was assumed to be vented through a single exhaust. The vent was assumed to exhaust directly onto the street, and a receptor was placed along the sidewalks at a pedestrian height of 6 feet and at a distance of 10 feet from the vent. An 8-hour persistence factor of 0.81 was used to account for meteorological variability over the average 8-hour period. Background and on-street CO concentrations determined from the CALQHC model were added to the modeling results to obtain the total ambient levels.

STATIONARY SOURCE ANALYSIS

HVAC SYSTEMS

A stationary source analysis was conducted to evaluate potential impacts from the proposed project’s HVAC systems. The boilers would generate hot water for building and domestic hot water heating. The proposed HVAC systems would utilize a number of design features to minimize energy consumption and to reduce emissions from fossil-fuel consumption, including the following:

- The use of conditioned transfer air within the vomitories of the arena space.
- The use of reheat coils and precoils to reduce energy demand in the arena during periods of peak heating and peak cooling, respectively.
- The use of reheat coils and precoils on 100 percent outside air units to reduce energy demand in the arena during periods of peak heating and peak cooling, respectively.

The proposed project’s residential buildings (except for the arena block) would potentially also be equipped with one or more natural gas-fired microturbines. These are small, high efficiency, low emitting combustion turbines which would be used to generate electricity to supply a portion of the buildings’ electrical needs in lieu of utility electric power. In addition, energy from the exhaust gases would be recovered to provide water heating for hot water, offsetting a portion of the buildings’ boiler operation. Microturbines displace energy purchased from older, less efficient and more polluting facilities so they result in lower energy usage and an overall reduction in emissions of criteria and non-criteria pollutants as well as greenhouse gases such as carbon dioxide. The total amount of additional emissions from the operation of microturbines at the project site is very small; therefore, no analysis of these units was performed.

The boilers would operate exclusively on natural gas, the cleanest fossil fuel. The boilers would be equipped with low-NO_x burners, which would limit NO_x emissions to no greater than 20 ppm. Each boiler installation would have one standby boiler available at any time to provide system redundancy.

A description of the HVAC systems is presented below for both the 2010 and 2016 analysis years.

2010

By 2010, it is anticipated that the arena block would be completed, as well as Site 5. A central boiler plant would serve the arena and Buildings 1, 2, 3 and 4. A separate boiler installation would serve Site 5.

For the purpose of this analysis, the central boiler plant is assumed to consist of five 800 horsepower firetube boilers (four operating, one standby), and Site 5 would consist of two 350 horsepower boilers (one operating, one standby). The exhaust stack for the central boiler plant boilers would be located above the roof of Building 4, and the exhaust stack for Site 5 would be above its roof. Figure 14-2 shows the location of the approximate HVAC stack locations for the 2010 development.

An emergency generator rated at approximately 2 megawatts (MW) would be installed to serve the arena block in the event of the loss of electrical power to the project site.

2016

The Phase II (2016) development would include individual boiler plants at each of the proposed buildings (Building 5 to Building 15) to provide heating and hot water. In addition to the Phase I development, the boilers at Buildings 5, and 9 would have a maximum capacity of 500 horsepower, the boilers at Building 7 would have a maximum capacity of 600 horsepower, the boilers at Building 6 would have a maximum capacity of 350 horsepower, the boilers at Buildings 8 and 10 would have a maximum capacity of 400 horsepower, and the boilers at Buildings 11, 12, 13, 14 and 15 would have a maximum capacity of 250 horsepower. At each building, two boilers would be installed, with one boiler in use and one boiler serving as a spare. Figure 14-3 shows the approximate HVAC stack locations for the 2016 development.

Boiler Emissions

Stack exhaust parameters and emission estimates for the proposed boiler installations were conservatively estimated for the 2010 and 2016 analysis years.

Short-Term Emissions

Short-term emissions rates were calculated based on emission factors obtained from various sources, including vendor data and equipment specifications, and the EPA *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*. PM_{10} and $PM_{2.5}$ emissions include both the filterable and condensable fractions.

Multiple scenarios were modeled to estimate emissions and predict short-term stationary source impacts. The boilers would be capable of operating at various loads depending on the heating and hot water demands of the proposed project's buildings. Therefore, the boiler (and emergency generator) equipment were modeled at operating loads of 25, 50, 75 and 100 percent to calculate impacts over a full range of operating conditions. The stack exhaust parameters and the estimated maximum short-term emission rates are provided in Table 14-3 for the boilers operating at 100 percent load.

Table 14-3
Boiler Emission Rates and Stack Parameters

		Boiler Capacity					
Parameter		800 HP	600 HP	500 HP	400 HP	350 HP	250 HP
Heat Input Rate (MMBtu/hr, HHV)		32.66	24.49	20.41	16.33	14.29	10.21
Stack Exhaust Temp. (°F)		256	256	256	268	272	281
Stack Exhaust Flow (lbs/hr)		28,634	21,476	17,896	14,317	12,527	8,948
Stack Exhaust Flow (ACFM)		8,821	6,616	5,513	4,485	3,946	2,853
Stack Exhaust Velocity (ft/s)		17.61	17.37	14.48	11.85	13.39	9.62
Lb/MMBtu, HHV	NO_x	0.024	0.024	0.024	0.024	0.024	0.024
	CO	0.04	0.04	0.04	0.04	0.04	0.04
	$PM_{10}/PM_{2.5}$	0.0076	0.0076	0.0076	0.0076	0.0076	0.0076
	SO_2	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Lb/hr	NO_x	0.78	0.59	0.49	0.39	0.34	0.24
	CO	1.31	0.98	0.82	0.65	0.57	0.41
	$PM_{10}/PM_{2.5}$	0.25	0.19	0.15	0.12	0.11	0.08
	SO_2	0.033	0.024	0.020	0.016	0.014	0.010

Notes:
HP = boiler horsepower rating.
MMBtu = million British thermal units per hour
HHV = higher heating value of fuel
ACFM = actual cubic feet per second
Emission rates and stack parameters are based on 100 percent load operation (per unit).
For the 500 HP boilers two stack exit velocities are specified; the first value is applicable to the boiler installations at Building 5, 8 and 10, while the second value is applicable to the boiler installation at Building 6.
PM_{10} and $PM_{2.5}$ emission factors based on Table 1.4-2 of AP-42, and include the condensable fraction.
NO_x, SO_2 and CO emissions based on industry data.

Annual Emissions

Based on conservative heating demand projections, the boilers were assumed to operate at the equivalent of 3,600 hours per year at 100 percent load on an annual average basis for the 2010 and 2016 analysis years. The emergency generator would operate (other than due to a loss of utility electric power) approximately 26 hours per year (based on 30 minutes of operation per week for testing to ensure reliability and availability). Table 14-4 presents a summary of the total annual emissions from the proposed project for the 2010 and 2016 analysis years, based on the above operating assumptions.

Table 14-4
Total Annual Emissions (Tons per Year)

Pollutant	2010	2016
NO_X	6.7	13.8
CO	10.5	22.2
PM_{10}	2.0	4.2
$PM_{2.5}$	2.0	4.2
SO_2	0.3	0.6

Note: Based on a maximum of 3,600 hours per year of boiler operation at 100 percent load) and 26 hours per year of emergency generator operation.

The proposed project would be required to meet the applicable New York State and New York City regulatory requirements for sources of air emissions. Based on the emission levels shown in

Table 14-4, the proposed project would be eligible to obtain a state facility air permit under 6 NYCRR Part 201-5. Operating limits would be included in the permit so that annual emissions of all air pollutants do not exceed "major stationary source" thresholds as defined in 40 CFR 52.21 or NYCRR Part 231-2. As such, the PSD and NANSR rules would not apply. The emissions limits would also be designed to be below the major source thresholds established under the EPA Title V operating permit regulations established at 40 CFR Part 70-71, and implemented by NYSDEC at 6 NYCRR Part 201-6. Air permits to construct would be obtained from DEP as required by the New York City Air Pollution Control Code.

Since the boilers would operate primarily during colder periods, the annual impact analysis used average monthly weather data for New York City to adjust the nominal 100 percent boiler load for each month of the year to approximate the average monthly boiler demand. This results in a projected operating load equivalent to operation at 100 percent load for 3,600 hours per year. The HVAC equipment was modeled at 25, 50, 75, and 100 percent load to account for varying boiler operating conditions throughout the year.

Dispersion Modeling

Potential impacts were evaluated using the EPA/AMS AERMOD dispersion model. The AERMOD model was designed as a replacement to the EPA Industrial Source Complex (ISC3) model and is applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions.

The AERMOD 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 when the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. The analysis of potential impacts from exhaust stacks was made assuming stack tip downwash, urban dispersion and surface roughness length, with and without building downwash, and elimination of calms.

The AERMOD Model also incorporates the algorithms from the PRIME model, which is specifically designed to predict impacts in the cavity region due to the effects of nearby structures. EPA's Building Profile Input Program (BPIPPRM), which is described in the *User's Guide to the Building Profile Input Program*, EPA, Research Triangle Park, N.C., was used to determine the projected building dimensions for the modeling with the building downwash algorithm enabled.

Meteorological Data

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at La Guardia Airport (2000–2004) and concurrent upper air data collected at Brookhaven, New York. These meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevations over the 5-year period. These data were processed using the EPA AERMET program to develop data in a format which can be readily processed by the AERMOD model. The land use around the site where meteorological surface data were available was classified using categories defined in digital United States Geological Survey (USGS) maps to determine surface parameters used by the AERMET program.

Receptor Locations

A comprehensive receptor network (i.e., off-site locations with continuous public access) was developed for the modeling analyses. The receptor network included regularly spaced ground- level receptors and numerous discrete receptors on nearby sensitive uses and tall buildings. A ground-level cartesian grid was used, centered on the project site and extending out to 1 kilometer (km), at a 100 meter interval, in all directions. Receptors were also placed at sensitive uses around the project site, such as at residential buildings, schools, religious institutions, and recreational facilities. In addition, numerous receptors were placed on residential buildings and open spaces located on the project site to determine project-on-project impacts. Receptors were placed at various building elevations on all façades to ensure that potential worst-case project-on-project impacts would be identified. Since the terrain around the project site is generally flat, terrain heights were not used in the model.

Background Concentrations

To estimate the maximum expected pollutant concentration at a receptor, the calculated impact from the exhaust stacks must be added to a background value that accounts for existing pollutant concentrations from other sources (see Table 14-5). The background levels are based on concentrations monitored at the nearest NYSDEC ambient air monitoring stations over the most recent three-year period for which data are available (2003-2005), with the exception of $PM_{10,}$ which, due to the limited monitoring data available for 2005, was based on 2002-2004 background data. For all pollutants except $PM_{2.5}$, the short-term averages (24-hour, 8-hour, 3-hour, and 1-hour) are the second-highest measured values over a specified period ($PM_{2.5}$ is based on the highest 98th percentile measurement over the same three-year period). The annual average background values are the highest measured concentrations for these pollutants. The measured background concentration was added to the predicted contribution from the modeled project sources to determine the maximum predicted total pollutant concentration. It was conservatively assumed that the maximum background concentrations occur on all days.

INDUSTRIAL SOURCE ANALYSIS

Potential effects from existing industrial operations in the surrounding area on the proposed project were analyzed. Industrial air pollutant emission sources within 400 feet of the project site boundaries were considered for inclusion in the industrial source air quality impact analysis, as suggested in the *CEQR Technical Manual*. This distance was used to identify the extent of the study area for determining air quality impacts on the proposed project from industrial sources.

Initially, a request was made to the DEP's Bureau of Environmental Compliance (BEC) and NYSDEC to obtain all the available information for facilities in the study area and to determine whether manufacturing or industrial emissions occur. In addition, a search of federal and state-permitted facilities within the study area was conducted using the EPA's Envirofacts database.[1]

Next, a field survey was conducted to identify buildings within 400 feet of the project site that have the potential for emitting air pollutants to confirm the information received from the DEP-BEC and NYSDEC, and to identify any additional sources of emissions from manufacturing or processing activities. Land use and Sanborn maps were reviewed to identify potential sources of emissions from manufacturing/industrial operations. The survey was conducted on February 4, 2005. A total of two permitted facilities were identified within 400 feet of the project site.

---

[1] http://oaspub.epa.gov/enviro/ef_home2.air

Table 14-5
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	PS 59, Manhattan	72	100
SO_2	3-hour	PS 59, Manhattan	202	1,300
	24-hour		123	365
	Annual		37	80
CO	1-hour	PS 59, Manhattan	4,581	40,000
	8-hour		2,863	10,000
PM_{10}	24-Hour	JHS 126, Brooklyn	50	150
	Annual (1)		21	50
$PM_{2.5}$	24-Hour (2)	JHS 126, Brooklyn	40.8	35
	Annual		15.3	15

Notes:
1 Annual standard revoked effective December 18, 2006.
2 EPA has lowered the NAAQS from 65 $\mu g/m^3$, effective December 18, 2006.

Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2002–2005.

After compiling the information on facilities with manufacturing or process operations in the study area, an air quality dispersion model screening database, ISC3, was used to estimate maximum potential impacts from different sources at various distances from the site. Impact distances selected for each source were the minimum distances between the boundary of the project site and the source site. Predicted worst-case impacts on the proposed project were compared with the short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) recommended in NYSDEC's *DAR-1 AGC/SGC Tables.*[1] These guideline concentrations present the airborne concentrations, which are applied as a screening threshold to determine whether future occupants of the proposed project could be significantly impacted from nearby sources of air pollution.

To assess the effects of multiple sources emitting the same pollutants, cumulative source impacts were determined. Concentrations of the same pollutant from industrial sources that were within 400 feet of the project site were combined and compared to the guideline concentrations discussed above.

E. EXISTING CONDITIONS

EXISTING MONITORED AIR QUALITY CONDITIONS

Monitored background concentrations of SO_2, NO_2, CO, ozone, lead, PM_{10} and $PM_{2.5}$ for the study area are shown in Table 14-6. These values (2005) are the most recent monitored data that have been made available by NYSDEC. There were no monitored violations of NAAQS for NO_2, SO_2, CO, lead or PM_{10} at these monitoring sites. The fourth highest 8-hour annual average ozone concentration and maximum annual $PM_{2.5}$ concentrations recorded at the nearest

[1] NYSDEC Division of Air Resources, Bureau of Stationary Sources, December, 2003.

Table 14-6
Most Recent Monitored Ambient Air Quality Data

Pollutants	Location	Units	Period	Concentration	Exceeds Federal Standard?	
					Primary	Secondary
CO	PS 59, Manhattan	ppm	8-hour	1.6	N	N
			1-hour	2.3	N	N
SO_2	PS 59, Manhattan	µg/m^3	Annual	29	N	-
			24-hour	100	N	-
			3-hour	160	-	N
Respirable particulates (PM_{10})	JHS 126, Brooklyn	µg/m^3	Annual	17 [1]	N	N
			24-hour	32 [1]	N	N
Respirable particulates ($PM_{2.5}$)	JHS 126, Brooklyn	µg/m^3	Annual	15.3	N [3]	N [3]
			24-hour	38.0	* [4]	* [4]
NO_2	PS 59, Manhattan	µg/m^3	Annual	68	N	N
Lead	Susan Wagner, Staten Island	µg/m^3	3-month	0.01 [1]	N	-
Ozone (O_3)	Queens College	ppm	1-hour	0.123 [2]	-	-
		ppm	8-hour	0.086	N [3]	N [3]

Notes:
[1] Ambient monitoring data are not yet available from NYSDEC for 2005. The latest available value was used instead.
[2] The 1-hour ozone NAAQS has been replaced with the 8-hour standard; however, the maximum monitored concentration is provided for informational purposes.
[3] The value exceeds the NAAQS; however, compliance is determined based on the most recent three-year average, and is less than the NAAQS.
[4] The most recent monitoring data does not exceed the current standard of 65µg/m^3. However, the concentration does exceed the revised 24-hour $PM_{2.5}$ standard of 35µg/m^3.
Source: NYSDEC, 2004-2005 New York State Ambient Air Quality Data.

NYSDEC monitoring sites exceed the NAAQS; however, since compliance is determined over a three-year average of monitoring data, the monitoring stations are considered to be in attainment of the NAAQS. For modeling purposes the analysis utilized the maximum values over the most recent three-year period (Table 14-5).

$PM_{2.5}$ BACKGROUND CONCENTRATIONS

$PM_{2.5}$ monitoring data were reviewed to understand the historical and seasonal patterns in $PM_{2.5}$ background concentrations, and the frequency of measured exceedances of the NAAQS. Figure 14-4 presents a summary of individual 24-hour average $PM_{2.5}$ measurements at the nearest monitoring location (JHS 126). The figure shows that there is no discernable pattern or trend to the data. This is expected because $PM_{2.5}$ is created by a wide variety of sources both directly and indirectly.

Figure 14-5 presents a histogram of the $PM_{2.5}$ data measured at JHS 126. The figure shows that 24-hour average $PM_{2.5}$ concentrations are typically between 5 µg/m^3 and 35 µg/m^3. The 98th percentile values, which are used as the basis for determining compliance with the 24-hour average $PM_{2.5}$ NAAQS, are typically 35 to 40 µg/m^3, which are above the recently revised $PM_{2.5}$ NAAQS, which were lowered from 65 µg/m^3 to 35 µg/m^3.

PREDICTED POLLUTANT CONCENTRATIONS IN THE STUDY AREA

As noted previously, receptors were placed at multiple sidewalk locations next to the intersections under analysis. The receptor with the highest predicted CO concentrations was used to represent these intersection sites for the existing conditions. CO concentrations were calculated for each receptor location, at each intersection, for each peak period specified above.

Table 14-7 shows the maximum predicted existing (2005) CO 8-hour average concentrations at the receptor sites. (No 1-hour values are shown since predicted values are much lower than the standard.) At all receptor sites, the maximum predicted 8-hour average concentrations are within the national standard of 9 ppm.

Table 14-7
Maximum Predicted Existing 8-Hour Average CO Concentrations for 2005

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	Weekday Pre-game	8.0
2	Atlantic Avenue and 6th Avenue	Weekday PM	5.3
3	Atlantic Avenue and Carlton Avenue	Weekday PM	5.3
4	Atlantic Avenue and Vanderbilt Avenue	Weekday PM	6.6
5	Dean Street and 6th Avenue	Weekend 4-5 PM	3.5
6	Dean Street and Vanderbilt Avenue	Weekday PM	4.0
7	Tillary Street and Flatbush Avenue	Weekday PM	7.2
Note: 8-hour standard is 9 ppm.			

F. FUTURE WITHOUT THE PROPOSED PROJECT—2010

MOBILE SOURCES ANALYSIS

CO

CO concentrations without the proposed project were determined for the 2010 analysis year using the methodology previously described. Table 14-8 shows future maximum predicted 8-hour average CO concentrations at the analysis intersections without the proposed project (i.e., 2010 No Build values). The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

Table 14-8
Future (2010) Maximum Predicted 8-Hour Average Carbon Monoxide No Build Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	Weekday PM	5.8
2	Atlantic Avenue and 6th Avenue	Weekday PM	4.2
3	Atlantic Avenue and Carlton Avenue	Weekday PM	4.2
4	Atlantic Avenue and Vanderbilt Avenue	Weekday PM	5.2
5	Dean Street and 6th Avenue	Weekday PM	3.1
6	Dean Street and Vanderbilt Avenue	Weekday PM	3.6
7	Tillary Street and Flatbush Avenue	Weekday PM	5.7
Note: 8-hour standard is 9 ppm.			

As shown in Table 14-8, 2010 No Build values are predicted to be lower than existing average concentrations (shown in Table 14-7). The decrease in CO concentrations would primarily result from the increasing proportion of newer vehicles with more effective pollution controls as well as the continuing benefits of the New York State I&M Program.

PM

PM concentrations without the proposed project were determined for the 2010 analysis year using the methodology previously described. Tables 14-9 and 14-10 present the future maximum predicted 24-hour and annual average PM_{10} and $PM_{2.5}$ concentrations, respectively, at the analysis intersections without the proposed project (i.e., 2010 No Build values). The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

Table 14-9
Future (2010) Maximum Predicted No Build
24-Hour and Annual PM_{10} Concentrations

Receptor Site	Location	24-Hour Concentration (μg/m^3)	Annual Average Concentration (μg/m^3)
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	61.27	25.30
5	Dean Street and 6th Avenue	55.26	22.62

Note: National Ambient Air Quality Standards—24-hour, 150 μg/m^3; annual average, 50 μg/m^3 (annual standard revoked, effective December 18, 2006).

Table 14-10
Future (2010) Maximum Predicted No Build
24-Hour and Annual $PM_{2.5}$ Concentrations

Receptor Site	Location	24-Hour Concentration (μg/m^3)	Annual Average Concentration (μg/m^3)
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	41.86	15.52
5	Dean Street and 6th Avenue	41.34	15.32

Note: National Ambient Air Quality Standards—Annual average, 15 μg/m^3; EPA has lowered the 24-hour NAAQS to 35 μg/m^3, effective December 18, 2006.

STATIONARY SOURCE ANALYSIS

In the future without the proposed project, it is assumed that the uses currently on the project site would remain. HVAC emissions would likely be lower in the No Build condition. Emissions from industrial uses would be anticipated to be greater in the No Build condition, since the proposed project would displace existing businesses on the project site.

G. PROBABLE IMPACTS OF THE PROPOSED PROJECT—2010

The proposed project in 2010 would result in increased mobile source emissions in the immediate vicinity of the project study area and could also affect the surrounding community with emissions from the HVAC equipment and parking facilities. The following sections describe the results of the studies performed to analyze the potential impacts on the surrounding community from these sources for the 2010 analysis year. In addition, existing industrial facilities were assessed for potential adverse impacts on the proposed project's buildings.

MOBILE SOURCES ANALYSIS

CO

CO concentrations with the proposed project were determined for the 2010 analysis year at traffic intersections using the methodology previously described. Table 14-11 shows the future maximum predicted 8-hour average CO concentration with the proposed project at the seven intersections studied. (No 1-hour values are shown since no exceedances of the standard would occur and the *de minimis* criteria are only applicable to 8-hour concentrations. Therefore, the 8-hour values are the most critical for impact assessment.) The values shown are the highest predicted No Build and Build concentrations for any of the time periods analyzed. The results indicate that the proposed project would not result in any violations of the CO standard or any significant impacts using the *de minimis* criteria for CO impacts described above at the receptor locations.

Table 14-11
Future (2010) Maximum Predicted 8-Hour Average
No Build and Build Carbon Monoxide Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm) (1), (2)	
			No Build	Build
1	Atlantic Avenue/Flatbush Avnue/4th Avenue	Weekday PM	5.8	6.0
2	Atlantic Avenue and 6th Avenue	Weekday PM	4.2	4.0
		Weekend Post-game	4.0	4.1
3	Atlantic Avenue and Carlton Avenue	Weekday PM	4.2	4.0
		Weekend Post-game	3.9	4.1
4	Atlantic Avenue and Vanderbilt Avenue	Weekday PM	5.2	5.3
		Weekend Post-game	4.7	5.0
5	Dean Street and 6th Avenue	Weekend Post-game	3.1	3.7
6	Dean Street and Vanderbilt Avenue	Weekday PM	3.6	3.7 (3)
7	Tillary Street and Flatbush Avenue	Weekday PM	5.7	5.8

Notes:
1 8-hour standard is 9 ppm.
2 Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No Build 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No Build) concentrations and the 8-hour standard, when No Build concentrations are below 8.0 ppm.
3 Includes the CO contribution from the proposed temporary parking facility at Block 1129.

PM

PM concentrations with the proposed project were determined for the 2010 analysis year using the methodology previously described. Tables 14-12 and 14-13 show the future maximum predicted 24-hour and annual average PM_{10} concentrations with the proposed project, respectively.

The values shown are the highest predicted concentrations for any of the time periods analyzed. The results indicate that the proposed project would not result in any violations of the 24-hour or annual PM_{10} standard and, therefore, the proposed project would not result in any significant adverse PM_{10} impacts at any of the receptor locations analyzed.

Table 14-12
Future (2010) Maximum Predicted
24-Hour Average PM_{10} Concentrations

Receptor Site	Location	24-Hour Concentration (μg/m³)[1]	
		No Build	Build
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	61.27	61.75
5	Dean Street and 6th Avenue	55.26	63.89
Note: [1] National Ambient Air Quality Standards—24-hour, 150 μg/m³.			

Table 14-13
Future (2010) Maximum Predicted
Annual Average PM_{10} Concentrations (μg/m³)

Receptor Site	Location	Annual Concentration (μg/m³)[1]	
		No Build	Build
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	25.30	25.40
5	Dean Street and 6th Avenue	22.62	24.71
Note: [1] National Ambient Air Quality Standards—annual average, 50 μg/m³ (NAAQS revoked, effective December 18, 2006).			

Future maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations with the proposed project were determined. The mobile source $PM_{2.5}$ analysis also determined the maximum predicted incremental impacts, so that they could be compared to the interim guidance criteria that would determine the potential significance of the proposed project's impacts. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in Tables 14-14 and 14-15, respectively. The results show that the annual and daily (24-hour) $PM_{2.5}$ increments are predicted to be below the interim guidance criteria and, therefore, the proposed project would not result in significant $PM_{2.5}$ impacts at the analyzed receptor locations.

Table 14-14
Future (2010) Maximum Predicted
24-Hour Average $PM_{2.5}$ Concentrations

Receptor Site	Location	24-Hour Concentration (μg/m³)		
		No Build	Build	Increment
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	41.86	41.93	0.07
5	Dean Street and 6th Avenue	41.34	42.26	0.92
Notes: EPA has lowered the NAAQS to 35 μg/m³, effective December 18, 2006. $PM_{2.5}$ interim guidance criteria—annual average (neighborhood scale), 0.1 μg/m³. The differences between No Build and Build are due to rounding.				

Table 14-15
Future (2010) Maximum Predicted
Annual Average $PM_{2.5}$ Concentrations

Receptor Site	Location	Annual Concentration (μg/m³)		
		No Build	Build	Increment
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	15.52	15.54	0.02
5	Dean Street and 6th Avenue	15.32	15.34	0.02
Notes: National Ambient Air Quality Standards—annual, 15 μg/m³. $PM_{2.5}$ interim guidance criteria—annual (neighborhood scale), 0.1 μg/m³.				

PARKING FACILITIES

A screening analysis was performed to assess potential impacts from parking garages. In 2010, the parking garage with the greatest capacity would be at Site 5. Based on the methodology previously discussed, the maximum overall predicted future CO concentrations, including ambient background levels and contributions from nearby on-street traffic (from the CAL3QHC modeling analysis), at the nearest sidewalk receptor locations, would be 12.7 ppm and 7.3 ppm for the 1- and 8-hour periods, respectively. The maximum 1- and 8-hour contribution from the parking garages would be 4.4 ppm and 1.3 ppm, respectively. The values are the highest predicted concentrations for any time period analyzed.

To ensure that impacts from the proposed project's parking facilities, when added to future Build traffic, are not significant with respect to the *CEQR de minimis* criteria, the location of the garage's exhaust vent(s) at Site 5 would be restricted to a minimum height of 20 feet above grade. These maximum predicted CO levels are below the applicable CO standards and, therefore, no significant adverse impacts from the proposed project's parking garages are expected.

STATIONARY SOURCES

HVAC SYSTEMS

Table 14-16 compares maximum ground-level concentrations of NO_2, SO_2, CO, and PM_{10} with EPA defined SILs. The results indicate that maximum concentrations from project stack emissions at ground-level receptor locations would be below EPA significant impact levels. This indicates that ambient air quality would not be significantly affected by the proposed project for these pollutants.

Table 14-16
Future (2010) Maximum Modeled Ground-Level Pollutant Increments (μg /m^3)

Pollutant	Averaging Period	Maximum Predicted Ground-level Increment	EPA SIL	NAAQS
NO_2	Annual	0.52	1	100
SO_2	3-hour	7.2	25	1,300
	24-hour	1.1	5	365
	Annual	0.05	1	80
CO	1-Hour	60.0	500	40,000
	8-Hour	24.7	100	10,000
PM_{10}	24-hour	2.6	5	150
	Annual	0.29	1	50 (3)
$PM_{2.5}$	24-hour	2.6	- (2)	35 (4)
	Annual	0.29	- (2)	15

Notes:
[1] NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.55.
[2] Pending promulgation of $PM_{2.5}$ regulations, EPA has recommended use of the permitting regulations applicable to PM_{10} emission sources and thus applies the PM_{10} 24-hour SIL of 5 μg/m^3 and the annual PM_{10} SIL of 1 μg/m^3 for permitting of PM_{10} and $PM_{2.5}$ emission sources.
[3] EPA revoked the annual NAAQS for PM_{10}, effective December 18, 2006.
[4] EPA has lowered the NAAQS for $PM_{2.5}$ to 35 μg/m^3, effective December 18, 2006.

Maximum predicted concentration increments from HVAC equipment, and overall concentrations, including background concentrations, are presented in Table 14-17 and Table 14-18, respectively.

Table 14-17
Future (2010) Maximum Modeled Stationary Source Pollutant Increments (μg /m³)

Pollutant	Averaging Period	Maximum Predicted Increment		PM2.5 Interim Guidance Criteria/EPA SIL
		On-Site [1]	Off-Site [2]	
NO_2 [3]	Annual	0.20	0.52	1
SO_2	3-hour	24.5	7.2	25
	24-hour	3.2	1.1	5
	Annual	0.02	0.05	1
CO	1-Hour	263	60.0	500
	8-Hour	54.2	24.7	100
PM_{10}	24-hour	4.2	2.6	5
	Annual	0.11	0.29	1
$PM_{2.5}$	24-hour	4.2	2.6	5
	Annual (Discrete)	0.11	0.29	0.3
	Annual (Neighborhood Scale)	0.036		0.1

Notes:
[1] Maximum on-site increments represent the maximum modeled concentrations occurring at elevated receptors on the project site.
[2] Maximum off-site increments represent the maximum modeled concentrations occurring at ground-level receptors, and at off-site elevated receptors.
[3] NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.55.

Table 14-18
Future (2010) Maximum Modeled Stationary Source Pollutant Concentrations (μg /m³)

Pollutant	Averaging Period	Maximum Predicted Increment	Maximum Background Concentration	Total Concentration	NAAQS
NO_2 [1]	Annual	0.52	72	72.5	100
SO_2	3-hour	24.5	202	226.5	1,300
	24-hour	3.2	123	126.2	365
	Annual	0.05	37	37.1	80
CO	1-Hour	263.3	4,581	4,844	40,000
	8-Hour	54.2	2,863	2,917	10,000
PM_{10}	24-hour	4.2	50	54.2	150
	Annual	0.29	21	21.3	50 (2)
$PM_{2.5}$	24-hour	4.2	40.8	45.0	35 (3)
	Annual	0.29	15.3	15.6	15

Notes:
[1] NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.55.
[2] EPA revoked the annual NAAQS for PM_{10}, effective December 18, 2006.
[3] EPA has lowered the NAAQS for$PM_{2.5}$ to 35 μg/m³, effective December 18, 2006.

Table 14-18 shows maximum predicted concentrations. As shown in the table, for NO_2, SO_2, CO, and PM_{10}, the maximum concentrations from stack emissions, when added to background concentrations, would be well below ambient air quality standards.

The air quality modeling analysis also determined the highest predicted increase in 24-hour and annual average $PM_{2.5}$ concentrations from the HVAC systems (see Table 14-18). As shown in the table, the maximum 24-hour incremental impact at any discrete receptor location would be less than the applicable interim guidance criterion of 5 $\mu g/m^3$. On an annual basis, the projected $PM_{2.5}$ impacts would be less than the DEP interim guidance criteria and NYSDEC policy threshold of 0.3 $\mu g/m^3$ at any discrete receptor location, and the DEP interim guidance criteria of 0.1 $\mu g/m^3$ for neighborhood scale impacts.

In addition, maximum 24-hour and annual average $PM_{2.5}$ impacts from the mobile source analysis (see Tables 14-14 and 14-15 above), when added to the maximum ground-level stationary source $PM_{2.5}$ concentrations, would be below the significant impact criteria. This is a conservative method of calculating cumulative impacts, as the locations of maximum concentration differ for the stationary and mobile sources. Therefore, no significant adverse air quality impacts are predicted from emissions of $PM_{2.5}$ from the proposed project.

As discussed in this FEIS, EPA has revised the PM NAAQS, including lowering the 24-hour $PM_{2.5}$ standard from the current level of 65 $\mu g/m^3$ to 35 $\mu g/m^3$. However, the criteria used to determine whether impacts from the proposed project are potentially significant have not changed, and the conclusions regarding the potential impacts from the proposed project are the same as presented in the DEIS. Therefore, this revised NAAQS does not affect the conclusions of this EIS that the proposed project would not result in any significant adverse air quality impacts.

INDUSTRIAL SOURCE ANALYSIS

The analysis indicates that no significant air quality impacts are expected in the year 2010. For specific details of the modeling results, see Section I, "Probable Impacts of the Proposed Project—2016," below.

H. FUTURE WITHOUT THE PROPOSED PROJECT—2016

MOBILE SOURCES ANALYSIS

CO

CO concentrations without the proposed project were determined for the 2016 analysis year using the methodology previously described. Table 14-19 shows future maximum predicted 8-hour average CO concentrations at the analysis intersections without the proposed project (i.e., 2016 No Build values). The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

As shown in Table 14-19, 2016 No Build values are predicted to be lower than existing average concentrations (shown in Table 14-7). The decrease in CO concentrations would primarily result from the increasing proportion of newer vehicles with more effective pollution controls as well as from the continuing benefits of the New York State I&M Program.

Table 14-19
Future (2016) Maximum Predicted 8-Hour Average Carbon Monoxide No Build Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	Atlantic Avenue/Flatbush Avnue/4th Avenue	Weekday PM	5.5
2	Atlantic Avenue and 6th Avenue	Weekday PM	4.1
3	Atlantic Avenue and Carlton Avenue	Weekday PM	4.2
4	Atlantic Avenue and Vanderbilt Avenue	Weekday PM	5.1
5	Dean Street and 6th Avenue	Weekday PM	3.0
6	Dean Street and Vanderbilt Avenue	Weekday PM	3.5
7	Tillary Street and Flatbush Avenue	Weekday PM	5.3
Note: 8-hour standard is 9 ppm.			

PM

PM concentrations without the proposed project were determined for the 2016 analysis year using the methodology previously described. Tables 14-20 and 14-21 present the future maximum predicted 24-hour and annual average PM_{10} and $PM_{2.5}$ concentrations, respectively, at the analysis intersections without the proposed project (i.e., 2016 No Build values). The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

Table 14-20
Future (2016) Maximum Predicted No Build 24-Hour and Annual PM_{10} Concentrations

Receptor Site	Location	24-Hour Concentration (μg/m^3)	Annual Average Concentration (μg/m^3)
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	62.06	25.63
5	Dean Street and 6th Avenue	55.57	22.70
Note: National Ambient Air Quality Standards—24-hour, 150 μg/m^3; annual average, 50 μg/m^3 (annual standard revoked, effective December 18, 2006).			

Table 14-21
Future (2016) Maximum Predicted No Build 24-Hour and Annual $PM_{2.5}$ Concentrations

Receptor Site	Location	24-Hour Concentration (μg/m^3)	Annual Average Concentration (μg/m^3)
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	41.75	15.50
5	Dean Street and 6th Avenue	41.36	15.32
Note: National Ambient Air Quality Standards—Annual average, 15 μg/m^3; EPA has lowered the 24-Hour NAAQS to 35 μg/m^3, effective December 18, 2006.			

STATIONARY SOURCE ANALYSIS

In the future without the proposed project, it is assumed that the uses currently on the project site would remain. HVAC emissions would likely be lower in the No Build condition. Emissions from industrial uses would be anticipated to be greater in the No Build condition, since the proposed project would displace existing businesses on the project site.

I. PROBABLE IMPACTS OF THE PROPOSED PROJECT—2016

The proposed project in 2016 would result in increased mobile source emissions in the immediate vicinity of the project study area and could also affect the surrounding community with emissions from HVAC equipment and parking facilities. The following sections describe the results of the studies performed to analyze the potential impacts on the surrounding community from these sources for the 2016 analysis year. In addition, existing industrial facilities were assessed for potential adverse impacts on the proposed project's buildings.

MOBILE SOURCES ANALYSIS

CO

CO concentrations with the proposed project were determined for the 2016 analysis year at traffic intersections using the methodology previously described. Table 14-22 shows the future maximum predicted 8-hour average CO concentration with the proposed project at the seven intersections studied. (No 1-hour values are shown since no exceedances of the standard would occur and the *de minimis* criteria are only applicable to 8-hour concentrations. Therefore, the 8-hour values are the most critical for impact assessment.) The values shown are the highest predicted No Build and Build concentrations for any of the time periods analyzed. The results indicate that the proposed project would not result in any violations of the CO standard or any significant impacts using the *de minimis* criteria for CO impacts described above at the receptor locations.

Table 14-22
Future (2016) Maximum Predicted 8-Hour Average
No Build and Build Carbon Monoxide Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)	
			No Build	Build
1	Atlantic Avenue/Flatbush Avnue/4th Avenue	Weekday PM	5.5	6.1
2	Atlantic Avenue and 6th Avenue	Weekday PM	4.1	4.1
		Weekend Post-game	3.9	4.0
3	Atlantic Avenue and Carlton Avenue	Weekday PM	4.2	4.2
		Weekend Post-game	3.7	4.0
4	Atlantic Avenue and Vanderbilt Avenue	Weekday PM	5.1	5.4
		Weekend Post-game	4.4	4.8
5	Dean Street and 6th Avenue	Weekend Post-game	3.0	3.8
6	Dean Street and Vanderbilt Avenue	Weekday PM	3.5	3.6
		Weekend Post-game	3.1	3.4
7	Tillary Street and Flatbush Avenue	Weekday PM	5.3	5.9

Notes:
8-hour standard is 9 ppm.
Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No Build 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No Build) concentrations and the 8-hour standard, when No Build concentrations are below 8.0 ppm.

PM

PM concentrations with the proposed project were determined for the 2016 analysis year using the methodology previously described. Tables 14-23 and 14-24 present the future maximum predicted 24-hour and annual average PM_{10} concentrations with the proposed project, respectively.

The values shown are the highest predicted concentrations for any of the time periods analyzed. The results indicate that the proposed project would not result in any violations of the PM_{10} 24-hour or annual standard and, therefore, the proposed project would not result in any significant adverse PM_{10} impacts at any of the receptor locations analyzed.

Table 14-23
Future (2016) Maximum Predicted
24-Hour Average PM_{10} Concentrations

Receptor Site	Location	24-Hour Concentration (µg/m³)[1]	
		No Build	Build
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	62.06	62.79
5	Dean Street and 6th Avenue	55.57	65.23
Note: [1] National Ambient Air Quality Standards—24-hour, 150 µg/m³.			

Table 14-24
Future (2016) Maximum Predicted
Annual Average PM_{10} Concentrations

Receptor Site	Location	Annual Concentration (µg/m³)[1]	
		No Build	Build
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	25.63	25.81
5	Dean Street and 6th Avenue	22.70	25.05
Note: [1] National Ambient Air Quality Standards—annual average, 50 µg/m³ (NAAQS revoked, effective December 18, 2006).			

Future maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations with the proposed project were determined. The mobile source $PM_{2.5}$ analysis also determined the maximum predicted incremental impacts, so that they could be compared to the interim guidance criteria that would determine the potential significance of the proposed project's impacts. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in Tables 14-25 and 14-26, respectively.

Table 14-25
Future (2016) Maximum Predicted
24-Hour Average $PM_{2.5}$ Concentrations

Receptor Site	Location	24-Hour Concentration (µg/m³)		
		No Build	Build	Increment
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	41.75	41.84	0.09
5	Dean Street and 6th Avenue	41.36	42.15	0.79
Notes: EPA has lowered the NAAQS to 35 µg/m³, effective December 18, 2006. $PM_{2.5}$ interim guidance criteria—annual average (neighborhood scale), 0.1 µg/m³. The differences between No Build and Build are due to rounding.				

Table 14-26
Future (2016) Maximum Predicted Annual Average $PM_{2.5}$ Concentrations

Receptor Site	Location	Annual Concentration ($\mu g/m^3$)		
		No Build	Build	Increment
1	Atlantic Avenue/Flatbush Avenue/4th Avenue	15.50	15.52	0.02
5	Dean Street and 6th Avenue	15.32	15.34	0.02

Notes:
National Ambient Air Quality Standards—annual, 15 $\mu g/m^3$.
$PM_{2.5}$ interim guidance criteria—annual (neighborhood scale), 0.1 $\mu g/m^3$.

The results show that the predicted annual and daily (24-hour) $PM_{2.5}$ increments are predicted to be below the interim guidance criteria and, therefore, the proposed project would not result in significant $PM_{2.5}$ impacts at the analyzed receptor locations.

PARKING FACILITIES

A screening analysis was performed to assess potential impacts from parking garages. In 2016, the parking garage with the greatest capacity would be at Block 1129; therefore, maximum CO concentrations were determined from this parking facility, as well as Site 5. Based on the methodology previously discussed, the maximum overall predicted future CO concentrations, including ambient background levels and contributions from nearby on-street traffic, at the nearest sidewalk receptor location were determined (see Table 14-27). As in the 2010 analysis (see Section G., "Probable Impacts of the Proposed Project—2010", above), the location of the garage's exhaust vent(s) at Site 5 would be restricted to a minimum height of 20 feet above grade. As shown in Table 14-27, the maximum predicted CO levels are below the applicable CO standards and, therefore, no significant adverse impacts from the proposed project's parking garages are expected.

Table 14-27
Future (2016) Maximum Predicted 8-Hour Average Carbon Monoxide Concentrations from Parking Garage

Parking Site	Parking Garage Concentration (ppm)		Cumulative Impact	
	1-hour	8-hour	1-hour	8-hour
Site 5	3.9	1.2	12.3	7.2
Block 1129	2.4	2.0	7.5	5.3

Notes:
Cumulative impact includes concentration from garage, on-street contribution (CAL3QHC modeling) and background.
1-hour standard is 35 ppm. 8-Hour standard is 9 ppm.

STATIONARY SOURCES

HVAC SYSTEMS

Table 14-28 compares maximum ground-level concentrations of NO_2, SO_2, CO, PM_{10} and $PM_{2.5}$ with EPA-defined SILs. The results indicate that maximum concentrations from project stack emissions at ground-level receptor locations would be below EPA significant impact levels. This indicates that ambient air quality would not be significantly affected by the proposed project for these pollutants.

Table 14-28
Future (2016) Maximum Modeled Ground-Level Pollutant Increments (μg /m³)

Pollutant	Averaging Period	Maximum Predicted Increment	EPA SIL	NAAQS
NO_2 [1]	Annual	0.28	1	100
SO_2	3-hour	5.2	25	1,300
	24-hour	0.79	5	365
	Annual	0.02	1	80
CO	1-hour	42.6	500	40,000
	8-hour	13.4	100	10,000
PM_{10}	24-hour	1.4	5	150
	Annual	0.16	1	50
$PM_{2.5}$	24-hour	1.4	- [2]	65 (3)
	Annual	0.16	- [2]	15)

Notes:
[1] NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.55.
[2] Pending promulgation of $PM_{2.5}$ regulations, EPA has recommended use of the permitting regulations applicable to PM_{10} emission sources and thus applies the PM_{10} 24-hour SIL of 5 μg/m³ and the annual PM_{10} SIL of 1 μg/m³ for permitting of PM_{10} and $PM_{2.5}$ emission sources.
[3] EPA has lowered the NAAQS for $PM_{2.5}$ to 35 μg/m³, effective December 18, 2006..

Maximum predicted concentration increments from HVAC equipment, and overall concentrations including background concentrations, are presented in Table 14-29 and Table 14-30, respectively.

Table 14-29
Future (2016) Maximum Modeled Stationary Source Pollutant Increments (μg /m³)

Pollutant	Averaging Period	Maximum Predicted Increment		$PM_{2.5}$ Interim Guidance Criteria/EPA SIL
		On-Site [1]	Off-Site [2]	
NO_2 [3]	Annual	0.75	0.30	1
SO_2	3-hour	24.5	5.2	25
	24-hour	3.2	0.8	5
	Annual	0.06	0.02	1
CO	1-hour	247.3	74.0	500
	8-hour	69.1	26.8	100
PM_{10}	24-hour	< 5.0	2.7	5
	Annual	0.43	0.17	1
$PM_{2.5}$	24-hour	< 5.0	2.7	5
	Annual (Discrete)	0.43	0.17	0.3
	Annual (Neighborhood Scale)	0.033		0.1

Notes:
[1] Maximum on-site increments represent the maximum modeled concentrations occurring at elevated receptors on the project site.
[2] Maximum off-site increments represent the maximum modeled concentrations occurring at ground-level receptors, and at off-site elevated receptors.
[3] NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.55.

Table 14-30
Future (2016) Maximum Modeled
Stationary Source Pollutant Concentrations (μg /m^3)

Pollutant	Averaging Period	Maximum Predicted Increment	Maximum Background Concentration	Total Concentration	NAAQS
NO_2 [1]	Annual	0.75	72	72.8	100
SO_2	3-hour	24.5	202	226.5	1,300
	24-hour	3.2	123	126.2	365
	Annual	0.06	37	37.1	80
CO	1-hour	247.3	4,581	4,828	40,000
	8-hour	69.1	2,863	2,932	10,000
PM_{10}	24-hour	< 5.0	50	< 55.0	150
	Annual	0.43	21	21.4	50 (2)
$PM_{2.5}$	24-hour	< 5.0	40.8	< 45.8	35 (3)
	Annual	0.43	15.3	15.7	15

Notes:
[1] NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.55.
[2] EPA revoked the annual NAAQS for PM_{10}, effective December 18, 2006.
[3] EPA has lowered the NAAQS for $PM_{2.5}$ to 35 μg/m^3, effective December 18, 2006.

Table 14-30 shows maximum predicted concentrations. As shown in the table, for NO_2, SO_2, CO, and PM_{10}, the maximum concentrations from stack emissions, when added to background concentrations, would be well below ambient air quality standards.

The air quality modeling analysis also determined the highest predicted increase in 24-hour and annual average $PM_{2.5}$ concentrations from the proposed project's stationary sources. The results showed that at any off-site receptor location, the maximum 24-hour incremental impact would be less than the applicable interim guidance criterion of 5 μg/m^3, while the projected $PM_{2.5}$ impacts for the annual period would be less than the DEP interim guidance criterion and NYSDEC $PM_{2.5}$ policy threshold of 0.3 μg/m^3.

Of the 2,522 elevated receptors modeled on project buildings, short-term $PM_{2.5}$ impacts were predicted to exceed the $PM_{2.5}$ interim guidance criteria at a total of 4 locations (on Building 9). An examination of the short-term $PM_{2.5}$ impacts exceeding the $PM_{2.5}$ interim guidance criteria was conducted to compare the modeled boiler operating loads with the anticipated boiler loads (which were estimated based on the actual ambient temperature conditions for these occurrences). This analysis demonstrated that the modeled impacts either occurred during the summer months when the boilers would only be used for hot water heating (and therefore, would be operating at a lower capacity than the modeled load), or during other months under moderate temperature conditions when the proposed project's boilers would also be operating at much less than the load that was modeled. The modeled $PM_{2.5}$ concentrations that were found to exceed 5 μg/m^3 were adjusted based on the ratio of anticipated versus modeled boiler load. The results indicated that there would be no anticipated on-site $PM_{2.5}$ impacts exceeding the short-term $PM_{2.5}$ interim guidance criteria of 5 μg/m^3 (see Table 14-30).

Annual increments exceeding the NYSDEC $PM_{2.5}$ significant impact threshold of 0.3 μg/m^3 were predicted at a total of 13 locations, on the upper floors of the exterior of Buildings 7 and 9. No exceedances of the annual $PM_{2.5}$ significant impact threshold would occur at the locations of air intake manifolds on the proposed project's buildings. The maximum overall increment was estimated to be 0.43 μg/m^3 as shown in Table 14-29. The potential exposure to $PM_{2.5}$ at these locations would be limited since occupants would not be expected to have their windows open continuously and be exposed to outdoor concentrations throughout the year (boiler emissions are highest in the winter when windows would least likely be opened). Furthermore, the maximum predicted $PM_{2.5}$ concentration levels are comparable to ambient levels of $PM_{2.5}$ measured at various locations in New York City over the past several years. The $PM_{2.5}$ incremental concentrations would be below the PM_{10} SIL, a component of the PM_{10} permitting program that EPA has recommended for the permitting of major $PM_{2.5}$ and PM_{10} emission sources pending promulgation of $PM_{2.5}$ permitting regulations.

Increments at off-site receptors were predicted to be below the threshold for potentially significant impacts. An analysis was also conducted to determine the neighborhood-scale annual $PM_{2.5}$ increment. The results of the analysis demonstrated the maximum neighborhood-scale increment was below the DEP interim guidance criterion of 0.1 $\mu g/m^3$ (see Table 14-29).

In addition, maximum 24-hour and annual average $PM_{2.5}$ impacts from the mobile source analysis (see Tables 14-25 and 14-26 above), when added to the maximum ground-level stationary source $PM_{2.5}$ concentrations, would be below the significant impact criteria. This is a conservative method of calculating cumulative impacts, as the locations of maximum concentration differ for the stationary and mobile sources. Therefore, no significant adverse air quality impacts are predicted from emissions of $PM_{2.5}$ from the proposed project.

As discussed in this FEIS, EPA has revised the PM NAAQS, including lowering the 24-hour $PM_{2.5}$ standard from the current level of 65 $\mu g/m^3$ to 35 $\mu g/m^3$. However, the criteria used to determine whether impacts from the proposed project are potentially significant have not changed, and the conclusions regarding the potential impacts from the proposed project are the same as presented in the DEIS. Therefore, this revised NAAQS does not affect the conclusions of this EIS that the proposed project would not result in any significant adverse air quality impacts.

INDUSTRIAL SOURCE ANALYSIS

As discussed above, a study was conducted to identify manufacturing and industrial uses within 400 feet of the project site. DEP-BEC and EPA permit databases were used to identify existing sources of industrial emissions. A total of two permitted facilities were identified within 400 feet of the project site in the 2016 Build condition.

The screening procedure used to estimate the emissions from these businesses is based on information contained in the operational permits obtained from DEP-BEC and NYSDEC. The information describes potential contaminants emitted by the permitted processes, hours per day and days per year in which there may be emissions (which is related to the hours of business operation), and the characteristics of the emission exhaust systems (temperature, exhaust velocity, height, and dimensions of exhaust).

Table 14-31 presents the maximum impacts at the project site. The table also lists the SGC and AGC for each toxic air pollutant. These results demonstrate that there would be no significant adverse air quality impacts on the proposed project from nearby industrial sources.

Table 14-31
Maximum Predicted Impacts from Industrial Sources

Pollutant	CAS No.	1-Hour (μg/m³)	SGC	Annual (μg/m³)	AGC
Particulate Matter	NY075-00-0	14.66	380	0.029	50
N-Methylpyrrolidone	00872-50-4	31.42	---	0.00083	100
Solvent Naptha Light Aromatic	64742-95-4	31.42	---	0.00008	---
Polytetrafluoroethylene [1]	09002-84-0	31.42	---	0.00083	---
MIBK	00108-10-1	31.42	31,000	0.00500	3,000
Xylene	01330-20-7	31.42	4,300	0.00250	100
Ethyl Benzene	00100-41-4	31.42	54,000	0.00083	1,000

Notes:
AGC- Annual Guideline Concentrations
SGC- Short-term Guideline Concentrations
[1] Polytetrafluoroethylene (PTFE) is a concern due to its products of decomposition when heated above 360°C, which have an AGC value of 0.00002 (ug/m³). However, the process which utilizes products containing this compound is conducted at room temperature; therefore, the AGC for its byproducts is not applicable.
Source:
NYSDEC DAR-1(Air Guide-1) AGC/SGC Tables, December 2003.

✷