A. INTRODUCTION

This chapter examines the potential for air quality impacts from the Proposed Project. Air quality impacts can be either direct or indirect. Direct impacts stem from air contaminant emissions generated by stationary sources at a proposed development site, such as emissions from fuel burned on site for heating, ventilation, and air conditioning (HVAC) systems. Indirect impacts are caused by potential emissions from nearby existing stationary sources and the potential for emissions due to mobile sources/vehicles generated by the project. The Proposed Project will include the potential for both direct and indirect impacts.

The Proposed Project would also include a public parking garage. Ventilation of air from the garage could potentially result in air quality impacts in the immediate vicinity of the ventilation outlets. In addition, potential effects of stationary source emissions of air toxics from existing nearby industrial facilities on the proposed hotel use will be assessed.

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 carbon monoxide (CO) and lead are predominantly influenced by mobile source emissions. Emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO and NO_2, collectively referred to as NO_x) come from both mobile and stationary sources. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, and sources utilizing non-road diesel such as diesel trains, marine engines, and non-road vehicles such as construction engines, but diesel-powered vehicles, primarily heavy duty trucks and buses, also currently contribute somewhat to these emissions; diesel fuel regulations which will begin to take effect in 2006 will reduce SO_2 emissions from mobile sources to extremely low levels. Particulate matter (PM) is emitted from both stationary and mobile sources. Fine particulate matter is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and volatile organic compounds (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 most CO emissions are from motor vehicles. Since CO is a reactive gas which 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 result in changes in traffic patterns and an increase in traffic volume in the study area and could potentially result in local increases in CO concentrations. Therefore, a mobile source analysis was conducted at critical intersections in the study area to evaluate future CO concentrations with and without the Proposed Project. A parking garage analysis was also conducted to evaluate future CO concentrations with the operation of the proposed parking garage.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOC, 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 carried 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 direct contribution of the Proposed Project to regional emissions of these pollutants would include any added stationary source emissions. The potential change in regional mobile source emissions of these pollutants due to the Proposed Project is related to the total vehicle miles traveled added or subtracted on various roadway types throughout the New York and New Jersey metropolitan area, which is designated as a severe non-attainment area for ozone by United States Environmental Protection Agency (USEPA).

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 is predicted. An analysis of project related emissions of these pollutants from mobile sources was not warranted.

However, potential impacts from the fuel to be burned for the Proposed Project's HVAC systems were evaluated.

LEAD

Lead emissions in air are 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, USEPA announced new rules drastically reducing 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. 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, analysis was not warranted.

RESPIRABLE PARTICULATE MATTER—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). Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, as well as wood–burning stoves and fireplaces. Particulate matter also acts as a substrate for the adsorption of other pollutants, often toxic and some likely carcinogenic compounds.

As described below, respirable 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 $PM_{2.5}$. $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorbed to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary particulate matter (often soon after the release from an exhaust pipe or stack) or from precursor gases reacting in the atmosphere to form secondary PM.

Diesel–powered vehicles, especially heavy duty trucks and buses, are a significant source of respirable PM. PM_{10} and $PM_{2.5}$ concentrations may, consequently, be locally elevated near roadways with high volumes of heavy diesel–powered vehicles. The proposed project will increase the number of diesel powered vehicles and could potentially result in local increases of respirable PM concentrations. Therefore, an analysis of potential impacts from PM_{10} and $PM_{2.5}$ was conducted at critical intersections in the study area.

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 the national standards. Vehicular sources of SO_2 are not significant and therefore, an analysis of this pollutant from mobile sources was not warranted.

As part of the Proposed Project, only natural gas (not No. 2 fuel oil) would be burned by the HVAC system boilers. Therefore, potential future levels of SO_2 from the HVAC systems were not examined.

AIR TOXICS

In addition to the criteria pollutants discussed above, air toxics from industrial sources are of concern. Industrial source emissions of air toxics are regulated by the USEPA. However, federal ambient air quality standards do not exist for air toxics. The New York State Department of Environmental Conservation (NYSDEC) has issued standards for certain air toxic compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. NYSDEC has also developed 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.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the Clean Air Act, primary and secondary 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. Primary standards set limits to protect public health, including the health of 'sensitive' populations such as asthmatics, children, and the elderly. 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. For NO_2, ozone, lead and PM, the primary and secondary standards are the same; there is no secondary standard for CO. USEPA promulgated additional NAAQS which became effective September 16, 1997: a new 8–hour standard for ozone, which will replace the existing 1–hour standard, and in addition to retaining the PM_{10} standards, USEPA adopted 24–hour and annual standards for $PM_{2.5}$. The standards for these pollutants are presented in Table 18–1. These standards have also been adopted as the ambient air quality standards for New York State.

STATE IMPLEMENTATION PLAN (SIP)

The Clean Air Act, as amended in 1990 (CAA) 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 USEPA, the state is required to develop and implement a State Implementation Plan (SIP), which is a state's plan on how it will meet the NAAQS under the deadlines established by the CAA.

USEPA has recently 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 York City is also committed to implementing site–specific control measures throughout the 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 NAA for PM_{10}. On December 17, 2004, USEPA took final action designating the five boroughs of New York City as well as Nassau, Rockland, Suffolk, Westchester and Orange counties as non-attainment under the NAAQS for $PM_{2.5}$. State and local governments are required to develop implementation plans designed to meet the standards by early 2008.

Table 18–1
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)				
1–Hour Average[2]	0.12	235	0.12	235
8–Hour Average[3]	0.08	157	0.08	157
Total Suspended Particles (TSP)				
Annual Mean Rural Open Space Rural Residential Urban Residential Urban Industrial	NA	 45 55 65 75	None	
Maximum 24–Hour Concentration	NA	250		
Respirable Particulate Matter (PM_{10})				
Average of 3 Annual Arithmetic Means	NA	50	NA	50
24–Hour Concentration[1]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Average of 3 Annual Arithmetic Means	NA	15	NA	15
24–Hour Concentration[4]	NA	65	NA	65
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: 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.
TSP levels are regulated by a New York State Standard only. All other standards are National Ambient Air Quality Standards (NAAQS).
1 Not to be exceeded more than once a year.
2 Applies only to areas designated as Non Attainment.
3 Three–year average of the annual fourth highest daily maximum 8–hr average concentration.
4 Not to be exceeded by the 98th percentile averaged over 3 years.
Sources: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards;
6 NYCRR Part 257: Air Quality Standards.

Nassau, Rockland, Suffolk, Westchester and the five counties of New York City have been designated as severe non–attainment for 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 USEPA effective March 6, 2002, addressing attainment of the one–hour ozone NAAQS by 2007. New York State has recently submitted revisions to the SIP; these SIP revisions included additional emission reductions that USEPA requested to demonstrate attainment of the standard, and an update of the SIP estimates using two new USEPA models—the mobile source emissions model MOBILE6, 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, USEPA designated these same counties as moderate non–attainment for the new 8–hour ozone standard which became effective as of June 15, 2004. USEPA revoked the 1–hour standard in June 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 would 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

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 18-1) would be deemed to have a potential significant adverse impact. In addition, in order 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.

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 the Proposed Project, as set forth in the *City Environmental Quality Review* (CEQR) *Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant environmental impact. 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 Action 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 Action) concentrations and the 8–hour standard, when No Action concentrations are below 8.0 ppm.

DE MINIMIS CRITERIA REGARDING $PM_{2.5}$ IMPACTS

The New York City Department of Environmental Protection (NYCDEP) is currently employing interim guidance criteria for evaluating the potential $PM_{2.5}$ impacts from NYCDEP projects subject to City Environmental Quality Review (CEQR). The interim guidance criteria currently employed by NYCDEP 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 µg/m^3 at a discrete location of public access, either at ground or elevated levels (microscale analysis); and
- Predicted annual average increase in ground–level $PM_{2.5}$ concentrations greater than 0.1 µg/m^3 on a neighborhood scale. Receptors in the annual $PM_{2.5}$ neighborhood scale models are placed at a minimum distance of 15 meters, or at a distance of one meter per 1,000 daily vehicle miles traveled on the roadway, from the nearest moving lane, based on the NYCDEP procedure for neighborhood scale corridor $PM_{2.5}$ modeling.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

The prediction of vehicle–generated CO and PM (PM_{10} and $PM_{2.5}$) concentrations 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 it is necessary to predict the reasonable worst case condition, most of these dispersion models predict conservatively high concentrations of pollutants, particularly under adverse meteorological conditions.

The mobile source analyses for the Proposed Project employs a model approved by USEPA that has 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 ensue from the Proposed Project. The assumptions used in the PM analysis for $PM_{2.5}$ were based on the latest $PM_{2.5}$ draft interim guidance developed by the NYCDEP.

DISPERSION MODEL 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 an algorithm for estimating vehicular queue lengths 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,

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

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 is employed in the CO analysis 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. CAL3QHCR is also used for PM analyses because 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.

Following the USEPA 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 0.70 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, the wind angle that maximized the pollutant concentrations was used in the analysis 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 performed with the CAL3QHCR model, which includes the modeling of hour-by-hour concentrations based on hourly traffic data and five years of monitored hourly meteorological data, was used to predict maximum 24-hour and annual average PM concentrations. The data consists of surface data collected at LaGuardia Airport and upper air data collected at Brookhaven, New York for the period 1999-2003. All hours are modeled, and the highest resulting concentration for each averaging period is presented.

ANALYSIS YEAR

The CO microscale analyses were performed for existing conditions (2004) and the years 2009 and 2014. The year 2009 represents project completion without the hotel and the year 2014 represents project completion with the hotel. The future year analyses were performed both without the Proposed Project (the No Build condition) and with the Proposed Project (the Build condition). The PM analysis was performed for the year 2009 only because the emissions are higher than 2014 and the truck increments are negligible between 2009 and 2014.

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

VEHICLE EMISSIONS DATA

Vehicular CO and PM emission factors were computed using the USEPA mobile source emissions model, MOBILE6.2[1]. This is the most current, recently released emissions model capable of calculating engine emission factors for various vehicle types, based on the fuel (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 the NYSDEC and NYCDEP. An ambient temperature of 43° Fahrenheit was used in accordance with CEQR guidelines.

Vehicle classification data were based on field studies and data obtained from other traffic studies. The general categories of vehicle types for specific roadways were further categorized into subcategories based on their relative fleet-wide breakdown.[2] Appropriate credits were used to accurately reflect the inspection and maintenance program. The inspection and maintenance programs require 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.

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 16, "Traffic and Parking"). Traffic data for the future without and with the Proposed Project were employed in the respective air quality modeling scenarios and included consideration of traffic from nearby Yankee Stadium. The weekday PM (5:15 to 6:15 PM) pre-game and weekend PM (4:00 to 5:00 PM) post-game peak periods were subjected to micro-scale analysis for CO. These time periods were selected for the mobile source analysis because they produce the maximum anticipated project–generated traffic and have poor levels of service and therefore have the greatest potential for significant air quality impacts.

For the $PM_{2.5}$ analysis (considering the highest truck increments) the peak midday (1-2 PM) and PM (5-6 PM) periods for the weekday non-game scenario were used as a baseline. Other hours were determined by adjusting those peak period volumes with the 24 hour distributions of actual vehicle counts collected for the project. The baseline used in the PM_{10} analysis was the same as the peak hours in the CO analysis. When applicable in the project build condition, the parking garage "ins and outs" from the 24 hour parking accumulation tables were used because the critical intersections selected for analysis included the entrance and exit to the project parking garages.

BACKGROUND CONCENTRATIONS

Background concentrations are those pollutant concentrations not directly accounted for through the modeling analysis, which directly accounts for vehicle-generated emissions on the streets

[1] USEPA, User's Guide to MOBILE6.1 and MOBILE6.2: Mobile Source Emission Factor Model, EPA420-R-02-028, October 2002.

[2] 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).

within 1,000 feet and line-of-sight of the receptor location. Background concentrations must be added to modeling results to obtain total pollutant concentrations at a study site.

The 8-hour average background concentration used in this analysis was 2.0 ppm for the 2009 and 2014 predictions. This value, obtained from NYCDEP, is based on CO concentrations measured at NYSDEC monitoring stations. For PM_{10} a value of 46 µg/m^3 was used for the 24-hour averaging period and a value of 20 µg/m^3 was used for the annual averaging period. Both values represent the highest of the latest three years measured at the IS-52 NYSDEC monitoring station. For $PM_{2.5}$, background concentrations are not considered, since impacts are determined on an incremental basis only.

MOBILE SOURCE ANALYSIS SITES

A total of four analysis sites were selected for microscale analysis (see Table 18-2). 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 greatest air quality impacts and maximum changes in the concentrations would be expected. (Sites 1 through 3 were analyzed for CO, only Site 2 was analyzed for PM_{10}, and only Site 4 was analyzed for $PM_{2.5}$.)

Table 18-2
Mobile Source Analysis Intersection Locations

Analysis Site	Location	Pollutants
1	E. 161st Street and Grand Concourse	CO
2	E. 151st Street and River Ave	CO/PM_{10}
3	E.149th Street and River Ave/Exterior St.	CO
4	Exterior Street and Project Site Parking Garages	$PM_{2.5}$

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. The receptors were placed at sidewalk or roadside locations near intersections with continuous public access. For $PM_{2.5}$ annual impacts, receptors were placed at a distance of 15 meters from the nearest moving lane (i.e., neighborhood scale).

PARKING GARAGE

The Proposed Project would result in the operation of two public parking garages. One would be a 256-space mechanically vented public parking garage below Retail Building B/F. The second would be a 2,342-space multi-level and naturally ventilated public parking garage between Retail Building C (on the exterior street level) and Retail Building D (on the River Avenue level). Emissions from vehicles using the parking garages could potentially affect ambient levels of CO in the immediate vicinity of the ventilation outlets. An analysis was performed using the methodology set forth in the *CEQR Technical Manual* Appendices 1 and 3.

Emissions from vehicles entering, parking, and exiting the garage were estimated using the USEPA MOBILE6.2 mobile source emission model and an ambient temperature of 43°F. For all arriving and departing vehicles, an average speed of five miles per hour was conservatively assumed for travel within the parking garages. In addition, all departing vehicles were assumed to idle for 1 minute before proceeding to the exit. The concentration of CO within the mechanically vented garage was calculated assuming a minimum ventilation rate, based on New York City

Building Code requirements, of one cubic foot per minute of fresh air per gross square foot of garage area. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period. (No exceedances of the 1-hour standard would occur, and the 8-hour values are the most critical for impact assessment since no violations of the 1-hour standard have been measured in New York City within the last 10 years.)

The CO concentrations were determined for the time periods when overall garage usage would be the greatest, considering the hours when the greatest number of vehicles would exit the facility. 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 garage analysis were derived from the trip generation analysis described in the traffic section of the EIS.

STATIONARY SOURCES

A stationary source analysis was conducted to evaluate potential impacts from the Proposed Project due to the project's HVAC systems. In addition, an assessment was conducted to determine the potential for impacts due to industrial activities within the project area.

HVAC ANALYSIS

An analysis of potential air quality impacts from the HVAC system boilers for the Proposed Project was performed using the Industrial Source Complex Short Term (ISCST3) dispersion model developed by USEPA, and described in *User's Guide for the Industrial Source Complex (ISC3) Dispersion Models* (USEPA-454/B-95-003a). The ISCST3 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 ISCST3 analyses of potential impacts from exhaust stacks were made assuming stack tip downwash, buoyancy-induced dispersion, gradual plume rise, urban dispersion coefficients and wind profile exponents, no collapsing of stable stability classes, and elimination of calms. ISCST3 was run both with and without the building downwash algorithms enabled and with PRIME algorithms to determine impacts within the building cavity zone. The meteorological data set consisted of the latest 5 years of meteorological data that are available: surface data collected at LaGuardia Airport (1999-2003) and concurrent upper air data collected at Brookhaven, New York.

The stack exit for the HVAC boilers were placed on the roof of each proposed building at locations closest to the proposed hotel (a sensitive receptor) and on the east-side of the project site closer to nearby sensitive uses. The stack locations for each proposed building are presented in Figure 18-1. The current design for the proposed hotel includes individually heated units, rather than central heating. The analysis assumes a single exhaust stack for the hotel heating system on the roof. This is a conservative assumption since it concentrates the source emissions at a single point.

The HVAC analysis includes two impact scenarios. The first scenario determines the impacts of each HVAC stack from the retail buildings on the proposed hotel (project-on-project impacts). The second scenario determines the impacts of each stack including the proposed hotel on all other receptors used in the analysis (see below).

A receptor grid was generated for the analysis that included 100 meter spacing out to 0.5 kilometers (km) and 500 meter spacing from 0.5 km out to 2.5 km. Additional discrete receptors within 0.4 km were placed at educational facilities and parks. Since the proposed hotel will be a sensitive receptor itself, receptors were placed on the hotel's facade at multiple elevations. This is modeled, not real. Also, due to the height of the HVAC stack on the hotel, additional receptors were placed at elevated locations on residential buildings of 18 stories or higher within 1 km of the project site.

The HVAC systems for the proposed development sites will use natural gas as fuel, with a minor electrical component. The pollutant of concern when burning natural gas is nitrogen oxides (NO_X). In addition, $PM_{2.5}$ impacts were considered in the analysis. Emission rates of NO_X from HVAC boilers were calculated using natural gas combustion emission factors obtained from Section 1.4 of USEPA's AP-42. The emission factors were multiplied by fuel consumption to obtain maximum hourly emission rates. Estimates of fuel consumption were based on the proposed size (in square feet) of each development site and values for fuel usage presented in the *CEQR Technical Manual*. The annual average NO_2 impacts from the Proposed Project were conservatively calculated assuming that all of the nitrogen oxides emitted by these operations were NO_2. The estimated emission rates and stack parameters used for the analysis are provided in Table 18-3 below.

Table 18-3
Emission Rates and Stack Heights for Proposed Development Sites

Development Site	Parameter			
	Annual Avg. NO_x Emission Rate (g/sec)	Annual Avg. $PM_{2.5}$ Emission Rate (g/sec)	Peak 24-hour $PM_{2.5}$ Emission Rate (g/sec)	Stack Height (feet)
Retail Building A	3.54E-02	2.69E-03	9.83E-03	84
Retail Building B/F	3.30E-02	2.51E-03	9.15E-03	96
Retail Building C	1.57E-03	1.20E-04	4.37E-04	71.5
Retail Building D	6.26E-04	4.75E-05	1.74E-04	50
Retail Building E.1/E.2	2.12E-03	1.61E-04	5.87E-04	35
Proposed Hotel	1.88E-02	1.43E-03	5.21E-03	230

The Proposed Project also would include the installation of an emergency generator which would be fueled by No. 2 oil. The generator would be used in the event of the sudden loss of power from the electrical grid. Occasionally, the generator would be tested for a short period of time to ensure its availability and reliability in the event of an actual emergency. Emergency generators are exempt from NYSDEC air permitting requirements, but would likely require a registration issued by NYCDEP. The emergency generator would be installed and operated in accordance with NYCDEP requirements, as well as other applicable codes and standards. Potential air quality impacts from the emergency generator are considered insignificant since the emergency generator would be used only for testing purposes outside of an actual emergency, and the frequency and duration of such tests would be minimal.

BACKGROUND CONCENTRATIONS

To estimate the maximum expected total pollutant concentrations at a given receptor, the predicted levels were added to corresponding background concentrations (See Table 18-4). The background levels were based on concentrations monitored at the nearest NYSDEC ambient air monitoring station. The measured background concentration was added to the predicted contribution from the modeled source to determine the maximum predicted total pollutant concentration. It was conservatively

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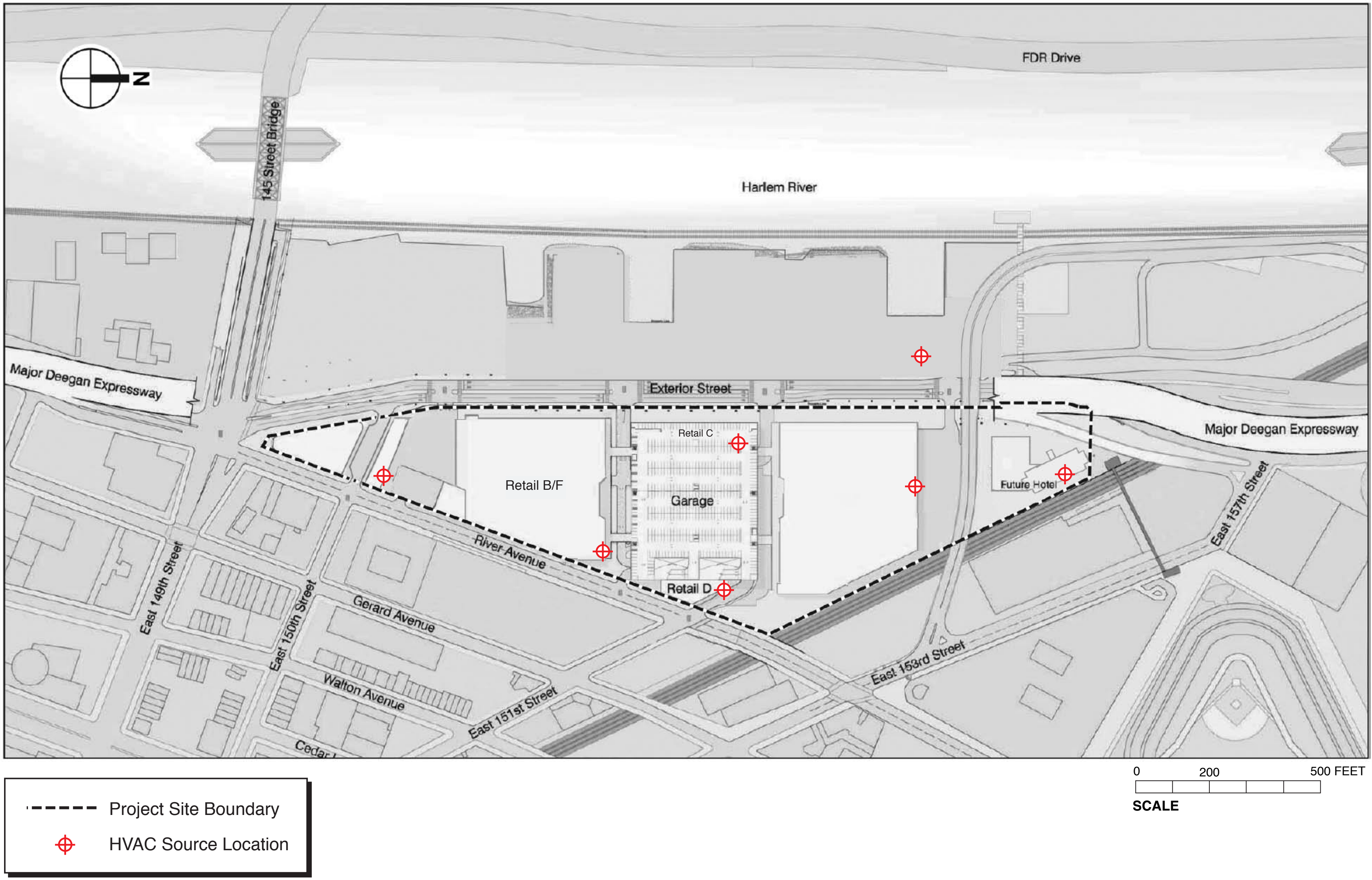

Figure 18-1
Air Quality Analysis—HVAC Source Locations

assumed that the maximum background concentrations occur on all days. For $PM_{2.5}$ background concentrations are not considered, since impacts are determined on an incremental basis only.

Table 18-4
Maximum Background Pollutant Concentration

Pollutant	Average Period	Location	Concentration (μg/m^3)	NAAQS (μg/m^3)
NO_2	Annual	IS52, The Bronx	60	100
Sources: 2001-2003 Annual New York State Air Quality Report Ambient Air Monitoring System, NYSDEC				

INDUSTRIAL SOURCES

Pollutants emitted from the exhaust vents of existing permitted industrial facilities were examined to identify potential adverse impacts on the proposed hotel associated with the Proposed Project.

Screening

Potential effects from existing industrial operations in the surrounding area on the Proposed Project were analyzed. All industrial air pollutant emission sources within 400 feet of the proposed project boundaries were considered for inclusion in the air quality impact analyses.

A request was made to NYCDEP's Bureau of Environmental Compliance (BEC) to obtain the most current information regarding the release of air pollutants from all existing manufacturing or industrial sources within the entire study area. The BEC air permit data provided was compiled into a database of source locations, air emission rates, and other data pertinent to determining source impacts. A comprehensive search was also performed to identify NYSDEC Title V permits and permits listed in the USEPA Envirofacts database.[1] Facilities that appeared in the Envirofacts database but did not also possess a NYCDEP certificate to operate were cross-referenced against NYSDEC's Air Guide-1 software emissions database, which presents a statewide compilation of permit data for toxic air pollutants, to obtain emissions data and stack parameters.

A field survey was conducted on September 22, 2004, to determine the operating status of permitted industries and identify any potential industrial sites not included in the permit databases. The results of the field survey were compared against BEC data sources.

The potential ambient concentrations of each air toxic contaminant were determined using a screening database from the USEPA Industrial Source Complex (ISC3) dispersion model. 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. These guideline concentrations present the airborne concentrations, which are applied as a screening threshold to determine if the users of the proposed hotel could be significantly impacted by nearby sources of air pollution.

[1] USEPA, Envirofacts Data Warehouse, http://oaspub.epa.gov/enviro/ef_home2.air.

E. EXISTING CONDITIONS

EXISTING MONITORED AIR QUALITY CONDITIONS (2003)

Monitored background data were utilized to determine the background. Monitored concentrations of CO, SO_2, particulate matter, NO_2, lead, and ozone ambient air quality data for the area are shown in Table 18-5. These values are the most recent monitored data that have been made available by NYSDEC for nearby monitoring stations. There were no monitored violations of the NAAQS for the pollutants at these sites in 2003.

Table 18-5
Representative Monitored Ambient Air Quality Data

Pollutants	Location	Units	Period	Concentrations			Number of Exceedances of Federal Standard	
				Mean	Highest	Second Highest	Primary	Secondary
CO	Botanical Gardens	ppm	8-hour	-	2.2	2.2	0	-
			1-hour	-	4.1	3.4	0	
SO_2	IS 52	ppm	Annual	0.011	-	-	0	-
			24-hour	-	0.052	0.051	0	-
			3-hour	-	0.089	0.080	-	0
Respirable Particulates (PM_{10})	IS 52	μg/m^3	Annual	22	-	-	0	0
			24-hour	-	60	46	0	0
Respirable Particulates ($PM_{2.5}$)	IS 52	μg/m^3	Annual	14.8	-	-	-	-
			24-hour	-	52	51.1	-	-
NO_2	IS 52	ppm	Annual	0.03	-	-	0	0
Lead	Susan Wagner	μg/m^3	3-month	-	0.01	0.01	0	-
O_3	IS 52	ppm	1-hour	-	0.109	0.107	0	0

Source: 2003 Annual New York State Air Quality Report, NYSDEC 2004 (Draft).

PREDICTED EXISTING POLLUTANT CONCENTRATIONS

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 18-6 shows the maximum predicted existing (2004) CO 8-hour average concentrations at these intersections. (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 18-6
(2004) Maximum Predicted 8-Hour
Average Carbon Monoxide Existing Concentrations
(parts per million)

Site	Location	Time Period	Existing 8-Hour Concentration (ppm)
1	161st Street and Grand Concourse	Weekday PM	4.9
		Saturday PM	5.2
2	151st Street and River Ave	Weekday PM	3.5
		Saturday PM	3.8
3	149th Street and River Ave/Exterior St.	Weekday PM	6.5
		Saturday PM	6.5

Notes:
8-hour CO standard is 9 ppm.
An adjusted ambient background concentration of 2.0 ppm is included in the no build values presented above.

F. THE FUTURE WITHOUT THE PROPOSED ACTIONS

MOBILE SOURCE ANALYSIS

CO

CO concentrations without the Proposed Project were determined for the 2009 and 2014 analysis years using the methodology previously described. Table 18-7 presents the future maximum predicted 8-hour average CO concentrations without the Proposed Project (i.e., 2009 and 2014 No Build values) at the analysis intersections in the project study area. The values shown are the highest predicted concentrations for the receptor locations for each of the time periods analyzed. As indicated in the table, the No Build concentrations are below the corresponding standard of 9 ppm.

PM_{10}

PM_{10} concentrations without the Proposed Project were determined for the 2009 analysis year using the methodology previously described for the intersection of 151st Street and River Avenue. As indicated in Table 18-8, the No Build concentrations are below the corresponding standards of 150 $\mu g/m^3$ and 50 $\mu g/m^3$ for the 24-hour and annual averaging periods, respectively.

Table 18-7
Future (2009 & 2014) Maximum Predicted 8-Hour Average Carbon Monoxide No Build Concentrations (parts per million)

Site	Location	Time Period	2009 No Build 8-Hour Concentration (ppm)	2014 No Build 8-hour Concentration (ppm)
1	161st Street and Grand Concourse	Weekday PM	4.2	3.9
		Saturday PM	3.4	3.2
2	151st Street and River Ave	Weekday PM	2.9	2.8
		Saturday PM	3.1	2.8
3	149th Street and River Ave/Exterior St.	Weekday PM	4.6	4.5
		Saturday PM	4.7	4.5

Notes:
8-hour CO standard is 9 ppm.
An adjusted ambient background concentration of 2.0 ppm is included in the no build values presented above.

Table 18-8
No Build (2009) Maximum Predicted PM_{10} Concentrations

Site	Location	24-Hour Concentration μg/m³	Annual Concentration μg/m³
2	151st Street and River Avenue	50.28	21.78

Note: 24-hour standard 150 $\mu g/m^3$; Annual standard 50$\mu g/m^3$. Includes background concentrations of 46 $\mu g/m^3$ and 22 $\mu g/m^3$ for the 24-hour and annual averaging periods, respectively.

G. PROBABLE IMPACTS OF THE PROPOSED ACTIONS

INTRODUCTION

The Proposed Project would result in increased mobile source emissions in the immediate vicinity of the project site. The Proposed Project could also affect the surrounding community with emissions from HVAC equipment. The following sections present the results of the studies performed to analyze the potential impacts on the surrounding community from project related sources.

MOBILE SOURCE ANALYSIS

CO

CO concentrations with the Proposed Project were determined for the 2009 and 2014 analysis years using the methodology previously described. Tables 18-9 and 18-10 present the future maximum predicted 8-hour average CO concentration with the Proposed Project (i.e., 2009 and 2014 Build Values) at the three intersections studied. Since no violations of the 1 hour CO standard have been measured in New York City within the last 10 years, 1–hour averages were not summarized in this report (although all 1–hour predicted CO concentrations would be well within the applicable standard).

Table 18-9
Future (2009) Maximum Predicted 8-Hour Average Carbon Monoxide Project Build Concentrations (parts per million)

Site	Location	Time Period	2009 Project Build 8-Hour Concentration[a] (ppm)	Not-To-Exceed *De minimis* Criteria[b] (ppm)
1	161st Street and Grand Concourse	Weekday PM	4.3	6.6
		Saturday PM	3.8	6.2
2	151st Street and River Ave	Weekday PM	3.3	6.0
		Saturday PM	3.7	6.0
3	149th Street and River Ave/Exterior St.	Weekday PM	4.9	6.9
		Saturday PM	4.8	6.9

Notes:
a An adjusted ambient background concentration of 2.0 ppm is included in the project build values presented above.
b The not-to-exceed value is derived by adding the minimum acceptable increase of CO concentrations (set forth in the *CEQR Technical Manual*) to the No Build concentration.
8-hour CO standard is 9 ppm.

Table 18-10
Future (2014) Maximum Predicted 8-Hour Average Carbon Monoxide Project Build Concentrations (parts per million)

Site	Location	Time Period	2014 Project Build 8-Hour Concentration[a] (ppm)	Not-To-Exceed *De minimis* Criteria[b] (ppm)
1	161st Street and Grand Concourse	Weekday PM	3.9	6.4
		Saturday PM	3.2	6.1
2	151st Street and River Ave	Weekday PM	2.8	5.9
		Saturday PM	2.8	5.9
3	149th Street and River Ave/Exterior St.	Weekday PM	4.5	6.7
		Saturday PM	4.5	6.8

Notes:
a An adjusted ambient background concentration of 2.0 ppm is included in the project build values presented above.
b The not-to-exceed value is derived by adding the minimum acceptable increase of CO concentrations (set forth in the *CEQR Technical Manual*) to the No Build concentration.
8-hour CO standard is 9 ppm.

The values shown are the highest predicted concentration for each of the time periods analyzed. Also shown in the tables is the *de minimis* criteria used to determine the significance of the incremental increase in CO concentrations that would result from the Proposed Project. The *de minimis* criteria are derived using procedures outlined in the *CEQR Technical Manual* (2001) that set a minimum allowable change in 8-hour average CO concentrations due to the Proposed Project.

The results indicate that in the future with the Proposed Project, there would be no potentially significant adverse mobile source air quality impacts (i.e., *de minimis* criteria were not exceeded). In addition, with or without the Proposed Project in 2009 or 2014, maximum predicted ambient CO concentrations at the intersections analyzed would be less than the corresponding ambient air quality standards.

PM_{10}

PM_{10} concentrations with the proposed project were determined for the 2009 analysis year using the methodology previously described. As indicated in Table 18-11, the Build concentrations are below the corresponding standards of 150 µg/m^3 and 50 µg/m^3 for the 24-hour and annual averaging periods, respectively.

Table 18-11
Build (2009) Maximum Predicted PM_{10} Concentrations

Site	Location	24-Hour Concentration µg/m^3	Annual Concentration µg/m^3
2	151st Street and River Avenue	53.18	22.62
Note: 24-hour standard 150 µg/m^3; Annual standard 50µg/m^3. Includes background concentrations of 46 µg/m^3 and 22 µg/m^3 for the 24-hour and annual averaging periods, respectively.			

$PM_{2.5}$

$PM_{2.5}$ concentrations with and without the Proposed Project were determined for the year 2009 using the methodology previously described. The results of this analysis are presented in Table 18-12 for the 24-hour and annual time periods. As indicated in the table, the predicted incremental increases of $PM_{2.5}$ concentrations for both time periods are under the corresponding interim guidance levels. Therefore, the Proposed Project is not considered to have significant $PM_{2.5}$ impacts.

Table 18-12
Future (2009) Maximum Predicted $PM_{2.5}$
Incremental Increases (µg/m^3)

Site	Location	Averaging Period	Modeled Conc.		Project Increment	Interim Guidance Threshold
			With Project	Without Project		
4	Exterior Street and Garage	24-hour	0.85	0.10	0.75	5
		Annual	0.092	0.033	0.059	0.1

PARKING GARAGE

Based on the methodology previously described, the maximum predicted 8-hour average CO concentrations from the two proposed parking facilities were analyzed using two receptor points: a near side receptor on the same side of the street as the parking facility and a far side receptor on the opposite side of the street from the parking facility. The total CO impacts included both background CO levels and contributions from traffic on adjacent roadways. When more than one roadway was adjacent to the parking facility, the roadway with higher traffic (i.e., greater CO levels) was used in the analysis.

For the 2,342-space multi-level, naturally ventilated parking garage between Retail Buildings C and D, the predicted CO concentrations at the near and far receptors analyzed on River Avenue are 0.27 ppm and 0.39 ppm, respectively. Therefore, including a background level of 2.0 ppm and on-street traffic with an estimated CO concentration of 0.46 ppm for the far receptor, the maximum predicted 8-hour average CO concentrations with the Proposed Project would be 2.23 ppm for the near receptor, and 2.84 ppm for the far receptor.

For the 256 space, mechanically ventilated parking garage below Retail Building B/F, the predicted CO concentrations at the near and far receptors analyzed on Exterior Street are 0.23 ppm and 0.10 ppm, respectively. Therefore, including a background level of 2.0 ppm and on-street traffic with an estimated CO concentration of 0.28 ppm for the far receptor, the maximum predicted 8-hour average CO concentrations with the Proposed Project would be 0.23 ppm for the near receptor, and 2.38 ppm for the far receptor. It should be noted that a single vent was used for the purpose of this analysis and it was placed on the south end of the garage near the loading docks and closest to Exterior Street at a height of twelve feet. This was a conservative assumption since design plans call for three or four vents across the south end of the building near the loading docks or roof level vents, four stories high.

As indicated above, the CO impacts from the two parking facilities were substantially below the applicable standard of 9 ppm. Therefore, it can be concluded that the parking facilities would not result in any significant adverse air quality impacts.

HVAC EQUIPMENT

The primary stationary source of air pollutants associated with the project would be the emissions from the natural gas-fired HVAC systems. The pollutants of primary concern are nitrogen dioxide and $PM_{2.5}$. The maximum concentrations were estimated using peak hourly emission rates for the HVAC boilers. The modeling analysis considered the impacts of the development sources on the proposed hotel and waterfront esplanade, as well as numerous off-site receptors, previously described. As indicated in Table 18-13, the maximum predicted ambient concentration of NO_2 is below the corresponding NAAQS, and Table 18-14 shows that the maximum predicted $PM_{2.5}$ is below the NYCDEP interim guidance values. Therefore, it can be concluded that the HVAC systems for the proposed retail buildings and hotel would not result in significant adverse air quality impacts.

Table 18-13
Maximum Predicted NO_x Concentrations HVAC Stationary Source Analysis

Pollutant	Background Concentration (ug/m^3)	Maximum Predicted Concentration (ug/m^3)	Total Maximum Predicted Concentration (ug/m^3)	NAAQS (ug/m^3)
NO_2	60	0.53	60.53	100

Table 18-14
HVAC Stationary Source Analysis
Maximum Predicted $PM_{2.5}$ Concentrations

Pollutant	Averaging Period	Maximum Predicted Concentration (μg/m^3)	Interim Guidance Value (μg/m^3)
$PM_{2.5}$	24-hour	1.5	5
	Annual	0.04	0.3

INDUSTRIAL SOURCE IMPACTS

The results of the field survey indicated that only one industrial source is within 400 feet of the proposed hotel. The facility emits several air contaminants to the atmosphere. The screening methodology in the *CEQR Technical Manual* was utilized for the analysis, with the air contaminant emission rates from the nearby industrial facility and a distance of 105 feet to the proposed development.

A single contaminant (trichloroethylene) has the potential to exceed the New York State Department of Environmental Conservation (NYSDEC) Air Guide-1 annual concentration based on the modeling analyses conducted. Therefore, to preclude the potential for significant adverse air quality impacts from the industrial source, an (E) designation for air quality will be incorporated into the rezoning proposal. The text of the (E) designation is as follows:

"In order to ensure there will be no potential adverse air quality impacts, if trichloroethene emissions continue at the adjacent business, all windows on the east face of the development on Block 2539, Lot 60, up to a height of 45 feet above local grade must be inoperable. Similarly, air intakes must not be placed up to a height of 45 feet above local grade in this location."

CONSISTENCY WITH NEW YORK STATE AIR QUALITY IMPLEMENTATION PLAN

Maximum predicted CO concentrations with the Proposed Project would be less than the corresponding ambient air standard. Therefore, the Proposed Project would be consistent with the New York State Improvement Plan (SIP) for the control of CO. ✷