Chapter 17: Construction Impacts

A. INTRODUCTION

This chapter summarizes the preliminary construction program for the proposed project and assesses the potential for construction-period impacts. The stages of construction and their associated activities are first described, followed by the types of impacts likely to occur. The assessment also describes methods that may be employed to minimize construction-period impacts.

Although there would be localized, temporary disruptions, the analysis concludes that there would likely be no significant traffic impacts during the peak construction hour of 6-7 AM. During the 3-4 PM construction peak hour, the magnitude of traffic impacts, if any, would be substantially lower as compared to when the project is open and operational.

B. OVERVIEW OF CONSTRUCTION ACTIVITIES

Construction is expected to begin in 2010 and last approximately 36 months. It would proceed in several stages, some of which would overlap: environmental remediation and interior demolition; excavation and grading; site preparation and framework construction; infrastructure improvements; interior construction; exterior construction and renovation; roadway changes and repaving; and site finishes and improvements. These stages are described in greater detail below.

ENVIRONMENTAL REMEDIATION AND INTERIOR DEMOLITION

Construction of the proposed project would begin with environmental remediation to address hazardous materials currently existing on the project site, as well as demolition of discrete interior building elements. The environmental remediation would be conducted under a Remedial Action Plan (RAP) and Health and Safety Plan (HASP) that have been prepared and submitted to the New York City Department of Environmental Protection (DEP) and have been reviewed and approved. As described in Chapter 9, "Hazardous Materials," measures would be taken to avoid potential adverse impacts during construction activities due to the presence of known and potential subsurface contamination. Demolition, excavation, and construction activities could disturb hazardous materials and increase pathways for human exposure. However, impacts would be avoided by performing construction activities in accordance with the RAP and HASP which includes procedures to identify and manage both known and unexpectedly encountered contamination, reduce the potential for exposure, and provide measures (e.g., air testing) to ensure that exposure to construction workers and the surrounding community would not occur. With the implementation of these measures, no significant adverse impacts related to hazardous materials would result from demolition and/or construction activities on the project site. The project may also apply for the Brownfield Cleanup Program (BCP) of the New York State Department of Environmental Conservation (DEC), in which case DEC would also be involved in the review and approval of the RAP and HASP.

The initial environmental remediation and demolition stage is expected to last approximately 3 months and continued environmental, asbestos, and hazardous materials remediation would occur for approximately 12 additional months. The continued environmental remediation phase would be concurrent with the excavation phase, described below.

EXCAVATION AND GRADING

This phase of the project would involve excavation and grading for the creation of the "bathtub" below the Armory's drill hall level and shoring the Armory's existing perimeter foundations by underpinning and tiebacks, a ramp to the parking level below the drill hall level, and a retention basin. Blasting is not anticipated to occur during excavation. Rock removal would be undertaken using jackhammers. This work would be concurrent with the continued environmental remediation phase. The excavation and grading phase of work would require approximately 12 months.

SITE PREPARATION AND FRAMEWORK CONSTRUCTION

Because the proposed project involves primarily interior construction, the project would involve limited site preparation, apart from the areas within the existing Armory structure. Most of the staging for site preparation would occur within the existing open areas on the project site outside of the Armory structure, particularly at the southwest corner near Reservoir Avenue. This phase also would involve initial framework construction to create a new, below grade concrete slab "bathtub" and foundation and the initial framework for the drill hall levels. This phase of work would require approximately 14 months. This phase would be concurrent with the continuing remediation and excavation phases, described above.

INFRASTRUCTURE IMPROVEMENTS

Infrastructure improvements at the site would include utility connections to existing water, sewer, electric, gas, and telecommunications. This phase of work would take place concurrently with remediation, excavation, and framework construction. Infrastructure improvements would take approximately 12 months.

INTERIOR CONSTRUCTION

Near the end of the initial framework construction phase, work would begin on framework construction above the drill hall level. This phase of interior construction would take approximately 18 months. The building's mechanical systems would also be installed during this phase.

EXTERIOR CONSTRUCTION / RENOVATION

Concurrent with the excavation and interior construction work, exterior renovation work would be undertaken. This work would include the cleaning, repair, and restoration of the Armory's facades and roof, where needed; repair and replacement of some of the building's windows, including the windows at the Armory's east and west ends; reopening of existing building entrances on Jerome Avenue; and the creation of new entrances on the Reservoir Avenue façade. This phase of work would require approximately 24 months.

ROADWAY CHANGES AND REPAVING

This phase would involve roadway geometry reconfigurations and repaving, including reconfiguring the Barnhill Triangle. The affected areas of roadways would be repaved. The roadway geometry reconfigurations would take approximately 5 months, and street repaving would take approximately 2 months. This phase would occur near the end of the overall construction period.

SITE FINISHES AND IMPROVEMENTS

This phase of building construction would involve final finishing details on the building's facades, construction of the interior tenant improvements, creating a landscaped open space in the southwest portion of the project site, and general landscaping improvements to the project site, including plantings, decorative pavers, lighting, and signage. The landscaping and façade finishing is anticipated to take approximately 3 months, and the tenant improvements would require approximately 7 months.

WORKERS AND TRUCK TRIP ESTIMATES BY CONSTRUCTION PHASE

For the initial environmental remediation and demolition phase (Months 1 through 3), the project would employ up to 50 workers per day. During this phase, on a typical day, approximately 5 truck trips would be generated. The continued environmental, asbestos, and hazardous materials remediation and excavation and grading phases would begin in Month 4 and would continue through Month 15. For the continued environmental, asbestos, and hazardous materials remediation phase, on a typical day, approximately 25 truck trips would be generated. The excavation and grading phase of work would generate approximately 30-60 truck trips on a typical day. The site preparation and framework construction phase would begin in Month 4 and would continue through Month 17 and would generate, on a typical day, approximately 20-30 truck trips. Infrastructure improvements would begin in Month 12 and would continue through Month 23, generating approximately 15 truck trips on a typical day. The number of workers on the project site during the continued environmental remediation, excavation and grading, site preparation and framework construction, and infrastructure improvements phases—Months 4 through 23—would increase from approximately 50 to up to 400.

Interior construction would occur during Months 12 through 29. This phase of construction would employ up to 400 workers per day. On a typical day, approximately 40-60 truck trips would be generated during this phase. The exterior construction/renovation phase would occur during Months 13 through 36 and would generate approximately 5-10 truck trips on a typical day. This phase would employ up to 400 workers during Months 13-24, and would scale back during Months 25-36 to up to 300 workers per day. Roadway geometry reconfigurations would occur during Months 29 through 33 and street repaving would occur during Months 32 and 33. This phase of work would employ up to 300 workers per day and would generate, on a typical day, approximately 30 truck trips. The site finishes and improvements phase would take place during Months 30 through 36 and would employ up 300 workers per day. This phase would generate up to 30 truck trips on a typical day.

A month-by-month assessment of workers and delivery trucks expected during the construction of the proposed project is presented in **Table 17-1**. In this conceptual construction schedule, the number of workers and truck deliveries would peak during the first quarter of 2011 with up to 400 workers per day and 168 trucks per day.

Table 17-1
Daily Number of Construction Workers and Delivery Trucks

2010	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Workers	50	50	50	50	50	50	400	400	400	400	400	400
Trucks	5	5	5	95	95	95	95	95	95	95	95	160
2011	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Workers	400	400	400	400	400	400	400	400	400	400	400	300
Trucks	168	168	168	98	98	73	73	73	73	73	73	58
2012	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Workers	300	300	300	300	300	300	300	300	300	300	300	300
Trucks	58	58	58	58	88	68	68	68	68	38	38	38

Source: The Related Companies

Table 17-2 presents the monthly breakdown of construction vehicle trips (including the worker and truck trips) for the construction related early morning (6-7 AM) and early afternoon (3-4 PM) peak hours.

Table 17-2
Monthly Peak Hour Construction Vehicle Trips

2010	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
6 – 7 AM	19	19	19	65	65	65	183	183	183	183	183	215
3 – 4 PM	17	17	17	17	17	17	135	135	135	135	135	135
2011	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
6 – 7 AM	219	219	219	185	185	171	171	171	171	171	171	131
3 – 4 PM	135	135	135	135	135	135	135	135	135	135	135	101
2012	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
6 – 7 AM	131	131	131	131	145	135	135	135	135	121	121	121
3 – 4 PM	101	101	101	101	101	101	101	101	101	101	101	101

Notes: Hourly construction worker and truck trips were derived from projected estimates of 400 workers and 168 trucks making two daily trips each (arrival and departure) in the first quarter of 2011. Numbers of construction worker vehicles were calculated using a 53-percent auto split with an auto-occupancy of 1.26.

As presented in **Table 17-2**, the peak hour construction vehicle trips would peak during the first quarter of 2011 with 219 and 135 vehicle trips during the early morning (6-7 AM) and early afternoon (3-4 PM) peak hours, respectively.

C. CONSTRUCTION EQUIPMENT AND ACTIVITIES

Typical equipment used for demolition, excavation, and initial framework construction for the bathtub and drill hall levels would include excavators, bulldozers, backhoes, compaction equipment, tractors, jackhammers, and concrete pumping trucks. Other types of equipment that would be used include hoist complexes, dump trucks and loaders, concrete trucks, and back hoes. Much of this same equipment would continue to be used during the roadway geometry reconfiguration and repaving phase. Trucks would deliver concrete and other building materials, and remove excavated material as well as demolition and construction debris. The construction equipment likely to be used during framework construction above the drill hall level and interior retail structure and tenant improvements would include compressors, cranes, hoists, bending jigs, and welding machines. During facade cleaning and repair and the installation of new windows, entrances, and mechanicals, hoists may continue to be used. Trucks would remain in use for material supply and construction waste removal. Interior and finishing work would employ a large number of construction workers, and a wide variety of fixtures and supplies would be delivered to the site.

The majority of construction activities would take place Monday through Friday, although the delivery or installation of certain equipment could occur on weekend days. Hours of construction are regulated by the New York City Department of Buildings (DOB) and apply in all areas of the City. In accordance with those regulations, almost all work could occur between 7 AM and 6 PM on weekdays, although workers would arrive and begin to prepare work areas before 7 AM. Occasionally, Saturday or overtime hours would be required to complete some time-sensitive tasks. Movement of certain oversized materials, to comply with the requirements of the New York City Department of Transportation (NYCDOT), would occur at night. Construction would require long-term parking lane closures along the west side of Jerome Avenue. In addition, some portions of the western sidewalk of Jerome Avenue and the northern sidewalk of Kingsbridge Road would be narrowed temporarily during construction. No other long-term parking lane or sidewalk closures would be expected to occur on streets bordering the project site during construction. Short-term roadway closures and sidewalk narrowings could occur along the west and south sides of the project site at times during the infrastructure improvement phase. Additionally, because of the project site's proximity to the No.4 train subway platform and viaduct, a reconnaissance survey of the subway structures and vibration monitoring within an "area of influence," as per New York City Transit's (NYCT) regulations, would be undertaken during construction. All such work would be coordinated with NYCT to ensure its approval of permits for the proposed construction.

D. PROBABLE IMPACTS OF THE PROPOSED PROJECT

As with the development of any large site, construction of the proposed project may be disruptive to the surrounding area. The following analysis describes the economic benefits associated with the construction and the temporary effects on land use, neighborhood character, open space, historic resources, natural resources, hazardous materials, traffic, air quality, noise, and public health.

ECONOMIC IMPACTS

Construction of the proposed project would have direct, positive impacts resulting from expenditures on labor, materials, and services, and indirect benefits created by expenditures by material suppliers, construction workers, and others involved in the project. An example of these indirect benefits would be the construction workers' purchases of food and other items from local convenience good retailers over the course of the construction period. Construction of the proposed project would also contribute to increased tax revenues for the city and state, including those from personal income taxes.

LAND USE AND NEIGHBORHOOD CHARACTER

As is typical with large construction projects, during periods of peak construction activity there would be some disruption, predominantly noise, to the nearby area; however, as the project primarily involves the renovation of an existing building for new uses, it would not be as disruptive as new construction of a facility of comparable size. There would be construction trucks and construction workers coming to the site. There would also be noise, sometimes intrusive, from building construction as well as trucks and other vehicles backing, loading, and unloading. These disruptions would be temporary in nature, particularly as most construction activities would take place within the Armory building. Overall, while the construction at the site would be evident to the local community, the limited duration of construction, in particular the limited intrusive periods of construction, should not result in significant or long-term adverse impacts on the local land use patterns or character of the nearby area.

HISTORIC RESOURCES

As described in Chapter 6, "Historic Resources," the proposed project would result in the stabilization, cleaning, renovation, and reuse of the Kingsbridge Armory, thereby returning this substantially vacant facility to productive use. The reuse of the building would involve exterior and interior alterations to the Armory and site. Because the Armory is a New York City Landmark, the proposed alterations to the Armory are subject to review and approval by the New York City Landmarks Preservation Commission (LPC) and require a Certificate of Appropriateness (CofA) from LPC. Therefore, the project sponsor must consult with LPC regarding the proposed alterations to the Armory. LPC's determination of the appropriateness of the proposed modifications to the landmark site and the issuance of a CofA would ensure that the proposed project would not adversely impact the historic character of the Kingsbridge Armory. Because the proposed project is also seeking federal historic tax credits, the project has been designed in consultation with the New York State Office of Parks, Recreation and Historic Preservation (OPRHP). Further, as a condition for receiving these tax credits, the project would also comply with the Secretary of the Interior's Standards, as interpreted by OPRHP and the National Park Service (NPS), thereby ensuring that construction of the proposed project would not adversely affect the Kingsbridge Armory. As the project would potentially involve discretionary actions by New York State, OPRHP may also review the project and the proposed alterations to the Armory under Section 14.09 of the New York State Historic Preservation Act of 1980.

Further, to avoid the potential for adverse physical impacts on the Armory, such as ground-borne construction-period vibrations, falling debris, and damage from heavy machinery, the proposed project would develop and implement a Construction Protection Plan (CPP) in consultation with LPC (and, as required, OPRHP) prior to construction. The CPP would follow the requirements established in DOB *Technical Policy and Procedure Notice (TPPN) #10/88*, concerning procedures for the avoidance of damage to adjacent historic structures from nearby construction. It would also follow the guidelines set forth in section 523 of the *CEQR Technical Manual*, including conforming to LPC's *New York City Landmarks Preservation Commission Guidelines for Construction Adjacent to a Historic Landmark* and *Protection Programs for Landmark Buildings*.

HAZARDOUS MATERIALS

The construction-period hazardous materials impacts of the proposed project are described above in "Environmental Remediation."

TRAFFIC AND PARKING

During construction, trips would be generated by the workers traveling to and from the site, as well as from construction-related truck trips.

DAILY WORKFORCE

The estimated average number of construction workers on site at any one time would vary, depending on the stage of construction, as detailed below:

- Initial environmental remediation and demolition would require approximately 50 workers on-site;
- Continuing remediation, excavation, framework construction, infrastructure improvements, the early portion of the installation of windows, entrances, and mechanicals, and façade renovation would require the labor of up to 400 workers per day, depending on the exact tasks being performed;
- Interior structure and tenant improvements, and the latter portion of the façade renovation phase of the project would require approximately 300 workers per day; and
- The roadway geometry reconfiguration and repaving, and final finishing phases would require approximately 300 workers per day.

These activities would not necessarily occur simultaneously. It is estimated that at the peak of construction, up to 400 workers could be employed at the project site during a given day.

CONSTRUCTION WORKER TEMPORAL DISTRIBUTIONS AND MODAL SPLITS

Given typical construction hours, worker trips would not be concentrated in the peak traffic analysis hours and would not represent a substantial increment during those peak traffic analysis hours. Construction work shifts typically begin by 7:00 AM and finish around 3:00 or 3:30 PM. Most construction workers arrivals would occur before the typical traffic peak period, and construction worker departures would generally occur just before the evening commuter peak period. According to the U.S. Census reverse journey-to-work (RJTW) data, commuting to work via auto for construction and excavation occupations in the study area is approximately 53 percent and average auto occupancy is 1.26 persons per auto. Therefore, it is expected that roughly half of the construction workers would commute via auto to and from the project site. Since the study area is well served by mass transit—including the No. 4, B and D subway lines and several bus routes including Bx3, Bx9, Bx22, Bx28, and Bx32—it is expected that a substantial number of construction workers would also use mass transit to commute to and from the project site.

TRUCK DELIVERIES

Truck deliveries would be spread throughout the day, depending on the construction phase. The breakdown of the number of trucks (for materials delivery and removal of debris/scrap from construction operations) that are anticipated during the various construction stages is as follows:

- Initial environmental remediation and interior demolition: up to 5 trucks per day;
- Excavation and grading and continued environmental remediation: up to 70 trucks per day;
- Site preparation and framework construction: up to 25 trucks per day;
- Infrastructure improvements: up to 15 trucks per day;
- Interior construction: up to 50 trucks per day;
- Exterior construction/renovation: up to 8 trucks per day;
- Roadway reconfiguration and repaving: up to 30 trucks per day; and
- Site finishes and improvements: up to 30 trucks per day.

The trucks would arrive at and depart from the project site via NYCDOT designated truck routes—which includes the Major Deegan Expressway, Fordham Road, University Avenue, Jerome Avenue, and Bailey Avenue. Trucks would service the Armory along the Reservoir

Avenue side. To minimize traffic disruptions, oversized equipment is assumed to be delivered at night.

PEAK HOUR CONSTRUCTION WORKER VEHICLE AND TRUCK TRIPS

Site activities would mostly take place during the typical construction shift of 7 AM to 3:30 PM. While construction truck trips would be made throughout the day (with more trips made during the early morning), and most trucks would remain in the area for short durations, construction worker travel would typically take place during the hours before and after the work shift. For analysis purposes, each worker vehicle was assumed to arrive in the morning and depart in the afternoon or early evening, whereas each truck delivery was assumed to result in two truck trips during the same hour (one “in” and one “out”).

The estimated daily vehicle trips were distributed throughout the workday based on projected work shift allocations and conventional arrival/departure patterns of construction workers and trucks. For construction workers, the majority (80 percent) of the arrival and departure trips would take place during the hour before and after each shift (6-7 AM for arrival and 3-4 PM for departure on a normal day shift). For construction trucks, deliveries would occur throughout the day when the construction site is active. Construction truck deliveries typically peak during the hour before the normal work day (25 percent of daily total), overlapping with construction worker arrival traffic. Based on these assumptions, peak hour construction traffic was estimated for the entire construction period. The peak construction hourly trip projections for the first quarter of 2011 are summarized in **Table 17-3**.

Table 17-3
Peak Construction Vehicle Trip Projections—First Quarter of 2011

	Auto Trips			Truck Trips			Total		
Hour	In	Out	Total	In	Out	Total	In	Out	Total
5 AM – 6 AM	0	0	0	0	0	0	0	0	0
6 AM - 7 AM	135	0	135	42	42	84	177	42	219
7 AM - 8 AM	34	0	34	17	17	34	51	17	68
8 AM - 9 AM	0	0	0	17	17	34	17	17	34
9 AM - 10 AM	0	0	0	17	17	34	17	17	34
10 AM - 11 AM	0	0	0	17	17	34	17	17	34
11- AM -12 PM	0	0	0	17	17	34	17	17	34
12 PM - 1 PM	0	0	0	17	17	34	17	17	34
1 PM - 2 PM	0	0	0	17	17	34	17	17	34
2 PM - 3 PM	0	17	17	8	8	16	8	25	33
3 PM - 4 PM	0	135	135	0	0	0	0	135	135
4 PM - 5 PM	0	17	17	0	0	0	0	17	17
5 PM - 6 PM	0	0	0	0	0	0	0	0	0
6 PM - 7 PM	0	0	0	0	0	0	0	0	0

Notes: Hourly construction worker and truck trips were derived from projected estimates of 400 workers and 168 trucks making two daily trips each (arrival and departure) in the first quarter of 2011. Numbers of construction worker vehicles were calculated using a 53-percent auto split with an auto-occupancy of 1.26.

As shown in **Table 17-4**, construction activities would result in maximum combined auto and truck traffic of 219 and 135 vehicle trips during the 6-7 AM and 3-4 PM peak hours, respectively, for the first quarter of 2011. In comparison, the proposed project would generate 243, 793, and 868 vehicle trips during typical weekday AM, midday, and PM peak hours, respectively, as shown in **Table 17-4**.

Table 17-4
Comparison of Vehicle Trips—Construction Phase vs. Build Conditions

Construction Phase (First Quarter 2011)				Full Build-Out Conditions (2013 Proposed Actions)			
Weekday Peak Period	**In**	**Out**	**Total**	**Weekday Peak Period**	**In**	**Out**	**Total**
Arrival Peak Hour (6:00 – 7:00 AM)	177	42	**219**	AM Peak Hour (7:30 – 8:30 AM)	153	90	**243**
Departure Peak Hour (3:00 – 4:00 PM)	0	135	**135**	Midday Peak Hour (12:30 – 1:30 PM)	432	361	**793**
				PM Peak Hour (4:30 – 5:30 PM)	417	451	**868**

During the 6-7 AM construction peak hour, background traffic volumes are approximately 56 percent lower than the 7:30 – 8:30 AM commuter peak hour. With approximately the same number of vehicle trips generated by the construction activities as compared to the completed development uses during the AM peak hour, projected operational impacts described in Chapter 13, "Traffic and Parking," represent the maximum envelope of potential traffic impacts associated with the projected construction traffic. There would likely be no significant traffic impacts during the peak construction hour of 6-7 AM since background traffic volumes are 56 percent lower at that hour.

During the 3-4 PM construction peak hour, background traffic volumes are comparable to the 4:30 – 5:30 PM commuter peak hour volumes. During the 3-4 PM construction peak hour, the construction phase would generate less than one-fifth of the overall projected volume when the project is open and operational. Traffic impacts, if any, would be substantially lower in magnitude during the 3-4 PM construction peak hour.

LANE CLOSURES AND STAGING

During construction, long-term parking lane closures would be required along the west side of Jerome Avenue. Some portions of the western sidewalk of Jerome Avenue and the northern sidewalk of Kingsbridge Road would be narrowed temporarily during construction. No other long-term parking lane or sidewalk closures would be expected to occur on streets bordering the project site during construction. Short-term roadway closures and temporary sidewalk narrowings could occur along the west and south sides of the project site at times during the infrastructure improvement phase. Sidewalk and lane closures would be finalized, as the maintenance and protection of traffic (MPT) plans are developed and reviewed with NYCDOT.

In addition, as part of the proposed project, a portion of Reservoir Avenue southwest of the Armory building would be de-mapped to create public open space and the existing Barnhill Triangle at the intersection of West Kingsbridge Road and Reservoir Avenue would be reconfigured. Any construction activities associated with the roadway reconfigurations are expected to take approximately five months and could alter travel patterns during that relatively short period.

All lane and sidewalk closures during construction would be coordinated with NYCDOT's Office of Construction Mitigation and Coordination (OCMC). Traffic control agents may need to be deployed at times to facilitate traffic flow near the project site.

PARKING

The construction activities would generate an estimated maximum daily parking demand of up to 170 spaces during the peak construction phase. This parking demand could be partially accommodated by the on-street spaces available within a ¼-mile radius, but some construction workers would need to park beyond ¼-mile of the project site along sections of Reservoir Avenue, Goulden Avenue, Jerome Avenue or Bedford Park Boulevard.

TRANSIT AND PEDESTRIANS

As described below, the projected construction activities are not expected to result in significant adverse transit and pedestrian impacts.

TRANSIT

With approximately 53 percent of the construction workers predicted to commute via auto, the remaining 47 percent are expected to travel to and from the project site via transit. As discussed above, it is estimated that at the peak of construction activity, up to 400 workers could be at the project site during a given day. This would result in approximately 188 construction-related transit trips during the 6-7 AM and 3-4 PM construction peak hours, respectively. Distributed among the No. 4, B and D subway lines and several bus routes including Bx3, Bx9, Bx22, Bx28, and Bx32, only nominal increases in transit demand would be experienced along each of those routes and at each of the transit access locations during hours within and outside of the typical commuter peak periods. Any temporary relocation of bus stops along bus routes that operate adjacent to the project site (Bx9, Bx22, Bx29, and Bx32), would be coordinated with NYCDOT and New York City Transit (NYCT) to ensure proper access is maintained.

PEDESTRIANS

For the same reasons discussed above, with respect to transit operations, a detailed pedestrian analysis to address the projected demand from the travel of construction workers to and from the project site is also not warranted. Considering that these pedestrian trips would primarily occur outside of peak hours and be distributed among numerous sidewalks and crosswalks in the area, there would not be a potential for significant adverse pedestrian impacts attributable to the projected construction worker pedestrian trips. During construction, where temporary sidewalk closures are required, adequate protection or temporary sidewalks and appropriate signage would be provided in accordance with NYCDOT requirements.

AIR QUALITY

Although they are temporary, construction projects can have a noticeable effect on surrounding communities. During construction of the proposed project, work activities and engine emissions from on-site equipment could have the potential to impact local air quality. Therefore, an assessment of the potential for air pollution from construction, based on construction activities and schedules, is discussed below along with methods that may be employed to minimize or eliminate the effects of construction activities on air quality.

This assessment was performed using a qualitative review of potential air emissions generated by construction activities. The assessment looked at the various construction tasks (e.g., excavation, foundation, interior structure, etc.) that would occur and the equipment types (excavators, dump trucks, etc.) that would likely be present in order to determine pollutants of concern. The relative significance of various emission sources is discussed, and measures to minimize potential effects on air quality are suggested for specific construction activities.

The important aspect of this project, as it relates to construction impacts on air quality, is that it occurs primarily inside an existing structure.

EFFECTS ON AIR QUALITY

The two main sources of air pollution at a construction site are diesel engine emissions and fugitive dusts. In general, most construction engines are diesel-powered, and produce relatively high levels of nitrogen oxides (NO_X) and particulate matter (PM). Although diesel engines emit much lower levels of carbon monoxide (CO) than gasoline engines, the stationary nature of construction emissions and the quantity of engines onsite could also lead to increased CO concentrations. Sulfur oxides (SO_x) emitted from diesel engines would likely be negligible since ultra-low-sulfur diesel (ULSD) fuel is now readily available and can be used in almost any diesel engine. Therefore, the pollutants of concern for the construction period are NO_2, CO, fine particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}), and fine particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$).

Construction activities also generate various levels of fugitive dust. An active construction project might include a wide variety of tasks that could generate or re-suspend fugitive dust on-site. Some of the more common activities are: excavating; dumping and grading of earthen materials; loading or drop operations that transfer materials (e.g., debris, soil and fill) to and from dump trucks; demolition work; use of abrasives on building facades; and on-site travel across paved or unpaved roads/surfaces that cause particulate matter to become airborne.

The quantity of air pollutants emitted during the construction period would likely vary over time. This is because equipment types and activities associated with each distinct construction task would be different. With regard to the effects on air quality, the excavation task is generally likely to emit the highest levels of air pollutants during the construction program. This would be especially true for particulate matter, since excavation activities have the greatest potential to generate fugitive dusts, as described above. The intensity of excavation would be a controlling factor for the emission levels. High intensity excavation would require greater amounts of equipment onsite, which would increase emissions from diesel engines. Higher excavation rates would also produce more fugitive dusts per unit time (i.e., increase daily emissions). The number of dump trucks needed for transporting excavated materials and delivery of fill would increase with excavation intensity. Any increase of vehicles traveling onsite would produce greater amounts of road dust.

Air emissions relating to tasks other than excavation would be most affected by the amount of heavy equipment being used onsite and the engine size (i.e., horsepower [hp]) of each unit. The number of delivery trucks entering the site would also affect emission levels. Queuing of heavy vehicles such as concrete delivery trucks may be a concern during the foundations task. However, in general these other tasks are less of a concern than the excavation periods.

Although the air emission sources described above would generate some level of air pollutants released to the atmosphere, it is not expected that the construction activities would increase those pollutants by amounts that would be considered significant in ambient air. Foremost in this determination is the fact that the majority of activities (including an estimated 90 percent of loading/unloading for excavation) would occur inside the Armory. Indoor work would significantly curtail emissions of fugitive (wind blown) dust. The walls of the Armory Building would also act as a barrier to the transport of air pollutants that otherwise could affect nearby fence-line receptors at ground level.

In, addition, the intensity levels for specific work tasks are not expected to be great enough to generate significant levels of air pollution that could affect nearby sensitive receptors. No more than 20 pieces of heavy equipment are expected to be present on site at any one time. This equipment would be expected to operate intermittently and would be spread across a large area that is approximately 600 feet long by 358 feet wide (i.e., the interior dimensions of the Armory). Emissions from multiple engine exhausts are not expected to be concentrated close to sensitive receptors.

In order to minimize potential construction-period effects on air quality, the following measures would be implemented as part of the construction program, to the extent commercially feasible:

- Clean Fuel—Ultra-low-sulfur diesel (ULSD) fuel would be required for diesel engines throughout the construction program.
- Idle Time Restrictions—The construction specifications will include the restriction of on-site vehicle idle time to three minutes for all vehicles that are not using the engine to operate a loading, unloading, or processing device (e.g., concrete mixing trucks).
- Utilization of Tier 1 or Newer Equipment—The construction specifications will encourage the use of Tier 1[1] or later construction equipment for non-road diesel engines greater than 50 hp. The "Tiers" are EPA standards that regulate criteria pollutants, including particulate matter (PM), hydrocarbons (HC), oxides of nitrogen (NO_x) and carbon monoxide (CO). Tier 1 standards are for construction equipment manufactured starting in 1998; Tier 2 and Tier 3 standards are for construction equipment manufactured in 2000 through 2008. The more recent the "Tier," the cleaner the engine for all criteria pollutants, including fine PM. Newer equipment with lower engine-out PM emission values would significantly reduce effects on air quality from diesel engines.

Construction also has the potential to affect air quality as a result of activities that generate fugitive dust. Although fugitive dusts will be contained indoors (with most work occurring inside the Armory), minimizing effects on air quality can be achieved by implementing, to the extent commercially feasible, the following work practices:

- Watering—Truck routes will be watered as needed;
- Cleaning—Truck exit areas will be established for washing off the wheels of all trucks that exit excavation areas; and
- Truck Covers—Dust covers for dump trucks will be required.

NOISE

Impacts on community noise levels during construction can result from noise from construction equipment operation, and from construction vehicles and delivery vehicles traveling to and from

[1] The first federal regulations for new non-road diesel engines were adopted in 1994, and signed by EPA into regulation in a 1998 Final Rulemaking. The 1998 regulation introduces Tier 1 emissions standards for all equipment 50 hp and greater and phases in the increasingly stringent Tier 2 and Tier 3 standards for equipment manufactured in 2000 through 2008. The Tier 1 through 3 standards regulate the EPA criteria pollutants, including particulate matter (PM), hydrocarbons (HC), oxides of nitrogen (NO_x) and carbon monoxide (CO). Prior to 1998, emissions from non-road diesel engines were unregulated. These engines are typically referred to as Tier 0.

the site. Noise and vibration levels at a given location are dependent on the type and quantity of construction equipment being operated, the acoustical utilization factor of the equipment (i.e., the percentage of time a piece of equipment is operating), the distance from the construction site, and any shielding effects (from structures such as buildings, walls, or barriers). Typical noise levels of construction equipment are shown in **Table 17-5**. Noise levels caused by construction activities would vary widely, depending on the phase of construction and the location of the construction activities relative to noise sensitive receptor locations. Noise sensitive receptors in the vicinity of the project sites include institutional uses to the north, east, and west of the project site and residential uses to the west of the project site.

Table 17-5
Typical Noise Emission Levels for Construction Equipment

Equipment Item	Noise Level at 50 ft. (dBA)
Air compressor	81
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer, Drills	88
Loader	85
Paver	89
Pile Driver (Impact)	101
Pile Driver (Sonic)	96
Pneumatic Tool	85
Pump	76
Rail Saw	90
Rock Drill	98
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	88

Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration (FTA), May 2006.

Construction noise is regulated by the requirements of the New York City Noise Control Code (also known as Chapter 24 of the Administrative Code of the City of New York, or Local Law 113), the DEP Notice of Adoption of Rules for Citywide Construction Noise Mitigation (also known as Chapter 28), and the U.S. Environmental Protection Agency (USEPA)'s noise emission standards. These local and federal requirements mandate that specific construction equipment and motor vehicles meet specified noise emission standards; that construction activities be limited to weekdays between the hours of 7 AM and 6 PM; and that construction materials be handled and transported in such a manner as not to create unnecessary noise. If weekend or after hour work is necessary, permits would be required to be obtained, as specified in the New York City Noise Control Code. Permit authorization for weekend or after hour construction work may be granted for the following circumstances—emergency work, cases of public safety, City construction projects, construction activities with minimal impact, and for a claim of undue hardship resulting from unique site characteristics, unforeseen conditions, scheduling conflicts and/or financial considerations. As part of the New York City Noise Control Code, a site-specific noise mitigation plan is to be developed and implemented that may include source controls, path controls, and receiver controls.

Typically, increased noise levels caused by construction activities can be expected to be greatest during the early stages of construction including the excavation, grading, foundation, and superstructure. It is anticipated that the most significant noise source associated with the construction equipment would be jackhammers, hoe rams, bulldozers, excavators, backhoes, vibratory compactors, rollers, and various types of trucks and earth moving equipment. As required by the New York City Noise Control Code, noise barriers (a minimum height of 8 feet) would be provided around the perimeter of the construction site. The majority of construction activity (i.e., stationary equipment and the loading/unloading of trucks) would occur inside the existing Kingsbridge Armory building. The brick façade of the Armory would act as a noise barrier and would reduce noise levels associated with the proposed construction activity in the adjacent community. While noise associated with the proposed construction activity may be considered noisy and intrusive, potential increases in noise levels as a result of construction-related activities would be expected to occur for limited duration. Therefore, no long-term, significant adverse noise impacts on the adjacent noise sensitive uses are expected from the proposed construction activities.

RODENT CONTROL

The proposed project would not engage in any particular solid waste management practices that could attract vermin and result in an increase in pest populations. Construction contracts would include provisions for a rodent (mouse and rat) control program. Before the start of construction, the contractor would survey and bait the appropriate areas and provide for proper site sanitation. During the construction phase, as necessary, the contractor would carry out an ongoing prevention, inspection, and response program. Coordination would be maintained with appropriate public agencies. Only registered rodenticides would be permitted, and the contractor would be required to perform rodent control programs in a manner that avoids hazards to persons, domestic animals, and non-target wildlife. ✷