Chapter 20: Construction

A. INTRODUCTION

This chapter summarizes the preliminary construction scenario for the proposed Cornell NYC Tech project and considers the potential for adverse impacts during construction. As described in Chapter 1, “Project Description,” Cornell is seeking a number of discretionary approvals to support and allow for the development of an applied science and engineering campus on Roosevelt Island (the “proposed project”). The first phase of the Cornell NYC Tech project is expected to be constructed and completed by 2017. During Phase 1, the existing Goldwater Memorial Hospital buildings would be demolished and an academic building, a corporate co-location building, a residential building, an Executive Education Center with hotel and conference facilities, and publicly-accessible open space would be constructed on the northern portion of the project site. In addition, a central utility plant that serves the campus may also be constructed. The remainder of construction is expected to be completed by the end of 2037 and would occur on the central and southern portion of the project site. This construction would include another ~~two~~ academic building~~s~~, two corporate co-location buildings, ~~two residential buildings~~, a mixed-use building containing academic and residential uses, a mixed-use building that comprises corporate co-location space at its base with a residential tower rising above, publicly-accessible open space, and possibly another central utility plant.

For each of the technical areas presented below, appropriate construction analysis years are selected to represent reasonable worst-case conditions relevant to that technical area, which can occur at different times for different analyses. For example, the noisiest part of the construction may not be at the same time as the heaviest construction traffic. Therefore, the analysis periods may differ for different analysis areas. Where appropriate, the analysis accounts for the effects of elements of the proposed project that would be completed and operational during the selected construction analysis years.

While the anticipated construction durations have been developed with an experienced New York City construction manager, the discussion is only illustrative as specific means and methods will be chosen at the time of construction, and the sequencing and timing of individual buildings is subject to change. The construction durations are conservatively chosen to serve as the basis of the analyses in this chapter and are representative of the reasonable worst-case for potential impacts. The preliminary schedule represents a compressed and conservative potential timeline for construction, which shows overlapping construction activities and simultaneously operating construction equipment. Thus, the analysis captures the cumulative nature of construction impacts, which would result in the greatest impacts at nearby sensitive receptors.

This chapter describes the city, state, and federal regulations and policies that govern construction, the expected construction schedule, and the construction methods to be used. This section establishes the framework used for the assessment of potential impacts from construction. The construction timeline—determined by the timing of the various major construction stages associated with constructing a building—such as excavation and foundation, superstructure, and interiors and finishes—is described. The types of equipment are discussed, and the number of workers and truck deliveries is estimated. Following the discussion of construction techniques, the chapter discusses potential impacts with regard to transportation, air quality, noise and vibration, historic resources, hazardous materials, natural resources, open space, socioeconomic conditions, community facilities, and land use and neighborhood character. The analysis concludes that the proposed project would result in significant adverse construction impacts related to transportation and to noise on open space. The results of the construction analyses for each technical area are discussed in more detail below.

B. GOVERNMENTAL COORDINATION AND OVERSIGHT

The following describes construction oversight by government agencies, which involves a number of city, state, and federal agencies. **Table 20-1** shows the main agencies involved in construction oversight and the agencies' areas of responsibilities. Primary responsibilities lie with the New York City Department of Buildings (DOB), which ensures that the construction meets the requirements of the Building Code and that the buildings are structurally, electrically, and mechanically safe. In addition, DOB enforces safety regulations to protect both the workers and the public. The areas of oversight include installation and operation of the equipment, such as cranes and lifts, sidewalk sheds, and safety netting and scaffolding. The New York City Department of Environmental Protection (NYCDEP) enforces the Noise Code, reviews and approves any needed Remedial Action Plan (RAP) and Construction Health and Safety Plan (CHASP), and regulates water disposal into the sewer system, the removal of tanks and asbestos abatement. The City of New York Department of Sanitation (DSNY) has regulatory and enforcement oversight over storage, transport, and disposal of asbestos waste. The Fire Department of New York City (FDNY) has primary oversight for compliance with the Fire Code and for the installation of tanks containing flammable materials. The New York City Department of Transportation (NYCDOT) reviews and approves any traffic lane and sidewalk closures. The New York City Transit (NYCT) is responsible for subway access and, if necessary, bus stop relocations. NYCT also regulates vibrations that might affect the subway system. The New York City Department of Parks and Recreation (DPR) is responsible for the oversight, enforcement, and permitting of the replacement of street trees that are lost due to construction. Section 5-102 et. seq. of the Laws of the City of New York requires a permit to remove any trees and the replacement of the trees as determined by calculating the size, condition, species and location rating of the tree proposed for removal.

The New York State Department of Labor (DOL) licenses asbestos workers. The New York State Department of Environmental Conservation (NYSDEC) regulates disposal of hazardous materials, and construction and operation of bulk petroleum and chemical storage tanks. On the federal level, the Environmental Protection Agency (EPA) has wide ranging authority over environmental matters, including air emissions, noise, hazardous materials, and the use of poisons. Much of the responsibility is delegated to the state level. The Occupational Safety and Health Administration (OSHA) sets standards for work site safety and the construction equipment.

Table 20-1
Construction Oversight in New York City

Agency	Areas of Responsibility
New York City	
Department of Buildings	Primary oversight for Building Code and site safety
Department of Environmental Protection	Noise, hazardous materials, RAPs/CHASPs, dewatering, tanks, asbestos abatement
City of New York Department of Sanitation	Storage, transport, and disposal of asbestos waste
Fire Department	Compliance with Fire Code, tanks
Department of Transportation	Lane and sidewalk closures
New York City Transit	Subway access, bus stop relocation
Department of Parks and Recreation	Street trees
New York State	
Department of Labor	Asbestos workers
Department of Environmental Conservation	Hazardous materials and tanks
United States	
Environmental Protection Agency	Air emissions, noise, hazardous materials, poisons
Occupational Safety and Health Administration	Worker safety

C. CONSTRUCTION PHASING AND SCHEDULE

While the methods and means described below have been developed with Tishman Construction Corporation, the discussion is preliminary and other means and methods may be chosen at the time of construction. The construction durations are conservatively chosen to serve as the basis of the analyses in this chapter and are representative of the reasonable worst-case for potential impacts. The preliminary schedule represents a compressed and conservative potential timeline for construction, which shows overlapping construction activities and simultaneously operating construction equipment. Thus, the analysis captures the cumulative nature of construction impacts, which would result in the greatest impacts at nearby sensitive receptors.

The construction of the proposed project is analyzed in two overall phases, which generally represent demolition of the existing Goldwater Hospital buildings and construction on the northern portion of the project site (Phase 1) followed by construction on the southern portion of the project site (Phase 2). The anticipated construction schedule is shown on **Figures 20-1** and **20-2** and **Table 20-2** and reflects the sequencing of construction events as currently contemplated.

Phase 1 construction is assumed to start in the beginning of 2014 and would be completed by the end of 2017. In Phase 1, the existing Goldwater Hospital buildings would be demolished and four buildings—an academic building, a corporate co-location building, a residential building, and an Executive Education Center—would be constructed on the northern portion of the project site. Various civil activities including utility upgrades, grading and leveling, photovoltaic (PV) panel installation, geothermal well system construction, and landscaping would also occur during Phase 1. In addition, it is assumed that a central utility plant would be constructed near the northern edge of the site.

Phase 2 is expected to commence in mid-2024 and continue through the end of 2037 in two separate development segments—2024 to 2028 (Phase 2A) and 2034 to 2037 (Phase 2B). In Phase 2, a total of ~~six~~ five buildings~~—two~~ an academic building~~s~~, ~~two residential buildings~~, ~~and~~ two corporate co-location buildings~~,~~ a mixed-use building containing academic and residential

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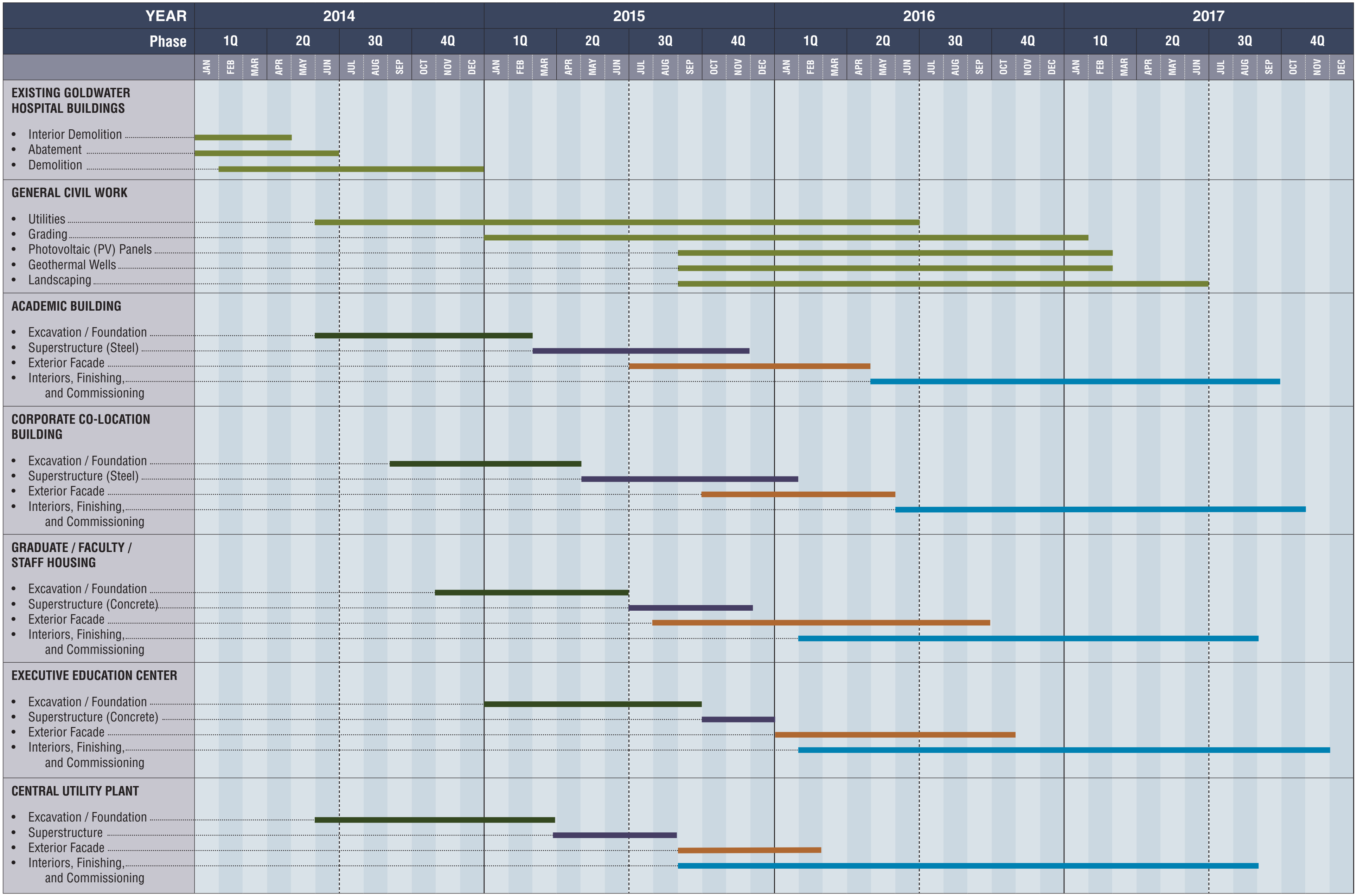
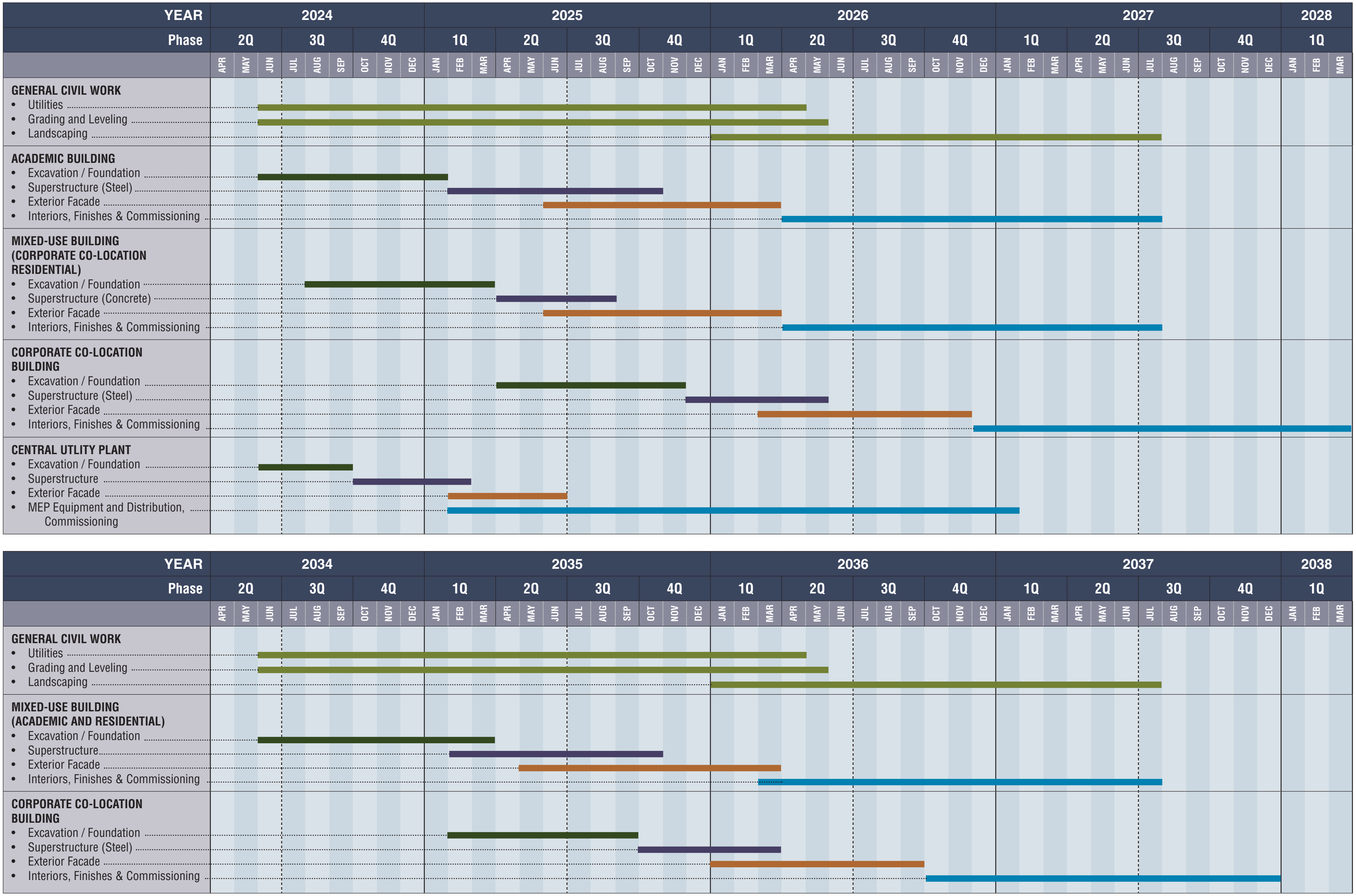


Anticipated Construction Schedule (Phase 1)

Figure 20-1



Anticipated Construction Schedule (Phase 2)

Figure 20-2

Table 20-2
Anticipated Construction Schedule

Building	Start Month	Finish Month	Approximate duration (months)
Phase 1			
Demolition of Goldwater Hospital Buildings	January 2014	December 2014	12
Civil Activities (including utilities, grading, photovoltaic panels, geothermal wells, and landscaping)	June 2014	June 2017	37
Academic Building	June 2014	September 2017	40
Corporate Co-location Building	August 2014	October 2017	39
Residential Building	November 2014	August 2017	34
Executive Education Center	January 2015	November 2017	35
Central Utility Plant (North)	June 2014	August 2017	39
Phase 2			
Civil Activities (including utilities, grading, and landscaping)	June 2024	July 2027	38
Central Utility Plant (South)	June 2024	January 2027	32
Academic Building	June 2024	July 2027	38
~~Residential Building~~ Mixed-Use Building (Corporate Co-location Residential)	August 2024	July 2027	36
Corporate Co-location Building	April 2025	March 2028	36
Civil Activities (including utilities, grading, and landscaping)	June 2034	July 2037	38
~~Academic Building~~ Mixed-Use Building (Academic and Residential)	June 2034	July 2037	38
~~Residential Building~~	~~August 2034~~	~~June 2037~~	~~35~~
Corporate Co-location Building	February 2035	December 2037	35
Source: Tishman Construction Corporation.			

uses, and a mixed-use building that comprises corporate co-location space at its base with a residential tower rising above—would be constructed on the central and southern portion of the project site. In addition, various civil activities including utility upgrades, grading, and landscaping would occur during Phase 2. A second central utility plant may also be constructed at the southern edge of the site.

The construction of the proposed project is expected to have an approximately seven-year gap between Phase 1 construction and Phase 2A construction, and a six year gap between Phase 2A construction and Phase 2B construction. These pauses in construction are based on Cornell's current expectations on programming, enrollment, and funding for the proposed project.

For each of the technical areas, appropriate construction analysis years are selected to represent reasonable worst-case conditions relevant to that technical area, which can occur at different times for different analyses. For example, the noisiest part of the construction may not be at the same time as the heaviest construction traffic. Therefore, the analysis periods may differ for different analysis areas. Where appropriate, the analysis accounts for the effects of elements of the proposed project that would be completed and operational during the selected construction analysis years.

D. CONSTRUCTION DESCRIPTION

OVERVIEW

Construction of large-scale buildings in New York City typically follows a general pattern. The first task is construction startup, which involves the siting of work trailers, installation of temporary power and communication lines, and the erection of site perimeter fencing. At the

Cornell NYC Tech site where there are existing buildings, any potential hazardous materials (such as asbestos), are abated, and the buildings are then demolished with some of the materials (such as concrete, block, and brick) either recycled or crushed on-site to be reused as fill and the debris taken to a licensed disposal facility. Excavation of the soils is next along with the construction of the foundations. When the below-grade construction is completed, construction of the core and shell of the new buildings begins. The core is the central part of the building and is the main part of the structural system. It contains the elevators and the mechanical systems for heating, ventilation, and air conditioning (HVAC). The shell is the outside of the building. As the core and floor decks of the building are being erected, installation of the mechanical and electrical internal networks would start. As the building progresses upward, the exterior cladding is placed, and the interior fit out begins. During the busiest time of building construction, the upper core and structure is being built while mechanical/electrical connections, exterior cladding, and interior finishing are progressing on lower floors.

Since the construction approach and procedures for each building would be similar, general construction procedures are described followed by the major construction tasks (construction startup, abatement and demolition, civil activities, excavation and foundation, superstructure, exterior cladding, and interiors finishes and commissioning).

GENERAL CONSTRUCTION PRACTICES

Cornell would have a field representative throughout the entire construction period. The representative would serve as the contact point for the community and local leaders, and would be available to resolve concerns or problems that arise during the construction process. New York City maintains a 24-hour-a-day telephone hotline (311) so that concerns can be registered with the city. Once demolition activities begin, a security staff would be on the specific construction site 24 hours a day, 365 days a year.

HOURS OF WORK

For the proposed project, construction is expected to take place Monday through Friday and with minimal weather make-up work on Saturdays. Certain exceptions to these schedules are discussed separately below. In accordance with New York City laws and regulations, construction work would generally begin at 7:00 AM on weekdays, with most workers arriving to prepare work areas between 6:00 AM and 7:00 AM. Normally weekday work would end by 3:30 PM, but it can be expected that to meet the construction schedule or to complete certain construction tasks, the workday would be extended beyond normal work hours on occasions. The work could include such tasks as completing the drilling of piles, finishing a concrete pour for a floor deck, or completing the bolting of a steel frame erected that day. The extended workday would generally last until about 6:00 PM and would not include all construction workers on-site, but just those involved in the specific task requiring additional work time.

Weekend work would not be regularly scheduled, but could occur to make up for weather delays or other unforeseen circumstances. In such cases, appropriate work permits from DOB would be obtained. Similar to an extended workday, the numbers of workers and pieces of equipment in operation would be limited to those needed to complete the particular task at hand. For extended weekday and weekend work, the level of activity would be reduced from the normal workday. The typical weekend workday would be on Saturday from 9:00 AM with worker arrival and site preparation to 5:00 PM for site cleanup.

Some tasks may have to be continuous, and the work could extend to more than a typical 8-hour day. For example, in certain situations, concrete must be poured continuously to form one structure without joints. An example of this is pouring concrete for foundations, which would be poured in sections. This type of concrete pour can require over 12 hours to complete. In addition, a noise mitigation plan pursuant to New York City Code would be developed and implemented to minimize intrusive noise affecting nearby sensitive receptors. A copy of the noise mitigation plan would be kept on-site for compliance review by NYCDEP and DOB.

DELIVERIES AND ACCESS

Roosevelt Island is served by the Roosevelt Island Bridge, which has a 36-ton-gross vehicle weight restriction. Therefore, as in other construction projects on Roosevelt Island, all trucks used for construction of the proposed project would meet this weight requirement. At limited times during construction, if a large piece of construction equipment (i.e., tower crane) could not be transported over the Roosevelt Island Bridge due to the weight restriction, the equipment would be transported via barges. At the time the DEIS was published, Cornell ~~is~~ had begun assessing the feasibility of barging as an alternative to truck material deliveries, but had not identified ~~. However, no~~ a practical and feasible method~~s~~ of barging ~~have been identified at this time~~. Since publication of the DEIS, Cornell has identified two barging techniques that are now under consideration. The potential use of barging during the construction period is assessed below in Section G, “Barging Alternative to Truck Material Deliveries.”

Access to the construction site would be controlled for the proposed project. The work areas would be fenced off, and limited access points for workers and trucks would be provided. Private worker vehicles would not be allowed into the construction area. Security staff would be on the site as needed, and all persons and trucks would have to pass through security points. Workers or trucks without a need to be on the site would not be allowed entry. After work hours, the gates would be closed and locked. Security guards would patrol the construction sites after work hours and over the weekends to prevent unauthorized access and ensure public safety.

Material deliveries to the site would be regimented and scheduled. Because of the level of construction activity involved for the proposed project, unscheduled or haphazard deliveries would not be allowed. For example, during excavation, each delivery truck would be assigned a specific block of time during which it must arrive on the site. If a truck is late for its turn, it would be accommodated if possible, but if not, the truck would be assigned to a later time. A similar regimen would be instituted for concrete deliveries, but the schedule would be stricter. If a truck is late, it would be accommodated if possible, but if on-time concrete trucks are in line, the late truck would not be allowed on-site. Because construction documents specify a short period of time within which concrete must be poured (typically 90 minutes), the load would be rejected if this time limit is exceeded.

During the finishing of the building interiors, individual deliveries would be scheduled to the maximum extent practicable. Studs for the partitions, drywall, electrical wiring, mechanical piping, ductwork, and other mechanical equipment are some of the materials that must be delivered and moved within each building. The available time for subcontractors’ use of the hoists would be tightly scheduled. Each trade, such as the drywall subcontractor, would be assigned a specific time to have its materials delivered and hoisted into the building. If the delivery truck arrives outside its assigned time slot, it would be accommodated if possible without disrupting the schedule of other deliveries.

LANE CLOSURES AND CONFIGURATION CHANGES, SIDEWALK CLOSURES

As described in Chapter 1, “Project Description,” a one-way loop road encircles the project site with traffic flow in a clockwise direction (i.e., southbound on East Loop Road and northbound on West Loop Road). North Loop Road and South Loop Road border the site to the north and south, respectively. To the east of the project site, East Loop Road continues as East Main Street then Main Street from its southern perimeter to a triangle located north of the Roosevelt Island subway station. To the west of the project site, West Loop Road continues as West Main Street then West Road between the same limits and intersects with Main Street. Because the roadways surrounding the project site would serve low traffic volumes with the closing of Goldwater Hospital, there is expected to be substantial flexibility in on-site staging and site access. During the course of construction, it is likely that the traffic lane on East Road would be closed for a period of approximately one year to allow for the demolition of the existing Goldwater Hospital buildings and roadway improvements. In addition, West Loop Road traffic lanes would be temporarily reconfigured from one-way northbound to two-way northbound-southbound during the East Loop Road closure to maintain vehicular access to the south of the project site, including South Point Park and Four Freedoms Park. This work would be coordinated with and approved by the Roosevelt Island Operating Corporation (RIOC) and/or NYCDOT. Turnaround areas would also be provided to facilitate bus service. After substantial demolition, sub-surface utility work, and road widening work has been completed, the current roadway flow would be expected to be restored. Temporary lane closures may be required throughout the construction project and would take place in accordance with RIOC and/or NYCDOT-approved maintenance and protection of traffic (MPT) plans and would be managed by on-site flag-persons and barricades for protection. During the course of construction, sidewalks may also be closed or protected for varying periods of time. This work would be coordinated with and approved by RIOC and/or NYCDOT. Pedestrian access at the waterfront promenades along the East River would remain open at all times during the entire construction period.

RODENT CONTROL

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 the contractor would carry out a maintenance program, as necessary. Signage would be posted, and coordination would be maintained with appropriate public agencies. Only EPA- and NYSDEC-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.

GENERAL CONSTRUCTION TASKS

CONSTRUCTION STARTUP TASKS

Construction startup work prepares a site for construction. The project site would be first fenced off, with mostly chain-link fencing to minimize interference with the persons passing by the site. Separate gates for workers and for trucks would be established. Field offices for the construction engineers and managers would be hauled to the site and installed. In addition, portable toilets, dumpsters for trash, and water and fuel tankers would be brought to the site and installed. Temporary utilities would be connected to the construction field. During the startup period, permanent utility connections may be made, but utility connections may be made almost any time during the construction sequence. Construction startup tasks would also involve site cleanup and vegetation and tree removal activities. For the proposed project, construction startup tasks are estimated to average 10 to 20 workers on site, and usually about 10 truck deliveries per day. The task would be completed within a few months.

INTERIOR DEMOLITION, ABATEMENT, AND STRUCTURAL DEMOLITION

Development of the project would require the demolition of the existing Goldwater Memorial Hospital complex. First, any economically salvageable materials would be removed. Then the interior finishes of the buildings would be demolished to expose the asbestos and hazardous materials for the abatement process. As the interiors are being demolished, the existing elevators and other vertical transportation shafts would be used to move debris to ground level. For the interior demolition, equipment would include small front end loaders and bull dozers to move the debris to the vertical shafts. The majority of the actual deconstruction would be done using hand tools. Interior demolition would have approximately 60 workers on site and typically 10 truckloads of debris removed per day. The interior demolition activities would first commence in the northernmost buildings - Buildings C, D, and F, and the southernmost building - Building J (See Figure 1-2 for location of the existing hospital buildings) and subsequently in Buildings B and E and finally in Building A. This task would take about five months to complete for all of the hospital buildings.

Next, these buildings would be abated of asbestos and any other hazardous materials within the existing buildings and structures. A 1992 asbestos survey indicated the presence of asbestos-containing materials (ACM) in the buildings. According to hospital representatives, limited ACM abatement has occurred since the survey as part of routine repairs and renovations. The ACM must be removed by a DOL-licensed asbestos abatement contractor prior to structural demolition. Asbestos abatement is strictly regulated by NYCDEP, DOL, EPA, and OSHA to protect the health and safety of construction workers and nearby residents and workers. Depending on the extent and type of ACM, these agencies would be notified of the asbestos removal project and may inspect the abatement site to ensure that work is being performed in accordance with applicable regulations, including the new February 2, 2011 NYCDEP regulations. These regulations specify abatement methods, including wet removal of ACM that minimize asbestos fibers from becoming airborne, and containment measures. The areas of the building with ACM would be isolated from the surrounding area with a containment system and a decontamination system. The types of these systems would depend on the type and quantity of ACM, and may include hard barriers, isolation barriers, critical barriers, and caution tape. Specially trained and certified workers, wearing personal protective equipment, would remove the ACM and place them in bags or containers lined with plastic sheeting for disposal at an asbestos-permitted landfill. Depending on the extent and type of ACM, an independent third-party air-monitoring firm would collect air samples before, during, and after the asbestos abatement. These samples would be analyzed in a laboratory to ensure that regulated fiber levels are not exceeded. After the abatement is completed and the work areas have passed a visual inspection and monitoring, if applicable, the structural demolition work would begin. Depending on the amount of ACM to be removed, about 60 workers and two trucks per day are expected to be needed for abatement, and this task is expected to last about six months.

Based on the buildings' age, lead-based paint may be present. Any activities with the potential to disturb lead-based paint would be performed in accordance with the applicable OSHA regulation (OSHA 29 CFR 1926.62—*Lead Exposure in Construction*). When conducting demolition (unlike lead abatement work), lead-based paint is generally not stripped from surfaces. Structures are disassembled or broken apart with most paint still intact. Dust control measures (spraying with water) would be used. The lead content of any resulting dust is therefore expected to be low. Work zone air monitoring for lead may be performed during certain activities with a high potential for releasing airborne lead-containing particulates in the immediate work zone, such as manual demolition of walls with lead paint or cutting of steel with lead-containing coatings. Such monitoring would be performed to ensure that workers performing these activities are properly protected against lead exposure.

Polychlorinated biphenyls (PCBs) were historically used in transformers (as a dielectric fluid), some underground high-voltage electric lines, hydraulically operated machinery, and fluorescent lighting ballasts. Suspected PCB-containing equipment (such as fluorescent light ballasts) that would be disturbed would be evaluated prior to disturbance. Unless labeling or test data indicate that the suspected PCB-containing equipment does not contain PCBs, it would be assumed to contain PCBs and removed and disposed of at properly licensed facilities in accordance with all applicable regulatory requirements.

Once the hospital buildings are abated of asbestos and any other hazardous materials, structural demolition would commence. When structures on the roof are being razed, enclosed chutes would be used to move the debris to the ground level. Because of the structural properties of the existing hospital buildings, large excavators may be needed to demolish most of the buildings. Front-end loaders would be used on the ground floor to load materials into dump trucks. The demolition debris would be sorted prior to being disposed at landfills to maximize recycling opportunities. About 40 to 50 workers are expected to be on-site, and typically 5 to 10 truckloads of debris would be removed per day. The structural demolition task is expected to last about 10 months.

CIVIL ACTIVITIES

The construction of the proposed project would include various civil activities, including utility upgrades, grading, PV panel installation, geothermal well system construction, and landscaping. Each day, approximately 40 to 70 workers and 10 to 15 trucks would be required for this task.

Utilities

All utilities that may be present on site and that may be affected by construction activities would be relocated in accordance with all applicable New York City regulations. The proposed buildings would receive some combination of electric and gas service via the Con Edison distribution system. However, PV panels, a geothermal well system, and two central energy utility plants are being considered to reduce energy consumption since Cornell has committed to achieve a minimum of LEED Silver certification for all project buildings. Utility work would also include the installation of utility connections to the proposed buildings and sub-surface off-site water and sewer line work.

Grading

Grading would be required for both construction phases to bring part of the project site to the desired elevation level. Site grading would be undertaken using cut and fill techniques and would seek to reuse as much material on-site as possible. All the fill material would be buried beneath the necessary level of cover. During Phase 1 construction, stockpiling is expected to be on the southern portion of the site. During Phase 2 construction, no stockpiling is expected as all of the excavated materials would be trucked from the project site. Equipment used during grading would include graders, loaders, and compactors.

PV Panels

PV panels would be installed above the roof of the academic building; the panels may also extend over a portion of the central spine (creating a canopy), and possibly continue over the roof of the corporate co-location building. PV panels may also be integrated into the landscape to form pavilions, covered rest areas, and similar ground-mounted structures. The equipment used for the installation of the PV panels would include various hand tools.

Geothermal Wells

Consistent with the net zero energy goals for the Phase 1 academic building, a below-grade closed-loop geothermal well field may be developed to serve the academic building. Approximately 140 geothermal wells may be constructed during Phase 1. These wells would provide heating and cooling for the academic building. Cornell may expand the geothermal system as practical for the full build, depending on the success of the Phase 1 system. Each geothermal well would take approximately three days to complete: one day for site set-up, one day for drilling and concurrent data collection, and one day to insert and grout the closed loop piping. The equipment used for each well would include a drill rig and a grout mixer/pump.

Landscaping

During construction of the publicly accessible open spaces, top soil may be imported for installation of the grassy areas and landscaping. Concrete sidewalks would be poured, and street furniture, such as benches and tables, would be installed. Dump trucks would bring the soil to the site for spreading. Trees and shrubs would be planted. For the active recreation areas, the ground surfaces would be installed, followed by the appropriate amenities. The majority of this work would be done by hand.

EXCAVATION AND FOUNDATION

A spread footing foundations system is expected to be used for the project buildings. In this type of foundation system, concrete column footings would be used to accommodate the concentrated load placed on them and support the structure above. These concrete footings would be reinforced with rebar as they are traditionally done. The project buildings would be founded on rocks.

Large excavators would be used for the task of excavation. The soil would be loaded onto dump trucks for transport to a licensed disposal facility or for reuse on a construction site that needs fill. The dump trucks would be loaded in the excavation itself, and a ramp would be built to the street level. Next, the concrete footings would be erected and subsequently the basement floors would be installed. The excavation/foundation task would involve the use of excavators, cranes, bull dozers, drill rigs, and various hand tools. The installation of the footings and basements would require concrete trucks, concrete pumps, vibrators, and compressors. During the excavation and foundation task, about 25 to 35 workers would be on-site per day for each building. In addition, approximately two to three trucks would enter and leave the project site per day for each building. As described above, since stockpiling is expected in Phase 1, there would also be trucks on-site stockpiling materials during this construction phase. Stockpiling is not expected during Phase 2 construction.

Below-Grade Hazardous Materials

All construction subsurface soil disturbances would be performed in accordance with an NYCDEP-approved RAP and CHASP. The RAP would provide for the appropriate handling, stockpiling, testing, transportation, and disposal of excavated materials, as well as any unexpectedly encountered tanks, in accordance with all applicable federal, state, and local regulatory requirements. The CHASP would ensure that all subsurface disturbances are done in a manner protective of workers, the community, and the environment.

Dewatering

The excavated area would not be water proof until the slab-on-grade is built. In addition, rain and snow could collect in the excavation, and that water would have to be removed. Temporary erosion and sediment controls during construction may include settling ponds and approved filtration systems, some of which could become integrated into permanent site features. The decanted water would then be discharged into the New York City sewer system. The settled sediments, spent filters, and removed materials would be transported to a licensed disposal area. Discharge in the sewer system is governed by NYCDEP regulations.

NYCDEP has a formal procedure for issuing a Letter of Approval to discharge into the New York City sewer system. The authorization is issued by the NYCDEP Borough office if the discharge is less than 10,000 gallons per day; an additional approval by the Division of Connections & Permitting is needed if the discharge is more than 10,000 gallons per day. All chemical and physical testing of the water has to be done by a laboratory that is certified by the New York State Department of Health (NYSDOH). The design of the pretreatment system has to be signed by a New York State Professional Engineer or Registered Architect. NYCDEP regulations specify the maximum pollutants concentration limits for water discharged into New York City sewers. NYCDEP can also impose project-specific limits, depending on the location of the project and contamination that has been found in nearby areas.

SUPERSTRUCTURE

The cores of each project building create the building’s framework (beams and columns) and floor decks. For the proposed project, the superstructure would either consist of reinforced concrete or be constructed of steel. Construction of the interior structure, or core, of the proposed buildings would include elevator shafts; vertical risers for mechanical, electrical, and plumbing systems; electrical and mechanical equipment rooms; core stairs; and restroom areas. Core construction would begin when the podium over the foundation is completed and would continue through the interior construction and finishing stage.

Superstructure activities would require the use of cranes, derricks, delivery trucks, forklifts, or loaders, and other heavy equipment such as tower cranes or crawler cranes, concrete pumps, welding machines, rebar benders and cutters, and compressors. Temporary construction elevators (hoists) would also be constructed for the delivery of materials and vertical movement of workers during this stage. Cranes would be used to lift structural components, façade elements, large construction equipment, and other large materials. Smaller construction materials and debris generated during this stage of construction would generally be moved with hoists. During peak construction, the number of workers would be about 30 to 80 per day for each building, depending on the size of the proposed building. Anywhere from 15 to 20 trucks per day would deliver materials to each building.

EXTERIOR FAÇADE

As the superstructure advances upward above ground, installation of the vertical mechanical systems would commence. After the superstructure is 5 to 10 floors above street grade, the exterior façade would be installed on the lower floors. Exterior construction would overlap with the superstructure task. The exterior façade would arrive on trucks and be lifted into place for attachment by cranes. Each day, approximately 15 workers and two to five trucks would be required for the exterior construction of each building.

INTERIORS, FINISHING, AND COMMISSIONING

This stage would include the construction of interior partitions, installation of lighting fixtures, and interior finishes (flooring, painting, etc.), and mechanical and electrical work. This activity would employ the greatest number of construction workers: with about 140 to 160 workers per day for each building. In addition, about 10 trucks per day per building would arrive and leave the construction site. Equipment used during interior construction would include exterior hoists, pneumatic equipment, delivery trucks, and a variety of small hand-held tools. Cranes may be used to lift mechanical equipment onto the roof of the building. While the greatest number of construction workers would be on-site during this stage of construction, this is the quietest because most of the construction activities would occur within the buildings.

E. NUMBER OF CONSTRUCTION WORKERS AND MATERIAL DELIVERIES

Construction is labor intensive, and the number of workers varies with the general construction task and the size of the building. Likewise, material deliveries generate many truck trips, and the number also varies. **Table 20-3** shows the estimated numbers of workers and deliveries to the project area by calendar quarter for all construction. These represent the average number of daily workers and trucks within each quarter. The average number of workers would be about 523 per day during Phase 1 and 311 per day during Phase 2. The average number of trucks would be 37 per day during Phase 1 and 21 per day during Phase 2.

Table 20-3
Average Number of Daily Workers and Trucks by Quarter

Phase 1																
Year	**2014**				**2015**				**2016**				**2017**			
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Workers	133	186	201	209	279	379	689	839	770	781	808	**867**	840	644	215	133
Trucks	10	13	15	19	25	34	**67**	65	66	59	49	37	31	29	3	5
Phase 2																
Year	**2024**				**2025**				**2026**				**2027**			
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Workers		72	131	147	207	352	435	455	494	508	481	516	465	377	207	149
Trucks		15	20	22	21	22	**35**	30	27	25	18	28	29	22	11	11
Year	**2028**															
Quarter	1st	2nd	3rd	4th												
Workers	104															
Trucks	10															
Year	**2034**				**2035**				**2036**				**2037**			
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Workers		38	71	119	137	319	360	349	460	452	467	**529**	477	402	224	129
Trucks		15	20	20	23	29	26	22	21	16	18	24	24	21	13	9
									Phase 1				**Phase 2**			
									Average		**Peak**		**Average**		**Peak**	
									523		867		311		529	
									37		67		21		35	

Notes: Construction would begin In the first quarter of 2014.
Sources: Tishman Construction Corporation

F. ENVIRONMENTAL EFFECTS OF PROJECT CONSTRUCTION ACTIVITIES

Similar to many large development projects in New York City, construction can be disruptive to the surrounding area for periods of time. The following analyses describe potential construction impacts with respect to transportation, air quality, noise and vibration, historic resources, hazardous materials, natural resources, open space, socioeconomic conditions, community facilities, and land use and neighborhood character.

TRANSPORTATION

TRAFFIC

Construction activities would generate construction worker and truck traffic. Based on the construction sequencing and worker/truck projections presented above, detailed trip generation estimates were developed to identify the construction-related peak hour trip-making activities. These estimates were then used as the basis for assessing the potential transportation-related impacts during construction. For Phase 1 construction, the projected peak construction traffic would be greater than the full build-out of the proposed project would generate, albeit during different peak hours. Therefore, a detailed analysis of traffic operations during Phase 1 construction was prepared for several key study area intersections (seven in total) to identify the potential construction-related significant adverse traffic impacts.

During Phase 2 construction, peak activities generated by construction workers and truck deliveries would be substantially lower in comparison to those during Phase 1 construction. However, the combination of the Phase 2 construction with the new trips generated by the operational uses of the completed Phase 1 and partially completed Phase 2 components may also create a potential for significant adverse traffic impacts during Phase 2 construction. Because the cumulative trip-making during Phase 2 construction would be less than projected for the full build-out of the proposed project, the potential impacts during this construction phase were addressed qualitatively. As presented below, the detailed analysis of traffic operations during Phase 1 construction concluded that there would be a potential for significant adverse traffic impacts at four of the seven analyzed intersections. Two of these impacted intersections could be mitigated using standard mitigation measures typically implemented by NYCDOT; practical mitigation measures could not be determined at this time for the other two impacted intersections. The recommended mitigation measures would be consistent with those proposed to mitigate the intersection impacts associated with the project's build-out and occupancy. An analysis of Phase 2 construction efforts determined that the cumulative trips generated under the Phase 2 construction scenario would be less than the operational full build-out of the project in 2038. As a result, the anticipated construction impacts would be within the envelope of traffic impacts identified for the 2038 With Action condition in Chapter 14, "Transportation," and can be similarly addressed with the mitigation measures described in Chapter 21, "Mitigation," to mitigate the projected significant adverse traffic impacts. Where operational impacts have been deemed unmitigatable, they may also be unmitigatable during Phase 2 construction.

Construction Trip Generation

Average daily construction worker and truck activities by quarter were projected for the entire construction period. Phase 1 construction is anticipated to begin in the first quarter of 2014. Phase 2 construction would start several years after the completion of Phase 1 in mid-2024 and be completed by the late 2037. Phase 1 and Phase 2 worker and truck trip projections were refined to account for worker modal splits and vehicle occupancy, arrival and departure distribution, and passenger car equivalent (PCE) factors for construction truck traffic.[1] These estimates are presented in **Tables 20-4** and **20-5**.

Table 20-4
Phase 1 Construction Trip Generation

Vehicle PCEs (Autos + Trucks)	2014				2015				2016				2017			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
6 AM - 7 AM	65	86	96	103	134	186	342	397	374	370	369	380	365	283	86	0
7 AM - 8 AM	17	26	28	29	40	50	96	111	104	101	100	102	95	76	21	0
8 AM -9 AM	4	4	8	8	12	12	28	28	28	24	20	16	12	12	0	0
9 AM -10 AM	4	4	8	8	12	12	28	28	28	24	20	16	12	12	0	0
10 AM - 11 AM	4	4	8	8	12	12	28	28	28	24	20	16	12	12	0	0
11 AM - 12 PM	4	4	8	4	8	12	24	24	24	24	20	12	12	12	0	0
12 PM - 1 PM	4	4	4	8	8	12	28	24	28	24	20	16	12	12	0	0
1 PM - 2 PM	0	4	0	4	4	12	12	12	8	8	12	4	4	8	0	0
2 PM - 3 PM	3	9	5	9	11	17	29	33	31	31	28	30	29	20	5	0
3 PM - 4 PM	57	78	80	87	114	158	286	345	318	322	329	352	341	259	86	0
4 PM - 5 PM	10	13	15	16	21	29	51	62	57	58	60	64	62	48	16	0
5 PM – 6 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Total	172	236	260	284	376	512	952	1,092	1,028	1,010	998	1,008	956	754	214	0

Daily Workforce and Truck Deliveries

Peak Phase 1 construction traffic is expected to take place from the third quarter of 2015 to the first quarter of the 2017 with little fluctuation in volumes. For a reasonable worst-case analysis of potential transportation-related impacts during construction, the daily workforce and truck trip projections during this period were used as the basis for estimating peak hour construction trips. It is expected that construction activities would generate the highest amount of daily traffic in the fourth quarter of 2015, with an estimated average of 839 workers and 65 truck deliveries per day (see **Appendix 20** for details).

After the completion and occupancy of the Phase 1 buildings, Phase 2 construction of the remaining site is expected to commence in mid-2024 and continue through the end of 2037 in two separate development segments—2024 to 2028 (Phase 2A) and 2034 to 2037 (Phase 2B). In Phase 2A, the highest amount of daily traffic would occur during the fourth quarter of 2026, with 516 daily workers and 28 daily truck deliveries, while in Phase 2B, the highest amount of daily traffic would occur during the fourth quarter of 2036, with 529 daily workers and 24 daily truck deliveries. These estimates of construction activities are further discussed below.

Construction Worker Modal Splits and Vehicle Occupancy

Based on the 2000 Census data on the construction and excavation industry for tracts in Astoria, Long Island City, and Roosevelt Island, approximately 58 percent of the construction workers would be expected to travel to the site by private autos at an average occupancy of 1.17 persons per vehicle. The remaining 42 percent would use public transportation.

[1] The traffic analysis assumed that each truck has a PCE of 2.0.

Table 20-5
Phase 2 Construction Trip Generation

Vehicle PCEs (Autos + Trucks)	2024				2025				2026				2027			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
6 AM - 7 AM		45	72	82	102	163	209	213	224	226	210	**233**	213	174	94	71
7 AM - 8 AM		15	21	27	33	47	59	57	61	62	56	63	58	45	25	19
8 AM -9 AM		8	8	8	8	8	16	12	12	12	8	12	12	8	4	4
9 AM -10 AM		8	8	8	8	8	16	12	12	12	8	12	12	8	4	4
10 AM - 11 AM		8	8	8	8	8	16	12	12	12	8	12	12	8	4	4
11 AM - 12 PM		4	8	8	8	8	12	12	12	12	8	12	12	8	4	4
12 PM - 1 PM		4	8	8	8	8	12	12	12	12	8	12	12	8	4	4
1 PM - 2 PM		0	4	4	4	4	4	4	4	0	0	4	8	8	4	4
2 PM - 3 PM		2	7	8	9	13	15	15	12	13	12	17	16	13	5	4
3 PM - 4 PM		33	56	62	86	143	181	189	200	206	194	**209**	189	154	86	63
4 PM - 5 PM		5	10	11	16	26	32	34	37	37	36	38	34	28	16	11
5 PM - 6 PM		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Total		132	210	234	290	436	572	572	598	604	548	**624**	578	462	250	192
Vehicle PCEs (Autos + Trucks)	**2028**															
	1Q	**2Q**	**3Q**	**4Q**												
6 AM - 7 AM	54				No construction activities projected for 2029 to 2033											
7 AM - 8 AM	14															
8 AM -9 AM	4															
9 AM -10 AM	4															
10 AM - 11 AM	4															
11 AM - 12 PM	4															
12 PM - 1 PM	4															
1 PM - 2 PM	0															
2 PM - 3 PM	3															
3 PM - 4 PM	46															
4 PM - 5 PM	7															
5 PM - 6 PM	0															
Daily Total	144															
6 AM - 7 AM		31	48	67	78	154	170	162	202	195	206	**234**	213	179	101	59
7 AM - 8 AM		12	15	20	22	44	48	43	54	53	54	60	55	48	26	17
8 AM -9 AM		8	8	8	8	12	12	8	8	8	8	8	8	8	4	4
9 AM -10 AM		8	8	8	8	12	12	8	8	8	8	8	8	8	4	4
10 AM - 11 AM		8	8	8	8	12	12	8	8	8	8	8	8	8	4	4
11 AM - 12 PM		4	8	8	8	12	8	8	8	8	8	8	8	8	4	4
12 PM - 1 PM		4	8	8	8	12	8	8	8	4	8	12	12	8	8	4
1 PM - 2 PM		0	4	4	8	8	4	8	8	0	0	8	8	8	4	4
2 PM - 3 PM		1	6	7	11	12	13	13	15	11	12	21	20	14	10	3
3 PM - 4 PM		19	32	51	58	130	146	142	186	183	190	**214**	193	163	93	51
4 PM - 5 PM		3	5	9	11	24	27	26	35	34	34	39	35	30	16	10
5 PM - 6 PM		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Total		98	150	198	228	432	460	434	540	512	536	**620**	568	482	274	164

Peak Hour Construction Worker Vehicle and Truck Trips

According to Cornell, site activities would mostly take place during the construction shift of 7:00 AM to 3:30 PM. While construction truck trips would be made throughout the day (with more trips made during the early morning), most trucks would remain in the area for short durations and construction workers would typically commute 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"). Furthermore, in accordance with the June 2012 *City Environmental Quality Review (CEQR) Technical Manual*, the traffic analysis assumed that each truck has a PCE of 2.0.

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 (approximately 80 percent) of the arrival and departure trips would take place during the hour before and after each shift. For construction trucks, deliveries would occur throughout the day when the construction site is active. Construction truck deliveries typically peak during the early morning (approximately 25 percent), overlapping with construction worker arrival traffic. The peak construction hourly trip projections for Phase 1 and Phase 2 construction are summarized in **Tables 20-6**, **20-7A** (Phase 2A), and **20-7B** (Phase 2B).

Table 20-6
Phase 1 Peak Construction Vehicle Trip Projections

Hour	Auto Trips Regular Shift			Truck Trips Regular Shift			Total Vehicle Trips			Total PCE Trips		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Weekday (4th Quarter of 2015)												
6 AM - 7 AM	333	0	333	16	16	32	349	16	365	365	32	397
7 AM - 8 AM	83	0	83	7	7	14	90	7	97	97	14	111
8 AM - 9 AM	0	0	0	7	7	14	7	7	14	14	14	28
9 AM - 10 AM	0	0	0	7	7	14	7	7	14	14	14	28
10 AM - 11 AM	0	0	0	7	7	14	7	7	14	14	14	28
11 AM - 12 PM	0	0	0	6	6	12	6	6	12	12	12	24
12 PM - 1 PM	0	0	0	6	6	12	6	6	12	12	12	24
1 PM - 2 PM	0	0	0	3	3	6	3	3	6	6	6	12
2 PM - 3 PM	0	21	21	3	3	6	3	24	27	6	27	33
3 PM - 4 PM	0	333	333	3	3	6	3	336	339	6	339	345
4 PM - 5 PM	0	62	62	0	0	0	0	62	62	0	62	62
Daily Total	416	416	832	65	65	130	481	481	962	546	546	1,092

Notes: Hourly construction worker and truck trips were derived from an estimated quarterly average number of construction workers and truck deliveries per day, with each truck delivery resulting in two daily trips (arrival and departure). Construction peak hours are shaded in this table.

Table 20-7A
Phase 2A Peak Construction Vehicle Trip Projections

Hour	Auto Trips Regular Shift			Truck Trips Regular Shift			Total Vehicle Trips			Total PCE Trips		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Weekday (4th Quarter of 2026)												
6 AM - 7 AM	205	0	205	7	7	14	212	7	219	219	14	233
7 AM - 8 AM	51	0	51	3	3	6	54	3	57	57	6	63
8 AM - 9 AM	0	0	0	3	3	6	3	3	6	6	6	12
9 AM - 10 AM	0	0	0	3	3	6	3	3	6	6	6	12
10 AM - 11 AM	0	0	0	3	3	6	3	3	6	6	6	12
11 AM - 12 PM	0	0	0	3	3	6	3	3	6	6	6	12
12 PM - 1 PM	0	0	0	3	3	6	3	3	6	6	6	12
1 PM - 2 PM	0	0	0	1	1	2	1	1	2	2	2	4
2 PM - 3 PM	0	13	13	1	1	2	1	14	15	2	15	17
3 PM - 4 PM	0	205	205	1	1	2	1	206	207	2	207	209
4 PM - 5 PM	0	38	38	0	0	0	0	38	38	0	38	38
Daily Total	256	256	512	28	28	56	284	284	568	312	312	624

Note: Hourly construction worker and truck trips were derived from an estimated quarterly average number of construction workers and truck deliveries per day, with each truck delivery resulting in two daily trips (arrival and departure).

Table 20-7B
Phase 2B Peak Construction Vehicle Trip Projections

Hour	Auto Trips			Truck Trips			Total					
	Regular Shift			Regular Shift			Vehicle Trips			PCE Trips		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Weekday (4th Quarter of 2036)												
6 AM - 7 AM	210	0	210	6	6	12	216	6	222	222	12	234
7 AM - 8 AM	52	0	52	2	2	4	54	2	56	56	4	60
8 AM - 9 AM	0	0	0	2	2	4	2	2	4	4	4	8
9 AM - 10 AM	0	0	0	2	2	4	2	2	4	4	4	8
10 AM - 11 AM	0	0	0	2	2	4	2	2	4	4	4	8
11 AM - 12 PM	0	0	0	2	2	4	2	2	4	4	4	8
12 PM - 1 PM	0	0	0	3	3	6	3	3	6	6	6	12
1 PM - 2 PM	0	0	0	2	2	4	2	2	4	4	4	8
2 PM - 3 PM	0	13	13	2	2	4	2	15	17	4	17	21
3 PM - 4 PM	0	210	210	1	1	2	1	211	212	2	212	214
4 PM - 5 PM	0	39	39	0	0	0	0	39	39	0	39	39
Daily Total	262	262	524	24	24	48	286	286	572	310	310	620

Note: Hourly construction worker and truck trips were derived from an estimated quarterly average number of construction workers and truck deliveries per day, with each truck delivery resulting in two daily trips (arrival and departure).

The maximum Phase 1 construction activities would result in 397 PCEs between 6 and 7 AM and 345 PCEs between 3 and 4 PM on weekdays in the fourth quarter of 2015. Phase 2 construction activities would result in 233 PCEs between 6 and 7 AM and 209 PCEs between 3 and 4 PM in the fourth quarter of 2026 (Phase 2A) and 234 PCEs between 6 and 7 AM and 214 PCEs between 3 and 4 PM in the fourth quarter of 2036 (Phase 2B). Since the projected construction peak hour traffic volumes during Phase 1 construction would be greater than the incremental peak hour traffic associated with the build-out of the proposed project, a detailed analysis of the construction peak hours of 6 to 7 AM and 3 to 4 PM was prepared to identify the potential traffic impacts during Phase 1 construction. Since the traffic contribution from the Phase 2 construction activities would be less than those projected for Phase 1 construction, the cumulative effects of these activities together with those generated by the completed Phase 1 components of the proposed project would also need to be considered, as further described below.

Phase 1 Construction Traffic Capacity Analysis

Seven study area intersections were selected for analysis of peak Phase 1 construction (fourth quarter of 2015). The operations at these intersections were analyzed using the Highway Capacity Software (HCS+) version 5.5, which is based on the methodologies presented in the *2000 Highway Capacity Manual (HCM)*. A discussion of the analysis methodology can be found in Chapter 14, "Transportation."

Future without Construction of the Proposed Project

Since, as described earlier, the peak Phase 1 construction period would be relatively flat between 2015 and 2017 and extend almost until the completion of the Phase 1 development in 2018, traffic volumes from the 2018 No Action condition were used as the baseline for the detailed Phase 1 construction traffic analysis. This analysis approach is conservative because it assumes all background traffic growth and No Action projects through 2018 would be added to the roadway network by 2015 to 2017, including both Southtown construction traffic and traffic from Southtown's residential units on Roosevelt Island. According to projections, Southtown construction would generate 95 auto trips and 8 truck trips during the 6-7 AM morning construction peak hour and 95 auto trips and 2 truck trips during the 3-4 PM afternoon construction peak hour. It is assumed that on-site parking for up to 30 autos would be provided at Southtown, and the remainder of construction workers would park at the Motorgate garage.

Based on the Automatic Traffic Recorder (ATR) traffic volume data collected to determine existing conditions (see Chapter 14, "Transportation"), overall background traffic volumes during the 6-7 AM construction peak hour are approximately 36 percent lower than the 7:30-8:30 AM peak hour analyzed for Phase 1 and Phase 2 conditions, and overall traffic volumes during the 3-4 PM construction peak hour are about 6 percent higher than the 4:30-5:30 PM peak hour; therefore, 2018 No Action traffic volumes were decreased for the 6-7 AM construction peak hour and increased for the 3-4 PM construction peak hour proportionate to the differences stated above and layered with Southtown construction traffic to create the 6-7 AM and 3-4 PM No Action construction peak hour traffic volumes (see **Appendix 20**).

The intersections of East/West Main Street at Main Street, West Road at Main Street, Main Street at the Roosevelt Avenue Bridge, Vernon Boulevard at 36th Avenue/Roosevelt Island Bridge, 36th Avenue at 21st Street, Broadway at 21st Street, and Astoria Boulevard/27th Avenue/Newtown Avenue at 21st Street were analyzed for potential construction traffic impacts. For the Phase 1 No Action construction condition, all seven intersections during the 6-7 AM construction peak hour and four of the seven intersections in the 3-4 PM construction peak hour would operate at an overall acceptable level of service. In the 3-4 PM period, Vernon Boulevard at 36th Avenue/Roosevelt Island Bridge, Broadway at 21st Street, and Astoria Boulevard/27th Avenue/Newtown Avenue at 21st Street would operate at overall unacceptable LOS E. Of the 29 traffic movements analyzed during the AM and PM construction peak hours, one movement would operate at unacceptable levels of service (i.e., mid-LOS D or worse) during the AM construction peak hour and eight movements would operate at unacceptable levels of service in the PM construction peak hour. A detailed summary of the No Action construction peak hour analysis results is provided in **Table 20-8**.

Future with Construction of the Proposed Project

According to projections presented above (see Table 20-6), peak Phase 1 construction activities would generate 333 autos and 32 trucks during the 6-7 AM construction peak hour (trip assignment presented in Appendix 20) and 333 autos and 6 trucks during the 3-4 PM construction peak hour (trip assignment presented in Appendix 20). It is expected that on-site parking for up to 100 autos would be provided at the Cornell project site, and the remainder of construction workers traveling by car would park at the Motorgate garage. Construction trucks would follow NYCDOT-designated truck routes, including the RFK Bridge, Queensboro Bridge, Queens-Midtown Tunnel, 21st Street, Broadway, and Vernon Boulevard, to travel to the project site and would then use 36th Avenue and Main Street to access the construction site. The overall projected 6-7 AM and 3-4 PM construction peak hour traffic volumes are also presented in Appendix 20.

An analysis of the seven construction study area intersections showed that the intersection of Vernon Boulevard at 36th Avenue/Roosevelt Island Bridge would be significantly impacted during both the 6-7 AM and 3-4 PM construction peak hours and that the intersections of 36th Avenue at 21st Street, Broadway at 21st Street, and Astoria Boulevard/27th Avenue/Newtown Avenue at 21st Street would be significantly impacted only during the 3-4 PM construction peak hour. Significant impacts at 36th Avenue/Roosevelt Island Bridge at Vernon Boulevard (AM construction peak hour only), 36th Avenue and 21st Street, and Astoria Boulevard/27th Avenue/Newtown Avenue at 21st Street ~~all four impacted locations~~ could be mitigated using standard mitigation measures typically implemented by

Table 20-8
Phase 1 No Action Construction Traffic Levels of Service

Intersection	App	Construction 6-7 AM Peak Hour				Construction 3-4 PM Peak Hour			
		Lane Group	V/C Ratio	Delay (SPV)	LOS	Lane Group	V/C Ratio	Delay (SPV)	LOS
East/West Main Street and Main Street									
West Road	EB	LT	-	7.1	A	LT	-	7.5	A
Main Road	SB	LR	-	7.1	A	LR	-	7.2	A
Overall Intersection		-	-	7.1	A	-	-	7.3	A
West Road and Main Street									
West Road	EB	LR	-	8.5	A	LR	-	9.5	A
West Road (south of island)	EB	LR	-	10.4	B	LR	-	10.8	B
Main Street	NB	LT	-	8.8	A	LT	-	10.6	B
	SB	TR	-	8.6	A	TR	-	9.1	A
Overall Intersection		-	-	8.9	A	-	-	10.1	B
Roosevelt Island Bridge Ramp and Main Street									
Roosevelt Isl. Bridge Ramp	WB	LR	-	10.4	B	LR	-	11.6	B
Main Street	NB	T	-	9.2	A	T	-	9.8	A
		R	-	8.8	A	R	-	10.4	B
	SB	LT	-	9.8	A	LT	-	15.6	C
Overall Intersection		-	-	9.8	A	-	-	12.9	B
Roosevelt Island Bridge/36th Avenue/Vernon Boulevard									
Roosevelt Island Bridge	EB	L	0.19	11.8	B	L	0.54	15.4	B
		TR	0.38	13.6	B	TR	0.79	20.1	C
36th Avenue	WB	LTR	0.31	12.8	B	LTR	0.33	13.6	B
Vernon Boulevard	NB	LTR	~~0.73~~ 0.62	~~15.7~~ 14.3	B	LTR	~~1.27~~ 1.20+	~~139.3~~ 138.3	F
	SB	LTR	~~0.72~~ 0.61	~~16.1~~ 14.1	B	LTR	0.90	29.8	C
Overall Intersection		-	~~0.56~~ 0.50	~~14.8~~ 13.7	B	-	1.03	~~59.9~~ 59.6	E
36th Avenue and 21st Street									
36th Avenue	EB	LTR	0.41	34.5	C	LTR	0.80	42.9	D
	WB	LTR	0.59	36.4	D	LTR	0.87	51.9	D
21st Street	NB	LTR	0.21	10.9	B	LTR	0.97	30.3	C
	SB	LTR	0.65	15.6	B	LTR	0.75	19.7	B
Overall Intersection		-	0.63	19.3	B	-	0.93	30.3	C
Broadway and 21st Street									
Broadway	EB	LTR	~~0.60~~ 0.53	~~43.8~~ 41.6	D	LTR	~~1.22~~ 1.20+	~~146.9~~ 145.1	F
	WB	LTR	~~0.55~~ 0.49	~~40.8~~ 39.6	D	LTR	~~1.29~~ 1.20+	~~179.8~~ 167.1	F
21st Street	NB	LTR	~~0.31~~ 0.30	~~13.6~~ 13.5	B	LTR	~~0.99~~ 0.98	~~36.9~~ 35.8	D
	SB	LTR	~~0.65~~ 0.63	~~17.8~~ 17.3	B	LTR	~~0.76~~ 0.74	~~22.0~~ 21.4	C
Overall intersection		-	~~0.64~~ 0.60	~~21.5~~ 20.6	C	-	~~1.08~~ 1.07	~~57.1~~ 55.0	E
Astoria Boulevard/27th Avenue/Newtown Avenue and 21st Street									
Astoria Boulevard	EB	L	~~0.54~~ 0.50	~~46.5~~ 45.5	D	L	0.50	42.9	D
		TR	~~0.55~~ 0.53	~~44.5~~ 44.1	D	TR	~~0.84~~ 0.82	~~52.1~~ 50.9	D
	WB	L	0.63	42.0	D	L	~~0.95~~ 0.93	~~73.1~~ 70.0	E
		TR	~~0.56~~ 0.48	~~40.0~~ 38.9	D	TR	~~0.82~~ 0.73	~~53.7~~ 49.3	D
21st Street	NB	LTR	~~0.44~~ 0.43	~~25.8~~ 25.7	C	LTR	~~1.17~~ 1.14	~~111.7~~ 96.8	F
	SB	LTR	0.72	28.3	C	LTR	0.96	~~42.5~~ 42.3	D
Overall Intersection		-	0.65	~~34.2~~ 33.7	C	-	~~1.03~~ 1.01	~~69.9~~ 64.1	E

Notes: Control delay is measured in seconds per vehicle. Overall intersection V/C ratio is the critical lane group’s V/C ratio.

NYCDOT. Mitigation identified for 36th Avenue/Roosevelt Island Bridge at Vernon Boulevard could only partially mitigate impacts during the PM construction peak hour. The recommended mitigation measures would be ~~consistent with~~ similar to those proposed to mitigate the intersection impacts associated with the project's build-out and occupancy. ~~Additional review of potential mitigation measures that may fully or partially mitigate these significant impacts will be undertaken for the Final EIS.~~ **Tables 20-9** and **20-10** summarize the capacity analysis results and mitigation recommendations for the 6 to 7 AM and 3 to 4 PM construction peak hours, respectively. A discussion of these results for each of the impacted intersections is provided below.

- *Roosevelt Island Bridge/36th Avenue and Vernon Boulevard*—Impacts on the northbound Vernon Boulevard shared left-turn/through/right-turn movement would occur during the AM and PM construction peak hours and impacts on the eastbound Roosevelt Island Bridge shared through/right-turn movement would occur during the PM construction peak hour. These impacts could be fully mitigated for only the AM construction peak hour and partially mitigated for the PM construction peak hour by modifying the signal timing. ~~are currently identified as unmitigatable, but additional review of potential mitigation measures will be undertaken for the Final EIS that may fully or partially mitigate these significant impacts~~.
- *36th Avenue and 21st Street*—Impacts on the eastbound 36th Avenue shared left-turn/through/right-turn movement and on the westbound 36th Avenue shared left-turn/through/right-turn movement would occur during the PM peak hour and could be mitigated by modifying the signal timing, shifting the eastbound approach centerline six feet to the north and restriping the approach from one 25-foot wide travel lane to one 11-foot wide exclusive left-turn lane and one 20-foot wide shared through/right-turn lane with parking for a distance of 200 feet back from the intersection and shifting the westbound approach centerline six feet to the south and restriping the approach from one 25-foot wide travel lane to one 11-foot wide exclusive left-turn lane and one 20-foot wide shared through/right-turn lane with parking for a distance of 125 feet back from the intersection.
- *Broadway and 21st Street*—Impacts on the eastbound Broadway shared left-turn/through/right-turn movement, the westbound Broadway shared left-turn/through/right-turn movement, and on the northbound 21st Street shared left-turn/through/right-turn movement would occur during the PM peak hour. These impacts could be fully mitigated by modifying the signal timing during the PM peak hour ~~are currently identified as unmitigatable, but additional review of potential mitigation measures will be undertaken for the Final EIS that may fully or partially mitigate these significant impacts~~.

Table 20-9
Phase 1 No Action, With Action, Mitigated Conditions Construction AM Peak Hour Traffic Levels of Service

Intersection	App	Phase 1 Construction No Action Condition				Phase 1 Construction With Action Condition				Phase 1 Construction Mitigated Condition				Recommended Mitigation Measures
		Lane Group	V/C Ratio	Delay (SPV)	LOS	Lane Group	V/C Ratio	Delay (SPV)	LOS	Lane Group	V/C Ratio	Delay (SPV)	LOS	
East/West Main Street and Main Street														
West Road	EB	LT	-	7.1	A	LT	-	7.4	A					Mitigation not required.
Main Road	SB	LR	-	7.1	A	LR	-	8.6	A					
Overall Intersection		-	-	7.1	A	-	-	8.5	A					
West Road and Main Street														
West Road	EB	LR	-	8.5	A	LR	-	9.6	A					Mitigation not required.
West Road (south of island)	EB	LR	-	10.4	B	LR	-	11.7	B					
Main Street	NB	LT	-	8.8	A	LT	-	9.2	A					
	SB	TR	-	8.6	A	TR	-	10.6	B					
Overall Intersection		-	-	8.9	A	-	-	10.3	B					
Roosevelt Island Bridge Ramp and Main Street														
Roosevelt Isl. Bridge Ramp	WB	LR	-	10.4	B	LR	-	14.3	B					Mitigation not required.
Main Street	NB	T	-	9.2	A	T	-	9.7	A					
		R	-	8.8	A	R	-	10.1	B					
	SB	LT	-	9.8	A	LT	-	10.5	B					
Overall Intersection		-	-	9.8	A	-	-	12.5	B					
Roosevelt Island Bridge/36th Avenue/Vernon Boulevard														
Roosevelt Island Bridge	EB	L	0.19	11.8	B	L	~~0.30~~ 0.28	~~13.7~~ 13.2	B	L	0.31	15.1	B	-Modify signal timing: shift 2 s green time from EB/WB phase to NB/SB phase [EB/WB green time shifts from 25 s to 23 s; NB/SB green time shifts from 25 s to 27 s]. ~~Unmitigatable Impact~~
		TR	0.38	13.6	B	TR	~~0.42~~ 0.40	~~14.1~~ 13.9	B	TR	0.44	15.7	B	
36th Avenue	WB	LTR	0.31	12.8	B	LTR	0.57	16.7	B	LTR	0.62	19.4	B	
Vernon Boulevard	NB	LTR	~~0.73~~ 0.62	~~15.7~~ 14.3	B	LTR	~~1.38~~ 1.14	~~191.2~~ 82.9	~~F~~E*	LTR	1.02	35.0	D	
	SB	LTR	~~0.72~~ 0.61	~~16.1~~ 14.1	B	LTR	~~0.87~~ 0.75	~~22.4~~ 17.2	~~C~~ B	LTR	0.70	14.0	B	
Overall Intersection		-	~~0.56~~ 0.50	~~14.8~~ 13.7	B	-	~~0.98~~ 0.85	~~65.3~~ 34.9	~~E~~ C	-	0.84	21.5	C	
36th Avenue and 21st Street														
36th Avenue	EB	LTR	0.41	34.5	C	LTR	0.44	35.1	D	L	0.20	31.8	C	Mitigation not required. -Shift centerline 6 ft to the north and restripe EB approach from one 25-ft travel lane to 11-ft exclusive left-turn lane, one 20-ft shared through-right lane with parking for 200 ft. -Shift centerline 6 ft to the south and restripe WB approach from one 25-ft travel lane to 11-ft exclusive left-turn lane, one 20-ft shared through-right lane with parking for 125 ft. **Mitigation analysis reflects improvements needed for the construction PM peak hour.**
		-	-	-	-	-	-	-	-	TR	0.34	33.3	C	
	WB	LTR	0.59	36.4	D	LTR	0.75	40.0	D	L	0.17	30.5	C	
		-	-	-	-	-	-	-	-	TR	0.69	38.4	D	
21st Street	NB	LTR	0.21	10.9	B	LTR	0.21	10.9	B	LTR	0.21	10.9	B	
	SB	LTR	0.65	15.6	B	LTR	0.74	17.2	B	LTR	0.74	17.2	B	
Overall Intersection		-	0.63	19.3	B	-	0.74	21.4	C	-	0.72	20.8	C	
Broadway and 21st Street														
Broadway	EB	LTR	~~0.60~~ 0.53	~~43.8~~ 41.6	D	LTR	~~0.63~~ 0.54	~~44.8~~ 41.9	D					Mitigation not required.
		-	-	-	-	-	-	-	-					
	WB	LTR	~~0.55~~ 0.49	~~40.8~~ 39.6	D	LTR	~~0.69~~ 0.60	~~44.3~~ 41.9	D					
		-	-	-	-	-	-	-	-					
21st Street	NB	LTR	~~0.31~~ 0.30	~~13.6~~ 13.5	B	LTR	~~0.31~~ 0.30	~~13.7~~ 13.5	B					
	SB	LTR	~~0.65~~ 0.63	~~17.8~~ 17.3	B	LTR	~~0.75~~ 0.69	~~19.7~~ 18.4	B					
Overall intersection		-	~~0.64~~ 0.60	~~21.5~~ 20.6	C	-	~~0.73~~ 0.66	~~23.1~~ 21.6	C					

Table 20-9 (Cont'd)
Phase 1 No Action, With Action, Mitigated Conditions Construction AM Peak Hour Traffic Levels of Service

		Phase 1 Construction No Action Condition				Phase 1 Construction With Action Condition				Phase 1 Construction Mitigated Condition				
Intersection	App	Lane Group	V/C Ratio	Delay (SPV)	LOS	Lane Group	V/C Ratio	Delay (SPV)	LOS	Lane Group	V/C Ratio	Delay (SPV)	LOS	Recommended Mitigation Measures
Astoria Boulevard/27th Avenue/Newtown Avenue and 21st Street														
Astoria Boulevard	EB	L	~~0.54~~ 0.50	~~46.5~~ 45.5	D	L	~~0.54~~ 0.50	~~46.5~~ 45.5	D	L	~~0.42~~ 0.50	~~28.5~~ 45.5	~~C~~ D	Mitigation not required. ~~Modify signal phasing: Add a new lag phase for the EB/WB exclusive left turns. The existing signal phasing [WB has 30 s green time; EB has 25 s green time; NB/SB has 50 s green time] would be modified to have the following: EB/WB will have 39 s green time; EB/WB exclusive left-turn phase will have 10 s green time ; NB/SB will have 56 s green time [each phase will have 3 s amber and 2 s all red].~~
		TR	~~0.55~~ 0.53	~~44.5~~ 44.1	D	TR	~~0.56~~ 0.54	~~44.8~~ 44.3	D	TR	~~0.36~~ 0.54	~~31.5~~ 44.3	~~C~~ D	
	WB	L	0.63	42.0	D	L	0.63	42.0	D	L	~~0.55~~ 0.63	~~28.2~~ 42.0	~~C~~ D	
		TR	~~0.56~~ 0.48	~~40.0~~ 38.9	D	TR	~~0.58~~ 0.50	~~40.4~~ 39.2	D	TR	~~0.44~~ 0.50	~~32.3~~ 39.2	~~C~~ D	
21st Street	NB	LTR	~~0.44~~ 0.43	~~25.8~~ 25.7	C	LTR	0.44	~~25.9~~ 25.8	C	LTR	~~0.39~~ 0.45	~~21.5~~ 26.0	C	-Restripe the NB approach from one 11-ft shared left-through lane and one 20-ft shared through-right lane with parking to one 11-ft shared left-through lane, one 10-ft travel lane, and one 10-ft parking lane which would serve as a right turn lane during the weekday PM peak period.
	SB	LTR	0.72	28.3	C	LTR	0.80	30.0	C	LTR	~~0.72~~ 0.80	~~26.3~~ 30.0	C	-Shift centerline 2 ft to the east and restripe SB approach from one 11-ft shared left-through lane and one 19-ft shared through-right lane with parking to one 11-ft shared left-through lane, one 10-ft travel lane, and one 11-ft parking lane which would serve as a right turn lane during the weekday PM peak period.
Overall Intersection		-	0.65	~~34.2~~ 33.7	C	-	~~0.70~~ 0.69	~~34.8~~ 34.3	C	-	0.69	~~26.8~~ 34.4	C	**Mitigation analysis reflects improvements needed for the construction PM peak hour.**

Notes: Control delay is measured in seconds per vehicle. Overall intersection V/C ratio is the critical lane group's V/C ratio. * indicates significant adverse impact.

Table 20-10
Phase 1 No Action, With Action, Mitigated Conditions Construction PM Peak Hour Traffic Levels of Service

Intersection	App	Phase 1 Construction No Action Condition Lane Group	V/C Ratio	Delay (SPV)	LOS	Phase 1 Construction With Action Condition Lane Group	V/C Ratio	Delay (SPV)	LOS	Phase 1 Construction Mitigated Condition Lane Group	V/C Ratio	Delay (SPV)	LOS	Recommended Mitigation Measures
East/West Main Street and Main Street														
West Road	EB	LT	-	7.5	A	LT	-	7.5	A					Mitigation not required.
Main Road	SB	LR	-	7.2	A	LR	-	7.4	A					
Overall Intersection		-	-	7.3	A	-	-	7.4	A					
West Road and Main Street														
West Road	EB	LR	-	9.5	A	LR	-	12.9	B					Mitigation not required.
West Road (south of island)	EB	LR	-	10.8	B	LR	-	10.9	B					
Main Street	NB	LT	-	10.6	B	LT	-	12.0	B					
	SB	TR	-	9.1	A	TR	-	10.1	B					
Overall Intersection		-	-	10.1	B	-	-	11.8	B					
Roosevelt Island Bridge Ramp and Main Street														
Roosevelt Isl. Bridge Ramp	WB	LR	-	11.6	B	LR	-	12.3	B					Mitigation not required.
Main Street	NB	T	-	9.8	A	T	-	9.8	A					
		R	-	10.4	B	R	-	12.6	B					
	SB	LT	-	15.6	C	LT	-	16.6	C					
Overall Intersection		-	-	12.9	B	-	-	13.9	B					
Roosevelt Island Bridge/36th Avenue/Vernon Boulevard														
Roosevelt Island Bridge	EB	L	0.54	15.4	B	L	0.70	18.8	B	L	0.66	23.9	C	Partially Mitigated -Modify the cycle length from 60 s to 90 s. EB/WB green time is 39 s; NB/SB green time is 41 s; each phase has 3 s of amber and 2 s of red time. ~~Unmitigatable Impacts~~
		TR	0.79	20.1	C	TR	1.20+	176.9	F*	TR	1.20+	162.0	F	
36th Avenue	WB	LTR	0.33	13.6	B	LTR	0.49	18.1	B	LTR	0.47	22.9	C	
Vernon Boulevard	NB	LTR	~~1.20+~~ 1.20+	~~139.3~~ 138.3	~~F~~ F	LTR	~~1.20+~~ 1.20+	~~146.3~~ 143.1	~~F~~ F*	LTR	1.20+	126.6	F	
	SB	LTR	0.90	29.8	C	LTR	0.90	~~30.1~~ 29.9	C	LTR	0.82	28.9	C	
Overall Intersection		-	~~1.03~~ 1.03	~~59.9~~ 59.6	~~E~~ E	-	1.20+	~~107.4~~ 106.5	F	-	1.20+	97.9	F	
36th Avenue and 21st Street														
36th Avenue	EB	LTR	0.80	42.9	D	LTR	1.20+	359.2	F*	L	0.87	50.9	D	-Shift centerline 6 ft to the north and restripe EB approach from one 25-ft travel lane to 11-ft exclusive left-turn lane, one 20-ft shared through-right lane with parking for 200 ft. -Shift centerline 6 ft to the south and restripe WB approach from one 25-ft travel lane to 11-ft exclusive left-turn lane, one 20-ft shared through-right lane with parking for 125 ft.
		-	-	-	-	-	-	-	-	TR	0.80	42.2	D	
	WB	LTR	0.87	51.9	D	LTR	0.92	58.8	E*	L	0.39	36.0	D	
		-	-	-	-	-	-	-	-	TR	0.68	40.9	D	
21st Street	NB	LTR	0.97	30.3	C	LTR	0.97	30.3	C	LTR	0.97	30.3	C	
	SB	LTR	0.75	19.7	B	LTR	0.75	19.7	B	LTR	0.75	19.7	B	
Overall Intersection		-	0.93	30.3	C	-	~~1.21~~ 1.20+	79.0	E	-	0.93	30.3	C	
Broadway and 21st Street														
Broadway	EB	LTR	1.20+	~~146.9~~ 145.1	F	LTR	1.20+	~~194.2~~ 188.2	F*	LTR	1.20+	145.4	F	~~Unmitigatable Impacts~~ Modify signal timing: shift 2 s green time from the LPI phase to the EB/WB phase and shift 2 s green time from the LPI phase to the NB/SB phase [EB/WB green time shifts from 31 s to 33 s; NB/SB green time shifts from 69 s to 71 s; LPI phase shifts from 10 s to 6 s].
		-	-	-	-	-	-	-	-	-	-	-	-	
	WB	LTR	1.20+	~~179.8~~ 167.1	F	LTR	1.20+	~~193.2~~ 177.4	F*	LTR	1.16	119.1	F	
		-	-	-	-	-	-	-	-	-	-	-	-	
21st Street	NB	LTR	~~0.99~~ 0.98	~~36.9~~ 35.8	D	LTR	~~1.05~~ 1.04	~~55.2~~ 53.2	~~E~~ D*	LTR	1.01	42.4	D	
	SB	LTR	~~0.76~~ 0.74	~~22.0~~ 21.4	C	LTR	~~0.76~~ 0.75	~~22.1~~ 21.5	C	LTR	0.72	19.7	B	
Overall intersection		-	~~1.08~~ 1.07	~~57.1~~ 55.0	E	-	~~1.14~~ 1.13	~~72.6~~ 69.5	E	-	1.08	53.9	D	

Table 20-10, cont'd
Phase 1 No Action, With Action, Mitigated Conditions Construction PM Peak Hour Traffic Levels of Service

Astoria Boulevard/27th Avenue/Newtown Avenue and 21st Street														
Astoria Boulevard	EB	L	0.50	42.9	D	L	0.50	42.9	D	L	~~0.44~~ 0.50	~~29.0~~ 42.9	~~C~~ D	~~Modify signal phasing: Add a new lag phase for the EB/WB. The existing signal phasing [WB has 24 s green time; EB has 28 s green time; NB/SB has 53 s green time] would be modified to have the following: EB/WB will have 39 s green time; EB/WB exclusive left-turn phase will have 10 s green time; NB/SB will have 56 s green time [each phase will have 3 s amber and 2 s all red].~~ -Prohibit parking along the NB approach for 100 ft from the intersection and for the SB approach for 100 ft from the intersection for the weekday PM peak period. -Restripe the NB approach from one 11-ft shared left-through lane and one 20-ft shared through-right lane with parking to one 11-ft shared left-through lane, one 10-ft travel lane, and one 10-ft parking lane which would serve as a right turn lane during the weekday PM peak period. -Shift centerline 2 ft to the east and restripe SB approach from one 11-ft shared left-through lane and one 19-ft shared through-right lane with parking to one 11-ft shared left-through lane, one 10-ft travel lane, and one 11-ft parking lane which would serve as a right turn lane during the weekday PM peak period.
		TR	~~0.84~~ 0.82	~~52.1~~ 50.9	D	TR	~~0.89~~ 0.87	~~55.8~~ 54.0	~~E~~ D	TR	~~0.64~~ 0.87	~~36.6~~ 54.0	D	
	WB	L	~~0.95~~ 0.93	~~73.1~~ 70.0	E	L	~~0.95~~ 0.93	~~73.1~~ 70.0	E	L	~~0.85~~ 0.93	~~52.1~~ 70.0	~~D~~ E	
		TR	~~0.82~~ 0.73	~~53.7~~ 49.3	D	TR	~~0.82~~ 0.73	~~53.7~~ 49.3	D	TR	~~0.47~~ 0.73	~~33.2~~ 49.3	~~C~~ D	
21st Street	NB	LTR	~~1.17~~ 1.14	~~111.7~~ 96.8	F	LTR	1.20+	~~149.6~~ 133.6	F*	~~LTR~~ LT	~~1.16~~ 0.83	~~103.1~~ 30.2	~~F~~ C	
		-	-	-	-	-	-	-	-	R	0.48	24.0	C	
	SB	LTR	0.96	~~42.5~~ 42.3	D	LTR	1.00	~~50.3~~ 49.8	D*	~~LTR~~ LT	~~0.91~~ 0.75	~~35.3~~ 29.7	~~D~~ C	
		-	-	-	-	-	-	-	-	R	0.27	21.7	C	
Overall Intersection		-	~~1.03~~ 1.01	~~69.9~~ 64.1	E	-	~~1.09~~ 1.06	~~86.3~~ 79.9	~~F~~ E	-	~~1.04~~ 0.86	~~59.1~~ 38.3	~~E~~ D	

Notes: Control delay is measured in seconds per vehicle. Overall intersection V/C ratio is the critical lane group's V/C ratio. * indicates significant adverse impact.

- *Astoria Boulevard/27th Avenue/Newtown Avenue and 21st Street*—Impacts on the northbound 21st Street shared left-turn/through/right-turn movement and the southbound 21st Street shared left-turn/through/right-turn movement would occur during the PM peak hour and could be mitigated by modifying the signal timing and by modifying the signal phasing to allow an eastbound/westbound exclusive left-turn phase. with the following measures:
- Prohibit parking along the northbound approach for the distance of 100 feet (a loss of approximately three parking spaces) and along southbound approach for a distance of 100 feet from the intersection (a loss of approximately four parking spaces) during the weekday PM peak period,
- Restripe the northbound approach from one 11-foot wide shared left-turn/through lane and one 20-foot wide shared through/right-turn lane with parking to one 11-foot wide shared left-turn/through lane, one 10-foot travel lane, and one 10-foot wide parking lane which would serve as a right turn lane during the weekday PM peak period, and
- Shift the southbound approach centerline two feet to the east and restripe the approach from one 11-foot wide shared left-turn/through lane and one 19-foot wide shared through/right-turn lane with parking to one 11-foot wide shared left-turn/through lane, one 10-foot wide travel lane, and one 11-foot wide parking lane which would serve as a right turn lane during the weekday PM peak period.

Comparison of Cumulative Operational and Construction Traffic

During Phase 2 construction, completed Phase 1 and Phase 2 components of the proposed project would generate incremental traffic to the area in addition to the activities anticipated to be generated by Phase 2 construction. As described above, peak Phase 2 construction is expected to occur in the fourth quarter of 2026 (Phase 2A) and the fourth quarter of 2036 (Phase 2B). A comparison of the projected traffic levels generated at the project site during peak Phase 2 construction and those upon full build-out of the proposed project in 2038 was developed and summarized in **Table 20-11**. As shown, the cumulative operational and construction traffic during peak Phase 2 construction would be of lower magnitudes than what the overall project would generate when completed in 2038. Therefore, the potential traffic impacts during peak Phase 2 construction would be within the envelope of significant adverse traffic impacts identified for the 2038 With Action condition in Chapter 14, “Transportation.”

Table 20-11
Comparison of Weekday Vehicle Trip Generation—Construction and Operational

Time	Peak Construction in 2026									2038 Full Build-Out Incremental Operational Trips in PCEs		
	Incremental Construction Trips in PCEs (Q4 2026)			Incremental Operational Trips from Completed Projects in PCEs			Total PCEs					
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
6-7 AM	219	14	233	3	2	5	222	16	238	4	3	7
7-8 AM	57	6	63	15	8	23	72	14	86	39	13	52
8-9 AM*	6	6	12	92	51	143	98	57	155	262	90	352
12-1 PM*	6	6	12	90	70	160	96	76	172	161	141	302
3-4 PM	2	207	209	21	42	63	23	249	272	27	67	94
4-5 PM*	0	38	38	71	108	179	71	146	217	116	288	404
Time	Peak Construction in 2036									2038 Full Build-Out Incremental Operational Trips in PCEs		
	Incremental Construction Trips in PCEs (Q4 2036)			Incremental Operational Trips from Completed Projects in PCEs			Total PCEs					
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
6-7 AM	222	12	234	5	3	8	227	15	242	4	3	7
7-8 AM	56	4	60	19	14	33	75	18	93	39	13	52
8-9 AM*	4	4	8	166	73	239	170	77	247	262	90	352
12-1 PM*	6	6	12	125	105	230	131	111	242	161	141	302
3-4 PM	2	212	214	22	44	66	24	256	280	27	67	94
4-5 PM*	0	39	39	95	189	284	95	228	323	116	288	404

Notes: Peak hours of operational traffic were determined to be 7:30-8:30 AM, 11:30-12:30 PM, and 4:15-5:15 PM.
Traffic volumes summarized for the 8-9 AM, 12-1 PM, and 4-5 PM account for a conservative overlap of construction-related traffic during these hours and operational trips during the operational analysis peak hours.
PCEs = passenger car equivalents where 1 truck trip equals 2 PCEs.

The construction and operational traffic increments summarized above provide an indication that peak hour traffic conditions during peak construction in 2026 and 2036 would be worse than those described for the 2018 Phase 1 completion but more favorable than those described for the 2038 full build-out. As detailed in Chapter 21, “Mitigation,” mitigation measures would be implemented at eight intersections to mitigate the 2018 operational traffic impacts. While the slightly higher traffic levels during peak construction in 2026 and 2036 could result in additional impacts beyond those identified for the 2018 Phase 1 With Action condition, the required mitigation measures are expected to be part of those presented for the 2038 full build-out of the proposed project. These mitigation measures could be implemented at the discretion of NYCDOT during construction of Phase 2.

Curb Lane Closures and Staging

Because the project site is not situated near sensitive land uses and the surrounding roadways would serve low traffic volumes with the removal of Goldwater Hospital, there is expected to be substantial flexibility in on-site staging and site access. During the course of construction, it is likely that the traffic lane on East Loop Road would be closed for a period of approximately one year to allow for the demolition of the existing Goldwater Hospital buildings and roadway improvements. In addition, West Loop Road traffic lanes would be temporarily reconfigured from one-way northbound to two-way northbound-southbound during the East Loop Road closure to maintain vehicular access to the south of the project site, including South Point Park and the future Four Freedoms Park. This work would be coordinated with and approved by

RIOC and/or NYCDOT. Turnaround areas would also be provided to facilitate bus service. After substantial demolition has been completed, the current roadway flow would be expected to be restored. Temporary lane closures may be required throughout the construction project and would take place in accordance with RIOC and/or NYCDOT-approved maintenance and protection of traffic (MPT) plans and would be managed by on-site flag-persons.

PARKING

Independent of the Cornell NYC Tech project, up to 30 spaces are expected to be provided on-site during construction for Southtown construction workers; the remaining Southtown construction workers who would drive plus overnight parking demand from the completed towers would be accommodated at the Motorgate garage.

During Phase 1 construction of the proposed project, Cornell construction workers would generate an estimated maximum daily parking demand for up to 430 spaces (fourth quarter of 2016). It is assumed that up to 100 parking spaces would be provided on-site. Since only short-term parking is available on-street, the remaining 330 spaces would be accommodated at the Motorgate garage, if no other parking resources are available. Under these conditions and assumptions, the Cornell Phase 1 construction worker parking demand would be fully accommodated either on-site or at the Motorgate garage. Cornell has committed to fund the costs of snow removal on the upper deck of the Motorgate garage in the event that construction worker parking requires that the upper deck of the garage be opened during winter months.

During Phase 2A and Phase 2B construction of the proposed project, Cornell construction workers would generate an estimated maximum daily parking demand of up to approximately 255 and 260 spaces (fourth quarters of 2026 and 2036, respectively). As with Phase 1 construction, up to 100 parking spaces are expected to be provided on-site, with the remaining parking demand accommodated at the Motorgate garage.

TRANSIT

The project site is served by the F line at the Roosevelt Island Station, the Tramway, and two bus routes (Q102 and RIOC Red Bus). Approximately 42 percent of construction workers were projected to travel to the project site via public transit. Most of these trips would be made via the F subway line during hours outside of the typical commuter peak periods. While some workers are expected to be provided parking on-site, most traveling by auto would be directed to park at the Motorgate garage, many of whom would travel between this parking location and the project site via the Red Bus.

During peak Phase 1 construction (maximum of approximately 870 average daily construction workers, as shown in Appendix 20), the 42-percent travel-by-transit distribution would represent approximately 364 daily workers traveling by transit. With 80 percent of these workers arriving or departing during the construction peak hours, the total estimated numbers of peak hour transit trips would be approximately 292 (42 bus, 250 subway). Since these incremental construction transit trips would occur during hours outside of the typical commuter peak periods where the background volumes are much lower, there would not be a potential for significant adverse transit impacts attributable to the projected construction worker transit trips during construction. However, because the Motorgate garage is approximately a 20-minute walk from the project site, most of the construction workers parking at the Motorgate garage would be expected to rely on the Red Bus for travel to/from the project site. As a result, during off-peak hours when the Red Bus operates at lower frequencies, there is a potential for a line-haul impact on the Red Bus that would warrant an increase in its service during off-peak hours. Based on the current capacity and service frequencies of the Red Bus, approximately 60 to 70 percent of the total construction workers could be accommodated by the Red Bus during the 6 to 7 AM and 3 to 4 PM construction peak hours. To fully accommodate the projected construction worker demand, three additional buses would need to be added to the Red Bus route during the 6 to 7 AM and 3 to 4 PM construction peak hours.

After the completion of Phase 1 and Phase 2A components of the proposed project, the Roosevelt Island subway station would incur increases in passengers generated by the completed uses. However, the total subway trips would be fewer than the full build-out for which no potential for significant adverse impacts was identified. Therefore, Phase 2 construction would also not result in any significant adverse subway impacts. For buses, although the Phase 1 build out would result in a significant adverse bus line-haul impact during the PM peak period (5-6 PM), total bus trips generated by the Phase 1 and Phase 2A population and the construction workers during the construction PM peak period (3-4 PM) would not exceed 50 bus trips and therefore would not be expected to result in a significant adverse bus line-haul impact. However, the significant adverse bus line-haul impact identified for the Q102 due to increase in demand from the completed buildings would also be expected to occur during this time. And similar to Phase 1 construction, construction workers parking at the Motorgate garage would generate additional demand for Red Bus service. But because the projected number of construction workers during Phase 2 construction would be substantially fewer than those in Phase 1 construction, the existing Red Bus service is expected to be adequate to fully accommodate construction worker travel between the Motorgate garage and the project site.

PEDESTRIANS

During Phase 1 construction, with a maximum of 867 average daily construction workers, as shown in Appendix 20, there would be up to approximately 694 workers arriving or departing during the construction peak hours via various modes of transportation. These pedestrian trips would primarily be concentrated during the peak hours (6 to 7 AM and 3 to 4 PM) outside of the commuter peak periods and would be distributed among numerous pedestrian facilities (i.e. sidewalks, corner reservoirs, and crosswalks) in the area. Accordingly, there would not be a potential for significant adverse pedestrian impacts attributable to the projected construction worker pedestrian trips.

During Phase 2 construction, the projected construction-related pedestrian trips would similarly not result in any significant adverse pedestrian impacts. However, impacts identified for the proposed project’s 2038 full build-out may occur with the completion of the first few Phase 2 buildings, which may warrant the earlier implementation of the recommended sidewalk widening described in Chapter 21, “Mitigation.” ~~In the event the sidewalk widening is determined to be infeasible, the projected impacts would be deemed unmitigatable.~~

AIR QUALITY

Emissions from on-site construction equipment and on-road construction-related vehicles, as well as dust generating activities, have the potential to affect air quality. In general, much of the heavy equipment used in construction has diesel-powered engines and produces relatively high levels of nitrogen oxides (NO_x) and particulate matter (PM). Gasoline engines produce relatively high levels of carbon monoxide (CO). Fugitive dust generated by construction activities is composed of particulate matter. As a result, the primary air pollutants of concern for construction activities include nitrogen dioxide (NO_2), particulate matter with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}) and less than or equal to 2.5 micrometers ($PM_{2.5}$), and CO.

The *CEQR Technical Manual* lists several factors for consideration in determining whether a detailed on-site and/or off-site construction impact assessment for air quality is appropriate. For on-site assessment, these factors include the duration of construction tasks, the intensity of construction activities, the location of nearby sensitive receptors (such as residences), and emissions control measures. For off-site assessment, the factors include the need for a detailed transportation analysis and if the construction vehicle increments would exceed the applicable *CEQR Technical Manual* screening levels (170 auto trips and 23 trucks at peak hour). All of these factors have been taken into consideration in the construction air quality preliminary assessment undertaken for this project.

ON-SITE SOURCES

Duration

In terms of air pollutant emissions, the most intense construction activities are demolition, excavation and foundation work, and superstructure construction, where a number of large non-road diesel engines would be employed. Demolition of the existing hospital buildings is expected to take 12 months (the year 2014) to complete and would occur only in Phase 1. Depending on the size of the building, excavation and foundation work for each of the proposed buildings during Phase 1 and Phase 2 construction would take approximately 8 to 10 months to complete, with the superstructure activities lasting between 4 and 10 months per building. Although exterior façade work, interiors, finishing, and commissioning would continue after superstructure work is complete, those efforts would result in very few emissions since the heavy duty diesel equipment associated with excavation and concrete work would no longer be needed on-site. The equipment that would be operating in these later tasks would be mostly small, and would be dispersed vertically throughout the building, resulting in very low concentration increments in adjacent areas. Overall, although the construction of each of the proposed buildings would take approximately 36 to 40 months to complete, the most intense construction activities in terms of air pollutant emissions would last for only a portion of this duration, taking anywhere from 12 to 20 months. Accounting for the overlapping of construction activities, the demolition, excavation and foundation, and superstructure work would last for a combined 27 months out of the 46- month construction period for Phase 1. Overall, although the complexity of the proposed project requires a somewhat longer duration of construction overall, the emissions intensity over the duration of construction would be lower (see below).

Intensity

During the demolition, excavation and foundation, and superstructure work, a handful of large non-road diesel engines would operate throughout the construction site. The only engine expected to be located in a single location for a long period of time is the tower crane. The tower crane may be used instead of crawler cranes during the construction of the taller project buildings (buildings that would be taller than 10 stories). Given the elevation of the tower crane engine, its location relative to nearby sensitive elevated locations where the nearest existing residential building located more than 600 feet away north of the project site, and the emissions controls, the tower crane would not result in substantial concentration increments. Other engines would generally move throughout the site, although a concrete pump would be located in one location during concrete pours. Based on the sizes of the proposed project buildings and the nature of the construction work involved, construction activities for the proposed project would not be considered out of the ordinary in terms of intensity, and in fact, emissions would be lower due to the emission control measures that would be implemented during construction of the proposed project (See "Emission Control Measures," below). In addition, at limited times during construction, if a large piece of construction equipment (i.e., tower crane) could not be transported over the Roosevelt Island Bridge due to the weight restriction, the equipment would be transported via barges. The barges would be used for transport only and would not operate after arriving at the project site. Therefore, emissions associated with barges during the construction of the proposed project are minimal.

Location of Nearby Sensitive Receptors

The project site is south of the Ed Koch Queensboro Bridge (Queensboro Bridge) and not within a Central Business District or along a major thoroughfare, and generally located at some distance away from sensitive uses, with the nearest existing residential building located more than 600 feet away north of the project site. The nearest sensitive locations are South Point Park, located to the south of the project site, and the waterfront promenades along the east river, located to the east and west of the project site. Phase 1 construction activities would occur primarily in the northern portion of the project site and away from South Point Park and the waterfront promenades. During Phase 2 construction, given the size of the project site and space available, most of the heavy diesel engines, deliveries, and intense activities, such as concrete pumping, would take place away from South Point Park and the waterfront promenades to the extent practicable.

Construction activities during Phase 2 may occur near the completed Phase 1 project buildings and the associated publicly accessible open spaces. However, Phase 2 construction would be gradual, with activities taking place from 2024 to 2028 and 2034 to 2037 In addition, given the size of the project site and the space available, most of the heavy diesel engines, deliveries, and intense activities such as concrete pumping would take place away from the Phase 1 completed buildings and the associated publicly accessible open space locations to the extent practicable.

Combined Operational and Construction Air Quality

As described in Chapter 15, "Air Quality," the air quality increments and concentrations resulting from Phase 1 operational mobile sources would be well below the applicable NAAQS and interim guidance criteria. In addition, the peak construction trips would occur during the 6-7 AM morning peak hour and the 3-4 PM afternoon peak hour, outside of the Phase 1 operational peak traffic hours and the typical commuter peak hours (8-9 AM and 5-6 PM). Therefore, the combined effects of construction and operational mobiles sources associated with the proposed project would not result in any significant adverse impacts. As described in Chapter 15, "Air Quality," the air quality increments and concentrations resulting from the operation of the potential Phase 1 combined Heat and Power (CHP) plant would also be well below the applicable NAAQS and interim guidance criteria. Furthermore, the potential Phase 1 CHP would be located at the north end of the project site whereas Phase 2 construction activities would occur at the middle and at the south end of the project site. Therefore, the combined effects of construction and operational stationary sources associated with the proposed project would not result in any significant adverse impacts.

Emission Control Measures

To ensure that the construction of the proposed project results in the lowest practicable diesel particulate matter (DPM) emissions, the project would implement an emissions reduction program for all construction activities, consisting of the following components:

- *Diesel Equipment Reduction.* Construction of the proposed project would minimize the use of diesel engines and use electric engines, to the extent practicable. The applicant would apply for a grid power connection early on so as to ensure the availability of grid power, reducing the need for on-site generators, and require the use of electric engines in lieu of diesel where practicable.
- *Clean Fuel.* Ultra-low sulfur diesel (ULSD) would be used exclusively for all diesel engines throughout the construction sites.
- *Best Available Tailpipe Reduction Technologies.* Nonroad diesel engines with a power rating of 50 horsepower (hp) or greater and controlled truck fleets (i.e., truck fleets under long-term contract with the project) including but not limited to concrete mixing and pumping trucks, would utilize the best available tailpipe (BAT) technology for reducing DPM emissions. Diesel particle filters (DPFs) have been identified as being the tailpipe technology currently proven to have the highest reduction capability. Construction contracts would specify that all diesel nonroad engines rated at 50 hp or greater would utilize DPFs, either installed on the engine by the original equipment manufacturer (OEM) or a retrofit DPF verified by the EPA or the California Air Resources Board (CARB), and may include active DPFs,[2] if necessary; or other technology proven to reduce DPM by ~~at least 90 percent~~ a similar level as the retrofit DPF verified by the EPA or CARB. This measure is expected to reduce site-wide tailpipe PM emissions by ~~at least~~ approximately 90 percent or more.
- *Utilization of Newer Equipment.* USEPA's Tier 1 through 4 standards for nonroad engines regulate the emission of criteria pollutants from new engines, including PM, CO, NO_x, and hydrocarbons (HC). All nonroad construction equipment in the proposed project with a power rating of 50 hp or greater would meet at least the Tier 3 emissions standard. Tier 3 NO_x emissions range from 40 to 60 percent lower than Tier 1 emissions and considerably lower than uncontrolled engines. All nonroad engines in the project rated less than 50 hp would meet at least the Tier 2 emissions standard
- *Dust Control.* Strict fugitive dust control plans would be required as part of contract specifications. For example, stabilized truck exit areas would be established for washing off the wheels of all trucks that exit the construction site. Truck routes within the sites would be either watered as needed or, in cases where such routes would remain in the same place for an extended duration, the routes would be stabilized, covered with gravel, or temporarily paved to avoid the re-suspension of dust. All trucks hauling loose material would be equipped with tight fitting tailgates and their loads securely covered prior to leaving the sites. Chutes would be used for material drops during demolition. An on-site vehicular speed limit of 5 mph would be imposed. Water sprays would be used for all excavation, demolition, and transfer of spoils to ensure that materials are dampened as necessary to avoid the suspension of dust into the air. Loose materials would be watered, stabilized with a biodegradable suppressing agent, or covered. In addition, all necessary measures would be

[2] There are two types of DPFs currently in use: passive and active. Most DPFs currently in use are the "passive" type, which means that the heat from the exhaust is used to regenerate (burn off) the PM to eliminate the buildup of PM in the filter. Some engines do not maintain temperatures high enough for passive regeneration. In such cases, "active" DPFs can be used (i.e., DPFs that are heated either by an electrical connection from the engine, by plugging in during periods of inactivity, or by removal of the filter for external regeneration).

implemented to ensure that the New York City Air Pollution Control Code regulating construction-related dust emissions is followed.

- *Source Location.* In order to reduce the resulting concentration increments, large emissions sources and activities such as concrete trucks and pumps would be located away from residential buildings, academic locations, and publicly accessible open spaces to the extent practicable and feasible.
- *Idle Restriction.* In addition to adhering to the local law restricting unnecessary idling on roadways, on-site vehicle idle time will also be restricted to three minutes for all equipment and vehicles that are not using their engines to operate a loading, unloading, or processing device (e.g., concrete mixing trucks) or otherwise required for the proper operation of the engine.

Therefore, based on analysis of all of the factors affecting construction emissions, on-site construction activities due to construction of the project would not result in any significant adverse impact on air quality.

OFF-SITE SOURCES

The maximum hourly traffic generated by construction of the proposed project would exceed the *CEQR Technical Manual* applicable CO and PM screening levels. Therefore, a quantified assessment of the potential impacts on air quality from traffic generated by the construction of the proposed project was conducted. The general methodology and the applicable standards and interim guidance criteria for mobile source modeling presented in Chapter 15, "Air Quality," was followed for intersection modeling during the construction period. The CAL3QHC model was used to perform mobile source CO computations, while CAL3QHCR, a refined version of the CAL3QHC model, was used to determine motor vehicle generated PM concentrations.

Based on the predicted traffic conditions, the traffic scenario for the fourth quarter of 2015 was determined to demonstrate the highest overall volumes of construction-related vehicles. Therefore, this period would represent the highest potential for air quality impacts. Sites for mobile source analysis were selected based on the construction model scenario and truck trip assignments analyzed for the assessment of traffic impacts during construction. The sites were chosen with the objective of capturing the highest construction-related concentration increment, the highest expected increments at locations where background concentrations were predicted to be high in the No Action condition, and the proximity of sensitive receptor locations. Based on these criteria, two intersections were selected for CO and PM modeling, as presented in **Table 20-12**.

Table 20-12
Mobile Source Analysis Sites

Analysis Site	Intersection
1	Vernon Boulevard and 36th Avenue
2	Main Street and East Road/West Road

Mobile Source Assessment—CO

CO concentrations during the construction of the proposed project were determined using the methodology previously described in Chapter 15, "Air Quality." In addition, for the intersection of Main Street and East Road/West Road, additional receptor locations were placed on residential buildings near this intersection. **Table 20-13** shows the future maximum predicted 8-hour average CO concentration with the proposed project at the analysis intersections studied. (No 1-hour values are shown, since no exceedances of the NAAQS would occur and the *de minimis* criteria are only applicable to 8-hour concentrations; therefore, the 8-hour values are the most critical for impact assessment.) The values shown are the highest predicted concentrations for the time periods analyzed. In addition, the incremental increases in 8-hour average CO concentrations are very small, and consequently would not result in a violation of the *CEQR Technical Manual de minimis* CO criteria. Therefore, the construction of the proposed project would not result in any significant CO air quality impacts due to mobile sources.

Table 20-13
Maximum Predicted 8-Hour Average CO Concentrations

Analysis Site	Location	No Action 8-Hour Concentration (ppm)	With Action 8-Hour Concentration (ppm)	NAAQS (ppm)
1	Vernon Boulevard and 36th Avenue	2.6	~~2.9~~3.0	9
2	Main Street and East Road/West Road	2.1	2.2	9

Note: An adjusted ambient background concentration of 1.8 ppm is included in the No Action values presented above.

Mobile Source Assessment—PM

Concentrations of PM_{10} and $PM_{2.5}$ from mobile sources during the construction of the proposed project were also determined at the intersections of Vernon Boulevard and 36th Avenue, and Main Street and East Road/West Road. **Table 20-14** shows the future maximum predicted 24-hour average PM_{10} concentrations. The values shown are the highest predicted concentrations for all locations analyzed and include the ambient background concentrations. The results indicate that the construction of the proposed project would not result in any violations of the PM_{10} standard or any significant adverse impacts on air quality.

Future maximum predicted 24-hour and annual average $PM_{2.5}$ concentration increments were calculated so that they could be compared to the interim guidance criteria that would determine the potential significance of any impacts from the construction of the proposed project. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in **Tables 20-15** and **20-16**, respectively. The results show that the annual and daily (24-hour) $PM_{2.5}$ increments are predicted to be well below the interim guidance criteria and, therefore, the construction of the proposed project would not result in significant $PM_{2.5}$ impacts at the analyzed receptor locations.

Table 20-14
Maximum Predicted 24-Hour Average PM_{10} Concentrations

Analysis Site	Location	No Action 24-Hour Concentration (μg/m^3)	With Action 24-Hour Concentration (μg/m^3)	NAAQS (μg/m^3)
1	Vernon Boulevard and 36th Avenue	~~52.8~~54.5	~~53.1~~55.1	150
2	Main Street and East Road/West Road	~~62.3~~51.9	~~62.5~~52.7	150

Note: An adjusted ambient background concentration of 44 μg/m^3 is included in the No Action values presented above.

Table 20-15
Maximum Predicted 24-Hour Average $PM_{2.5}$ Concentrations

Analysis Site	Location	No Action 24-Hour Concentration (μg/m³)	With Action 24-Hour Concentration (μg/m³)	Increment (μg/m³)	Interim Guidance Threshold (μg/m³)
1	Vernon Boulevard and 36th Avenue	~~2.30~~2.7	~~2.37~~2.9	~~0.07~~0.2	5/2
2	Main Street and East Road/West Road	~~4.84~~2.0	~~4.91~~2.2	0.070.2	5/2
Note: $PM_{2.5}$ interim guidance criteria—24-hour average, 2 μg/m³ (5 μg/m³ not-to-exceed value).					

Table 20-16
Maximum Predicted Annual Average $PM_{2.5}$ Concentrations

Analysis Site	Location	No Action 24-Hour Concentration (μg/m³)	With Action 24-Hour Concentration (μg/m³)	Increment (μg/m³)	Interim Guidance Threshold (μg/m³)
1	Vernon Boulevard and 36th Avenue	~~0.036~~0.038	~~0.038~~0.041	~~0.002~~0.003	0.1
2	Main Street and East Road/West Road	~~0.110~~0.013	~~0.111~~0.014	0.001	0.1
Note: $PM_{2.5}$ interim guidance criteria—annual (neighborhood scale) 0.1 μg/m³.					

NOISE AND VIBRATION

NOISE

Introduction

Impacts on community noise levels during construction of the proposed project could result from noise from construction equipment operation and from construction and delivery vehicles traveling to and from the construction site. Noise and vibration levels at a given location are dependent on the kind and number of pieces of construction equipment being operated, the acoustical utilization factor of the equipment (i.e., the percentage of time a piece of equipment is operating at full power), the distance from the construction site, and any shielding effects (from structures such as buildings, walls, or barriers). Noise levels caused by construction activities vary widely and depend on the phase of construction and the location of the construction relative to receptor locations. The most significant construction noise sources are expected to be the movements of trucks to and from the project site, as well as impact equipment such as excavators with ram hoes, drill rigs, rock drills, tower cranes, and paving breakers.

Noise from construction activities and some construction equipment is regulated by the New York City Noise Control Code and by EPA. The New York City Noise Control Code, as amended December 2005 and effective July 1, 2007, requires the adoption and implementation of a noise mitigation plan for each construction site, limits construction (absent special circumstances as described below) to weekdays between the hours of 7:00 AM and 6:00 PM, and sets noise limits for certain specific pieces of construction equipment. Construction activities occurring after hours (weekdays between 6:00 PM and 7:00 AM, and on weekends) may be authorized in the following circumstances: (1) emergency conditions; (2) public safety; (3) construction projects by or on behalf of city agencies; (4) construction activities with minimal noise impacts; and (5) where there is a claim of undue hardship resulting from unique site characteristics, unforeseen conditions, scheduling conflicts, and/or financial considerations. EPA requirements mandate that certain classifications of construction equipment meet specified noise emissions standards.

Construction Noise Impact Criteria

The *CEQR Technical Manual* states that significant noise impacts due to construction would occur "only at sensitive receptors that would be subjected to high construction noise levels for an extensive period of time." This has been interpreted to mean that such impacts would occur only at sensitive receptors where the activity with the potential to create high noise levels (the "intensity") would occur continuously for approximately two years or longer (the "duration"). The *CEQR Technical Manual* states that the impact criteria for vehicular sources, using the No Action noise level as the baseline, should be used for assessing construction impacts. As recommended in the *CEQR Technical Manual*, this study uses the following criteria to define a significant adverse noise impact from mobile and on-site construction activities:

- If the No-Action noise level is less than 60 dB(A) $L_{eq(1)}$, a 5 dB(A) $L_{eq(1)}$ or greater increase would be considered significant.
- If the No-Action noise level is between 60 dB(A) $L_{eq(1)}$ and 62 dB(A) $L_{eq(1)}$, a resultant $L_{eq(1)}$ of 65 dB(A) or greater would be considered a significant increase.
- If the No-Action noise level is equal to or greater than 62 dB(A) $L_{eq(1)}$, or if the analysis period is a nighttime period (defined in the CEQR criteria as being between 10:00 PM and 7:00 AM), the incremental significant impact threshold would be 3 dB(A) $L_{eq(1)}$.

Noise Analysis Fundamentals

Construction activities for the proposed project would be expected to result in increased noise levels as a result of: (1) the operation of construction equipment on-site; and (2) the movement of construction-related vehicles (i.e., worker trips, and material and equipment trips) on the roadways to and from the project site. The effect of each of these noise sources was evaluated.

Noise from the operation of construction equipment on-site at a specific receptor location near a construction site is generally calculated by computing the sum of the noise produced by all pieces of equipment operating at the construction site. For each piece of equipment, the noise level at a receptor site is a function of:

- The noise emission level of the equipment;
- A usage factor, which accounts for the percentage of time the equipment is operating at full power;
- The distance between the piece of equipment and the receptor;
- Topography and ground effects; and
- Shielding.

Similarly, noise levels due to construction-related traffic are a function of:

- The noise emission levels of the type of vehicle (e.g., auto, light-duty truck, heavy-duty truck, bus, etc.);
- Volume of vehicular traffic on each roadway segment;
- Vehicular speed;
- The distance between the roadway and the receptor;
- Topography and ground effects; and
- Shielding.

For the Phase 1 noise analysis, noise generated by construction-related traffic was calculated using the Federal Highway Administration's *Traffic Noise Model* Version 2.5 (TNM). The TNM is a computerized model developed for the Federal Highway Administration (FHWA) that takes into account various factors due to traffic flow, including traffic volumes, vehicle mix (i.e., percentage of autos, light duty trucks, heavy duty trucks, buses, etc.), sources/receptor geometry, and shielding (including barriers and terrain, ground attenuation, etc.). It is the model recommended in the *CEQR Technical Manual* for traffic noise analysis.

Location of Nearby Sensitive Receptors

As discussed above in "Air Quality," the nearest sensitive locations are South Point Park, located to the south of the project site, and the waterfront promenades along the east river, located to the east and west of the project site. These open space areas would be the closest sensitive receptors to the on-site construction activity associated with the proposed project.

The next closest sensitive receptors are the existing residential buildings north of the project site near the Tram station, which are located at least 600 feet from the project site; it is expected that these receptors would be shielded from noise at the project site by the Sportspark building and Queensboro Bridge structure.

Several residential and open space areas and one public school building are located along Main Street between the Roosevelt Island Bridge and the project site, which is the route that trucks are expected to use to access the project site during the construction period. These residences, school, and open spaces also constitute sensitive receptor sites and are referred to in the following sections as the "truck route receptors."

In addition, the completed Phase 1 project buildings and the associated publicly accessible open spaces would be sensitive receptors during Phase 2 construction.

Existing weekday daytime noise levels adjacent to the project site and the expected truck routes to and from the site, as described in Chapter 17, "Noise," range from the mid 60s to low 70s of dBA depending on the specific location and the level of traffic on adjacent roadways.

Noise Reduction Measures

Construction of the proposed project would be required to follow the requirements of the New York City Noise Control Code (New York City Noise Code) for construction noise control measures. Specific noise control measures would be described in a noise mitigation plan required under the New York City Noise Code. These measures would include a variety of source and path controls.

In terms of source controls (i.e., reducing noise levels at the source or during the most sensitive time periods), the following measures would be implemented in accordance with the New York City Noise Code:

- Equipment that meets the sound level standards specified in Subchapter 5 of the New York City Noise Control Code would be used from the start of construction. **Table 20-17** shows the noise levels for typical construction equipment and the mandated noise levels for the equipment that would be used for construction of the proposed project.
- As early in the construction period as logistics will allow, diesel- or gas-powered equipment would be replaced with electrical-powered equipment such as welders, water pumps, bench saws, and table saws (i.e., early electrification) to the extent feasible and practicable.

- Where feasible and practical, construction sites would be configured to minimize back-up alarm noise. In addition, all trucks would not be allowed to idle more than three minutes at the construction site based upon New York City Local Law.
- Contractors and subcontractors would be required to properly maintain their equipment and mufflers.

In terms of path controls (e.g., placement of equipment, implementation of barriers or enclosures between equipment and sensitive receptors), the following measures for construction would be implemented to the extent feasible and practical:

- Where logistics allow, noisy equipment, such as cranes, concrete pumps, concrete trucks, and delivery trucks, would be located away from and shielded from sensitive receptor locations. Once building foundations are completed, delivery trucks would operate behind a construction fence, where possible;
- Noise barriers would be utilized to provide shielding (e.g., the construction sites would have a minimum 8-foot barrier and, where logistics allow, truck deliveries would take place behind these barriers once building foundations are completed); and
- Path noise control measures (i.e., portable noise barriers, panels, enclosures, and acoustical tents, where feasible) would be used for certain dominant noise equipment to the extent feasible and practical (i.e., asphalt pavers, drill rigs, excavators with ram hoe, and hoists). These barriers are conservatively assumed to offer only a 10 dBA reduction in noise levels for each piece of equipment to which they are applied, as shown in **Table 20-17**. The details for construction of portable noise barriers, enclosures, tents, etc. are based upon NYCDEP Citywide Construction Noise Mitigation.

Previous construction noise analyses have shown that construction with measures such as these usually results in noise levels in the mid-70s of dBA within approximately 100 feet from the construction site.

2018 Analysis Year (Phase 1)

The construction of Phase 1 of the proposed project would be expected to last a total of 40 months with the most noise-intensive construction occurring during demolition, excavation and foundation (D/E/F) work. As discussed above, the analysis looks first at the intensity of noise levels during construction, then assesses the potential duration of those noise levels, and finally makes a determination of the potential for impact.

Intensity of Construction Noise

The waterfront promenade locations immediately across East Road and West Road adjacent to the project site where Phase 1 construction would occur represent the locations most likely to experience increased noise levels resulting from the operation of stationary construction equipment. With the construction noise control measures described, noise levels at these locations during construction would be approximately in the mid to high 70s of dBA at 50 to 100 feet from the construction site boundary. Such levels would be expected to result in exceedances of the *CEQR Technical Manual* noise impact criteria. Therefore, the promenade is discussed further in the following section “Duration of Construction Noise.”

Table 20-17
Typical Construction Equipment Noise Emission Levels (dBA)

Equipment List	NYCDEP and FTA Typical Noise Level at 50 feet[1]	Mandated Noise Level at 50 feet[2] Under Subchapter 5 of the NYC Noise Control Code	Noise Level with Path Controls at 50 feet[3]
Asphalt Paver	85	85	75
Asphalt Roller	85	74	
Backhoe/Loader	80	77	
Compressors	80	67	
Concrete Pump	82	79	
Concrete Trucks	85	79	
Cranes	85	77	
Cranes (Tower Cranes)	85	85	75
Delivery Trucks	84	79	
Drill Rigs	84	84	74
Dump Trucks	84	79	
Excavator	85	77	
Excavator with Ram Hoe	90	90	80
Fuel Truck	84	79	
Generators	82	68	
Hoist	85	80	70
Impact Wrenches	85	85	75
Jackhammer	85	82	72
Mortar Mixer	80	63	
Pile Driver	101	95	73[4]
Power Trowel	85	85	75
Powder Actuated Device	85	85	75
Pump (Spray On Fire Proof)	82	76	
Pump (Water)	77	76	
Rebar Bender	80	80	
Rivet Buster	85	85	75
Rock Drill	85	85	75
Saw (Chain Saw)	85	75	
Saw (Concrete Saw)	90	85	75
Saw (Masonry Bench)	85	76	
Saw (Circular & Cut off)	76	76	
Saw (Table Saw)	76	76	
Sledge Hammers	85	85	75
Street Cleaner	80	80	
Tractor Trailer	84	79	
Vibratory Plate Compactor	80	80	
Welding Machines	73	73	

Notes:
1 Sources: Citywide Construction Noise Mitigation, Chapter 28, Department of Environmental Protection of New York City, 2007. Transit Noise and Vibration Impact Assessment, FTA, May 2006.
2 Mandated noise levels are achieved by using quieter equipment, better engine mufflers, and refinements in fan design and improved hydraulic systems.
3 Path controls include portable noise barriers, enclosures, acoustical panels, and curtains, whichever feasible and practical.
4 Based on information from noise bellow system manufacturer.

At South Point Park, approximately 100 feet south of the majority of the construction work during Phase 1, noise levels due to construction would be approximately in the mid to high 50s of dBA, which would not be expected to result in exceedances of the *CEQR Technical Manual* noise impact criteria. Therefore, South Point Park is not discussed further.

At sensitive receptors north of the project site, which would be located at least 600 feet from the project site and would be shielded by the Sportspark building and Queensboro Bridge structure, noise levels due to construction would be approximately in the high 40s of dBA, which would not be expected to result in exceedances of the *CEQR Technical Manual* noise impact criteria. Therefore, these sensitive receptors are not discussed further.

At the truck route receptors along Main Street and West Road on Roosevelt Island, which would serve as the primary routes for traffic accessing the project site during construction and therefore represent the locations most likely to experience increased noise levels resulting from the construction trucks, $L_{eq(1)}$ noise levels during the peak hour of construction traffic (6 to 7 AM) were calculated to range from 56.4 dBA to 74.8 dBA (See Appendix 20 for the detailed construction traffic noise analysis results) with noise level increments resulting from construction traffic up to 6.2 dBA.. Such levels would be expected to result in exceedances of the *CEQR Technical Manual* noise impact criteria. Therefore, these truck route receptors are discussed further in the following section, "Duration of Construction Noise."

Duration of Construction Noise

The noisiest construction activities of Phase 1 construction would include the demolition, excavation and foundation work; this work is expected to last approximately 21 months. Consequently, exceedances of the *CEQR Technical Manual* noise impact criteria that would occur at the adjacent waterfront promenades during the noisiest work would not be expected to occur continuously for 24 months. Therefore, while the noise level increases may be perceptible and intrusive, they would not be considered "long-term" or significant according to CEQR criteria. Therefore, the promenade is not discussed further.

Construction and worker trips to and from the project site would be expected to occur at levels sufficient to result in exceedances of the *CEQR Technical Manual* noise impact criteria at the truck route receptors throughout the construction of Phase 1. Consequently, exceedances of the *CEQR Technical Manual* noise impact criteria that would occur at these sensitive receptors would be considered significant according to CEQR criteria.

Phase 1 Construction Noise Impacts

No significant adverse noise impacts would result from construction noise at the project site at the waterfront promenade locations, South Point Park, or at sensitive receptors north of the project site.

At the truck route receptors along Main Street and West Road between the Roosevelt Island Bridge and the Project Site, significant construction noise impacts would be expected to occur due to trucks passing along these routes to and from the project site and workers traveling to the project site during the AM construction traffic peak hour (6 to 7 AM). These residential buildings all have double-glazed windows and a means of alternate ventilation (i.e., air conditioning), and would be expected to achieve between 25 and 35 dBA of attenuation. Consequently, these buildings would be expected to experience interior $L_{10(1)}$ values less than 45 dBA during the construction period, which would be considered acceptable according to CEQR criteria, and would therefore not be expected to experience a significant impact. The open space areas along Main Street would experience exceedances; since there would be no attenuation measures, these exceedances, based on the intensity and duration, would be considered significant adverse impacts.

2038 Analysis Year (Full Build)

The construction of Phase 2 of the proposed project would commence in mid-2024 and continue through the end of 2037 in in two separate development segments—2024 to 2028 and 2034 to

2037. This would involve construction of the remaining ~~six~~ five buildings of the proposed project, as well as the remainder of the project-generated publicly accessible open space.

Intensity of Construction Noise

At the open space receptor locations immediately adjacent to the project site, including the waterfront promenade locations immediately across East Road and West Road adjacent to the project site and South Point Park, which represent the locations most likely to experience increased noise levels resulting from the operation of stationary construction equipment, with the construction noise control measures described, noise levels during construction would be similar to those during the Phase 1 construction, approximately in the mid to high 70s of dBA at 50 to 100 feet from the construction site boundary. Such levels would be expected to result in exceedances of the *CEQR Technical Manual* noise impact criteria. Therefore, the promenade and South Point Park are discussed further in the following section "Duration of Construction Noise."

These exceedances would be expected to occur throughout the more intense phases of construction such as excavation and foundation work.

Sensitive receptors north of the project site would be shielded by the Sportspark building and Queensboro Bridge structure, and noise levels due to on-site construction would be approximately in the mid to high 40s of dBA, which would not be expected to result in exceedances of the *CEQR Technical Manual* noise impact criteria. Therefore, these receptors are not discussed further.

At receptors along Main Street and West Road on Roosevelt Island, noise levels during the peak hour of construction traffic (6 to 7 AM) would be less than those predicted for Phase 1 construction. This would be because less construction activity occurs simultaneously during Phase 2 than during Phase 1, which results in fewer construction trucks and construction worker trips. It is expected that construction of Phase 2 would generate less traffic than the operational condition of the Full Build as analyzed in Chapter 17, "Noise." Significant noise impacts were not projected to occur as a result of the operational condition of the Full Build, and consequently, construction of the Full Build would also not be expected to result in exceedances of the *CEQR Technical Manual* noise impact criteria due to mobile sources. Therefore, these receptors are not discussed further.

Duration of Construction Noise

The noisiest construction activities of the Phase 2 construction, which include excavation and foundation work, would have the potential to last longer than 24 continuous months. Consequently, exceedances of the *CEQR Technical Manual* noise impact criteria that would occur at the adjacent open space receptor locations (the promenade and South Point Park) during the noisiest work would have the potential to last longer than 24 continuous months, and be considered significant according to CEQR criteria.

Project-Related Sensitive Receptors

As discussed above, the buildings completed in Phase 1 of the proposed project would be newly completed sensitive receptors during construction of the remainder of the project. The residential and hotel portions of Phase 1 of the proposed project would be constructed to provide between at least 28 dBA of window/wall attenuation, which would result in interior noise levels at these receptor locations that would be considered acceptable according to CEQR criteria throughout most of the construction period. While these buildings may experience interior noise levels that exceed the CEQR recommended 45 dBA interior L_{10} value for residential uses at some limited times during the construction period, such exceedances would be of very limited duration and as a result of the requirements of the NYC Noise Control Code, would not occur during the nighttime hours, which are the most sensitive for residential and hotel uses.

As in the existing and No-Action conditions, during construction of Phase 2 of the proposed project, publicly accessible open space areas that would be created as part of Phase 1 of the proposed project would be expected to experience $L_{10(1)}$ noise levels that exceed the 55 dBA $L_{10(1)}$ noise level recommended for outdoor areas requiring serenity and quiet by the *CEQR Technical Manual* noise exposure guidelines. There are no practical and feasible mitigation measures that could be implemented to reduce noise levels to below the 55 dBA $L_{10(1)}$ guideline within the open space areas. Although noise levels in these new public space areas would be above the 55 dBA $L_{10(1)}$ guideline noise level, they would be comparable to noise levels at public areas elsewhere on Roosevelt Island and would be comparable to or less than noise levels in a number of open space areas located adjacent to heavily trafficked roadways, including Brooklyn Bridge Park, Prospect Park, Fort Greene Park, and other urban open space areas. The 55 dBA $L_{10(1)}$ guideline is a worthwhile goal for outdoor areas requiring serenity and quiet. However, due to the level of activity present at most New York City open space areas and parks (except for areas far away from traffic and other typical urban activities) this relatively low noise level is often not achieved.

Combined Operational and Construction Noise

As described in Chapter 17, "Noise," the noise-level increments resulting from operation of Phase 1 of the proposed project was calculated to be less than 2.0 dBA at nearby noise receptors. Such small increments would not substantially increase noise associated with construction as described above, and consequently the combined effects of construction and operational noise associated with the proposed project would not result in any additional significant adverse impacts beyond what was described above.

Phase 2 Construction Noise Impacts

Significant construction noise impacts due to the operation of on-site construction equipment would be expected to occur at the waterfront promenades on the east and west sides of the Island adjacent to the project site and at South Point Park. These locations would be expected to experience noise levels in the mid to high 70s of dBA for over 24 months. There is no feasible and practicable mitigation that would be effective in eliminating this projected construction noise impact.

No significant adverse noise impacts would result from construction noise (either noise on-site or from mobile sources) at the residential receptors north of the project site, at the truck route receptors, or at the Phase 1 buildings.

VIBRATION

Introduction

Construction activities have the potential to result in vibration levels that may in turn result in structural or architectural damage, and/or annoyance or interference with vibration-sensitive activities. In general, vibratory levels at a receiver are a function of the source strength (which in turn is dependent upon the construction equipment and methods utilized), the distance between the equipment and the receiver, the characteristics of the transmitting medium, and the receiver building construction. Construction equipment operation causes ground vibrations which spread through the ground and decrease in strength with distance. Vehicular traffic, even in locations close to major roadways, typically does not result in perceptible vibration levels unless there are discontinuities in the roadway surface. With the exception of the case of fragile and possibly historically significant structures or buildings, construction activities generally do not reach the levels that can cause architectural or structural damage, but can achieve levels that may be perceptible and annoying in buildings very close to a construction site. An assessment has been prepared to quantify potential vibration impacts of construction activities on structures and residences near the project site.

Construction Vibration Criteria

For purposes of assessing potential structural or architectural damage, the determination of a significant impact is based on the vibration impact criterion used by LPC of a peak particle velocity (PPV) of 0.50 inches/second. For non-fragile buildings, vibration levels below 0.60 inches/second would not be expected to result in any structural or architectural damage.

For purposes of evaluating potential annoyance or interference with vibration-sensitive activities, vibration levels greater than 65 VdB would have the potential to result in significant adverse impacts if they were to occur for a prolonged period of time.

Construction Vibration Analysis Results

The potential for structural or architectural damage due to vibration from project construction was considered for the Queensboro Bridge. As a known architectural resource, this structure would require the application of the more stringent vibration criteria described above for such (the LPC criteria of 0.50 inches/second PPV). However, as a result of the distance between the bridge and the construction site, vibration levels at this structure, as well as other less-sensitive nearby structures, would not be expected to exceed the 0.50 inches/second PPV limit.

In terms of potential vibration levels that would be perceptible and annoying, the two pieces of equipment that would have the most potential for producing levels which exceed the 65 VdB limit are pile drivers and vibratory rollers. They would produce perceptible vibration levels (i.e., vibration levels exceeding 65 VdB) at receptor locations within a distance of approximately 600 feet (i.e., the open spaces nearest the project site—the promenades and South Point Park). However, while the vibration may be perceptible and even intrusive, the operation would only occur for limited periods of time at a particular location and therefore would not result in any significant adverse impacts. Any blasting that may occur would be expected to produce vibrations less perceptible than those from the operation of the two pieces of equipment cited above. In no case are significant adverse impacts from vibrations expected to occur.

OTHER TECHNICAL AREAS

HISTORIC AND CULTURAL RESOURCES

As discussed in Chapter 7, "Historic and Cultural Resources," the demolition of the Goldwater Hospital complex would constitute a significant adverse impact on this architectural resource. Cornell ~~is consulting~~ has consulted with OPRHP and LPC regarding appropriate measures to partially mitigate the significant adverse impact on this architectural resource. These measures ~~are being developed and will~~ would be implemented by Cornell in consultation with OPRHP and LPC, as set forth in a Letter of Resolution (LOR) ~~to be signed by~~ among Cornell, OPRHP, LPC, and the Roosevelt Island Operating Corporation (RIOC). These measures are described in Chapter 22, "Mitigation."

No architectural resources are located within 90 feet of the project site. Therefore, the proposed project would not be expected to result in inadvertent construction-related impacts to any architectural resources in the study area.

HAZARDOUS MATERIALS

As discussed in Chapter 10, "Hazardous Materials," studies of the project site indicate that existing buildings may contain hazardous materials such as ACM and lead-based paint. Soil that would be disturbed by the proposed project includes urban fill materials with elevated concentrations of certain metals and Semi Volatile Organic Compounds (SVOCs). Demolition and excavation activities could disturb these hazardous materials and potentially increase pathways for human or environmental exposure. Impacts would be avoided by implementing the following measures:

- A RAP and associated CHASP ~~would be~~ were prepared and submitted to NYCDEP ~~for review and approval prior to implementation during project construction construction~~ and were approved by NYCDEP in a letter dated November 8, 2012 (see Appendix 10). The RAP ~~would~~ addresses requirements for items such as: installation of two feet of clean fill as a "site cap" in unpaved areas; soil reuse criteria; soil stockpiling, soil disposal and transportation; dust control; dewatering procedures; quality assurance; procedures for the closure and removal of the known petroleum storage tanks; and contingency measures should additional petroleum storage tanks or contamination be unexpectedly encountered. The CHASP ~~would identify~~ identifies potential hazards that may be encountered during construction and specify appropriate health and safety measures to be undertaken to ensure that subsurface disturbance is performed in a manner protective of workers, the community, and the environment (such as personal protective equipment, air monitoring requirements including community air monitoring, and emergency response procedures). ~~The RAP and CHASP would be prepared in accordance with a letter from NYCDEP to the New York City Economic Development Corporation dated February 22, 2012, which outlined measures to be included in the RAP and CHASP based on the findings of the Phase I ESA and Phase II.~~
- Unless information exists to indicate that suspect ACM do not contain asbestos, prior to demolition activities, an asbestos survey would be completed and all ACM that would be disturbed by these activities would be removed and disposed of in accordance with applicable regulatory requirements.
- Any renovation/demolition activities with the potential to disturb lead-based paint would be performed in accordance with the applicable Occupational Safety and Health Administration regulation (OSHA 29 CFR 1926.62—Lead Exposure in Construction).
- Unless labeling or laboratory testing data indicates that suspect PCB-containing electrical equipment (including underground transformers) and fluorescent lighting fixtures do not contain PCBs, and that fluorescent lights do not contain mercury, disposal would be performed in accordance with applicable regulatory requirements.

With the implementation of these measures, no significant adverse impacts related to hazardous materials would result from construction activities in the project area.

NATURAL RESOURCES

Groundwater

The RAP would address requirements for items such as soil stockpiling, soil disposal and transportation, dust control, dewatering procedures, procedures for the closure and removal of the known petroleum storage tanks, and contingency measures should petroleum storage tanks or contamination be unexpectedly encountered during Phase 1 and Phase 2 of the proposed project.

Implementation of the RAP and CHASP described above would ensure that the proposed project would not result in adverse impact on groundwater quality.

Floodplain

No areas of 100-year floodplain occur within the project site. The 500-year floodplain zone extends into the project site towards its midpoint where the elevation is lowest. The 500-year floodplain zone within and adjacent to the study area is affected by coastal flooding and would not be affected by construction or regrading/filling. Therefore, construction of the proposed project would not increase the potential for public and private losses due to flood damage, or increase the exposure of public utilities to flood hazards.

Aquatic Resources and Wetlands

No in-water construction activities would occur with the proposed project. Soil disturbing activities associated with Phase 1 activities would be conducted in accordance with the NYSDEC State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001). Erosion and sediment control measures to be implemented during construction activities would be specified in the stormwater pollution prevention plan (SWPPP). With the implementation of these measures, stormwater discharged to the East River through the existing stormwater outfalls (18 outfalls on the west and 19 on the east sides of the Island currently receive runoff from the project site) during construction of Phase 1 and full build of the proposed project would not result in significant adverse impacts to NYSDEC littoral zone tidal wetlands along the shoreline of Roosevelt Island or to the water quality or aquatic biota of the East River. Groundwater recovered during dewatering operations that may be required as part of Phase 1 and Phase 2 construction activities would be discharged to the East River through the existing stormwater outfall in accordance with NYSDEC SPDES permitting requirements and would not have the potential to result in significant adverse impacts to water quality, aquatic biota, or NYSDEC littoral zone tidal wetlands.

Terrestrial Ecological Communities and Vegetation

As described in detail in Chapter 9, “Natural Resources,” the ecological communities present within the project site would be characterized by Edinger et al. (2002) as “terrestrial cultural” communities that include “mowed lawn with trees,” “mowed roadside/pathway,” “paved road,” and “urban structure exterior.” A total of 132 trees comprising 26 species are found within the project site, with pin oak being the most abundant tree species. Construction of Phase 1 would result in the clearing of most of the trees and other vegetation within the project site due to grading activities required for the placement of 2 feet of clean fill material. At present, it is estimated that approximately 90 of the 132 trees on site would require removal. The loss of these trees and the existing “terrestrial cultural” ecological communities within the project site, which are common to the New York metropolitan area, would not result in significant adverse impacts to vegetation resources within the region. Measures would be taken to protect the health and condition of trees on site that would not require removal. During Phase 2 construction, some of the vegetation planted during Phase 1 would be removed. The loss of vegetation within these planted areas would not adversely affect local tree and plant populations.

Wildlife

Potential impacts to wildlife from construction activities for the project generally include noise and visual disturbances. Demolition of the existing buildings on site and construction of the proposed Phase 1 buildings would generate extensive noise and anthropogenic activity.

However, impacts to wildlife would be minimal because wildlife in the surrounding area consists of urban-adapted, highly disturbance-tolerant species, as described in Chapter 9, “Natural Resources.” The species of wildlife in the area are ubiquitous throughout the city and commonly inhabit areas with extensive levels of human disturbance and degraded habitat conditions. Human activity and disturbance levels within the project site are presently quite high due to the operation of the hospital, active roadways, and overall urban setting. Wildlife occurring in the area would not be expected to be significantly impacted by the noise and other anthropogenic disturbances generated by project construction. However, during Phase 1construction, wildlife individuals using the limited habitats present on the project site would be expected to move to nearby suitable habitat during demolition of the hospital, tree removal and other land disturbing activities. Phase 2 construction would have the potential to result in a similar displacement of some wildlife individuals due to the increased activity, noise, or loss of vegetation during construction. As extreme generalists, the individuals of these species that would be displaced would not be expected to have difficulty identifying and relocating to suitable habitat nearby. Similar habitat conditions (mowed lawn with trees, artificial structures, etc.) are present throughout Roosevelt Island and abundant throughout the city. Any such displacement of wildlife from the project site during Phase 1 or Phase 2 would not represent a significant or permanent impact to these species at the individual or population level. Local shelters and other organizations will be consulted to develop measures for the humane removal of feral cats existing on the project site prior to construction.

Threatened, Endangered, and Special Concern Species and Significant Habitat Areas

The peregrine falcon (*Falco peregrinus*) is the only federally or state-listed terrestrial species that is considered to have the potential to occur in the study area. However, the project site lacks suitable nesting locations for peregrine falcons, and the occurrence of peregrine falcons in the area would be limited to migrants briefly passing through or individuals from nest sites elsewhere in the city. Therefore, construction of Phase 1 and Phase 2 of the proposed project would not eliminate or degrade nesting habitat for the species. Hunting opportunities in the project area for migrant peregrine falcons or individuals from nests elsewhere in the city would be unaffected by construction of the proposed project.

The federally and state-listed species that have the potential to occur in the East River in the vicinity of the project site would only occur in the vicinity of the Roosevelt Island shoreline near the project site as occasional transients. As discussed under “Aquatic Resources and Wetlands,” construction of Phase 1 and full build of the proposed project would not adversely affect water quality or habitat conditions in the East River, and would therefore have no direct or indirect effects on any individuals of these species potentially occurring in the East River or essential fish habitat.

OPEN SPACE

Construction of the proposed project would occur in close proximity to South Point Park, an open space resource located immediately south of the Goldwater Memorial Hospital Site and immediately north of ~~the future~~ Four Freedoms Park site, and the waterfront promenade, a walkway for pedestrians that extends along the east and west sides of Roosevelt Island north of South Point Park. Both open spaces are expected to remain open during the entire construction period, and access to these open spaces would be maintained.

Construction activities would be conducted with the care mandated by the close proximity of several open spaces to the proposed project. Dust control measures—including watering of exposed areas and dust covers for trucks—would be implemented to ensure compliance with the New York City Air Pollution Control Code, which regulates construction-related dust emissions. At limited times over the course of the entire construction period, construction activities such as structural demolition, excavation, and foundations may generate noise that could impair the enjoyment of nearby open space users. Although construction fences around the project site may shield the open spaces from construction activities, as described above in "Noise", elevated noise levels are predicted to occur for two or more consecutive years at open space receptors immediately adjacent to the project site during Phase 2 construction. Therefore, construction of the proposed project would result in significant adverse impacts on open spaces.

SOCIOECONOMIC CONDITIONS

Construction activities associated with the proposed project would not result in any significant adverse impacts on socioeconomic conditions. Construction of the proposed project would not block or restrict access to any facilities in the area or affect the operations of any nearby businesses, including Sportspark, which is located north of the project site. Lane closures are not expected to occur in front of entrances to any existing or planned retail businesses, and construction activities would not obstruct major thoroughfares used by customers or businesses. Utility service would be maintained to all businesses. Overall, construction of the proposed project is not expected to result in any significant adverse impacts on surrounding businesses.

Construction would create direct benefits resulting from expenditures on labor, materials, and services, and indirect benefits created by expenditures by material suppliers, construction workers, and other employees involved in the construction activity. Construction also would contribute to increased tax revenues for the city and state, including those from personal income taxes.

COMMUNITY FACILITIES

No community facilities are located near the construction site. Construction workers would not place any burden on public schools and would have minimal, if any, demands on libraries, child care facilities, and health care facilities. Construction of the proposed project would not block or restrict access to any facilities in the area, including Sportspark, which is located north of the project site, and would not materially affect emergency response times. New York Police Department (NYPD) and FDNY emergency services and response times would not be materially affected due to the geographic distribution of the police and fire facilities and their respective coverage areas.

LAND USE AND NEIGHBORHOOD CHARACTER

Construction activities would affect land use on the project site but would not alter surrounding land uses. As is typical with construction projects, during periods of peak construction activity there would be some disruption, predominantly noise, to the nearby area. There would be construction trucks and construction workers coming to the site. There would also be noise, sometimes intrusive, from construction work as well as trucks and other vehicles backing up, loading, and unloading. These disruptions would have minimal effects on land uses within the study area, particularly as most construction activities would take place within the project site, which is located south of Queensboro Bridge and not within a Central Business District or along a major thoroughfare, and generally located at some distance away from most sensitive uses except for South Point Park and the waterfront promenade. Nevertheless, throughout the construction period, measures would be implemented to control noise, vibration, and dust on construction sites, including the erection of construction fencing and in some areas fencing incorporating sound-reducing measures. Construction activity associated with the proposed project would be localized and would not alter the character of the larger neighborhoods surrounding the project site.

G. BARGING ALTERNATIVE TO TRUCK MATERIAL DELIVERIES[3]

INTRODUCTION

The analysis of construction-period effects presented above in this chapter represents a reasonable worst-case construction scenario in which all materials are delivered to and removed from the Cornell NYC Tech project site by truck. However, Cornell is considering alternatives to this truck-based approach and is exploring the feasibility of employing barges during the Phase 1 construction period. The feasibility of employing barges during the Phase 2 construction period would be explored when details on the Phase 2 construction components become more defined.

Working with Tishman Construction Corporation, Cornell examined a number of different barging techniques, taking into account the types of materials that could be barged, the quantities of those materials, the infrastructure needed to support each type of barge, and the proximity of related harbor facilities within the New York harbor.

This section presents two barging techniques now under consideration and provides an assessment of the potential for barging to result in significant adverse impacts. Cornell has committed to further explore the feasibility of employing barges during the construction period.

DESCRIPTION OF POTENTIAL BARGING OPERATIONS

Based on Cornell’s investigation to date, two barging techniques have been identified for further consideration—the Harbor Barge and the Roll-On/Roll-Off Barge.

Additional actions/approvals for use of the either (or both) barging techniques are as follows:

- US Army Corps of Engineers (USACE) authorization under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.
- U.S. Coast Guard approval of marine activity.
- New York State Department of Environmental Conservation (NYSDEC) authorization under Article 15 of the Environmental Conservation Law.
- OPRHP and LPC approval under Section 106 of the National Historic Preservation Act for work in the area of the Roosevelt Island seawall.[4]
- Roosevelt Island Operating Corporation authorization of Cornell’s application for the USACE and NYSDEC authorizations and RIOC’s granting of a license for Cornell to undertake barging activities on RIOC property.

In addition, use of barges would have to be consistent with the Coastal Zone Management Act, through the New York State Department of State’s Coastal Management Program and approved Local Waterfront Revitalization Plans (i.e., the City’s Waterfront Revitalization Program).

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[3] This section, Section G, is new to the FEIS.

[4] The seawall has not been formally evaluated to determine whether it meets the National and State Register of Historic Places (S/NR) eligibility criteria as an architectural resource.

The barging operations are described further in this section.

As noted in the discussion below, use of barging (either technique) would require some closure of a segment of the Roosevelt Island promenade to the east of the site. Cornell is committed to maintaining access—both pedestrian and vehicular—to South Point Park and the Four Freedoms Park at all times during construction of the proposed project.

HARBOR BARGE

With the Harbor Barge technique, a harbor barge could be used for the removal of bulk materials from the project site, such as gravel, soil, and demolition materials. In addition, the harbor barge could be used for delivery of bulk materials to the site, such as soils and gravel. This barge technique would be predominantly employed for approximately the first year of Phase 1 construction when demolition materials would be removed from the project site. It is anticipated that with use of the Harbor Barge, a portion of the site/civil work previously projected to occur over the course of Phase 1 construction would instead be concentrated in the earlier portion of Phase 1.

Under this option, a spud or jack-up crane barge would be installed on the east side of Roosevelt Island adjacent to the project site. One or two transport barges or scows would be docked and secured to the crane barge, acting as a temporary dock, periodically throughout this time, and demolition byproducts would be delivered and placed onto the transport barge or into the scow by way of the barge-mounted crane. The spud or jack-up crane barge would be located just off the seawall in water of sufficient depth to obviate any need for dredging. If a spud barge is used, spuds would be drilled and socketed into bedrock; the barge would be permanently moored, floating up and down on the spuds. If a jack-up barge is selected, the spuds would be lowered to the bottom with the crane barge lifted (jacked-up) and supported in a fixed position. A gangway would be provided for workmen to access the crane barge; this gangway would bridge over the existing seawall so no excavation would be required.

To reduce the amount of time each barge is in place, it is possible that Cornell may stockpile material on site for several weeks or months before removal by barge. Bulk material would be stockpiled on land and covered and protected to prevent dispersion. The materials quantities being stockpiled would range from 10,000 to 20,000 cubic yards per day. Barges are not expected to remain moored and tied up to the crane barge longer than one to two weeks at any one time.

During those periods when barges are being loaded, a segment of the Roosevelt Island promenade on the east shoreline would be closed to allow the transfer of material. Public access to the east promenade would be closed during daytime work hours when this transfer would occur. It is estimated that one to two transport barges would be required per day during the pick-up periods, with activity distributed throughout the day.

ROLL-ON/ROLL-OFF BARGE

The Roll-On/Roll-Off Facility (or Floatbridge Facility) could be used for the delivery of materials typically loaded on trucks, such as structural steel; cladding materials; materials for interior work (partition systems; mechanical, electric and plumbing materials; finishes; furniture, fixtures, and equipment [FF&E]); and sitework materials (e.g., planters, pavers, trees, sod, solar panels, among other materials).

Under this option, a temporary pile-supported platform, bridge, barge spuds, and breasting/mooring dolphins would be constructed on the east side of Roosevelt Island and would remain in place for the duration of Phase 1 construction. The platform is anticipated to be trapezoidal in shape and approximately 65 feet long flaring out from about 35 feet on the north to approximately 75 feet on the south. The platform would span across the existing seawall and into the channel, supported on approximately twenty 18- to 24-inch steel pipe piles socketed into rock. The platform would also extend 10 to 15 feet into the island to avoid loading the waterfront seawall or embankment at the edge.[5] The bridge would span between the platform and the spud barge.[6] A clear width of 20 feet would provide two 10-foot-wide lanes or a single lane for extra-wide vehicles as necessary.

The spud moored floating barge supporting the bridge would be held in place by four 24- to 30-inch steel pipe piles socketed into bedrock in the river bottom. It is currently contemplated that the barge would be approximately 140 feet long with a 39 feet beam and set at a draft of 7 feet. This barge would be equipped with a heavy-duty adjustable ramp on the barge deck at its southern end to allow passage of traffic to and from a transfer barge.

Berthing and mooring monopiles socketed into rock would be provided for the barges or carfloats delivering trucks to the facility. Trucks arriving on barges or carfloats would access the project site via the ramp and platform. The barge or carfloat would arrive at the facility and be moored against the breasting dolphins and locked into the spud barge. The ramp on the spud barge would be adjusted to match the delivery barge/carfloat and the trucks driven across the barge, up the bridge and onto the platform. Trucks would be marshaled across the loop road by flag persons. A similar operation in reverse would be used for trucks leaving the island.

Construction of the platform, bridge, barge spuds and mooring/breasting dolphins would likely involve the use of construction barges with barge mounted cranes and a vibratory pile driver and a down-the-hole hammer or other drilling equipment to socket the piles. The deck and bridge would be erected by floating and land based cranes and equipment. It is estimated that construction of the platform, bridge, spud piles, mooring and breasting dolphins and installation of the barge would require six to nine months. At completion of Phase 1 construction, the platform and ramp would likely be demolished, again using barge-mounted and land based equipment. It is anticipated that piles and spuds would be cut below the mudline.

Use of the Roll-On/Roll-Off Facility would require that a segment of the Roosevelt Island promenade on the east shoreline be closed for the duration of Phase 1 construction. Approximately 200 to 300 feet of the roadway would be closed to allow staging and queuing of trucks and other construction equipment using the facility.

It is estimated that approximately 5 to 10 barges would arrive at the site each day with activity distributed throughout the day.

ASSESSMENT OF THE USE OF HARBOR BARGE AND ROLL-ON/ROLL-OFF BARGE

This assessment focuses on the potential for construction-period impacts in those analyses areas that could be affected by the change in construction transport technique. The following sections

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[5] The platform could be built using precast concrete pile caps and planks; this would minimize the use of over-water formwork and also speed up the construction time. Alternatively, a steel floor beam and pile cap frame could be used along with a heavy timber deck to form the platform superstructure.

[6] The bridge is anticipated to consist of a 60-foot-long steel pony truss or steel multi-stringer bridge and would either be fabricated off site and delivered as a unit or be erected on site.

follow the same outline as the assessment above and focus on transportation, air quality, noise and vibration, hazardous materials, natural resources, historic and cultural resources, and open space.

Neither barging option would result in conclusions different than the truck-based approach in the areas of socioeconomic conditions, community facilities, and land use and neighborhood character.

HARBOR BARGE

Transportation

With the truck-based approach analyzed above, it was projected that for Phase 1 construction, there would be an average of about 37 trucks per day, with a peak of 67 in the third quarter of 2015 (see Table 20-3). Use of the Harbor Barge technique would result in an estimated reduction of between 20 and 25 percent of overall trucks trips over the Phase 1 construction period. Because much of the site civil work that was projected to occur over the course of Phase 1 could be concentrated in the earlier portion of Phase 1, use of the Harbor Barge would result in a reduction of the average daily truck number and would result in a reduction of the peak number as well. While this barging technique would result in a reduction of construction truck traffic on Main Street, it is not expected to materially change the conclusions made in the detailed construction traffic analysis in this chapter.

Because use of the Harbor Barge technique would affect truck trips and not construction worker trips, there would be no change to the conclusions presented above as they relate to parking, transit, and pedestrians.

Air Quality

Use of the Harbor Barge technique would result in a reduction of overall truck trips. Therefore, similar to the conclusions of the air quality mobile source analysis presented above, there would be no significant adverse construction impacts from mobile source emissions. Since air quality concentrations predicted at receptors immediately adjacent to the construction site are primarily a result of machinery assessed as on-site stationary sources, a reduction in truck trips would have minimal effects on the air quality concentrations predicted at these receptors.

Noise and Vibration

Use of the Harbor Barge would result in some localized increases in noise levels from barge operations that could potentially exceed CEQR noise impact criteria at open space locations near the barge activities (i.e., along the Roosevelt Island promenade to the east of the site). These localized noise increases would not be expected to result in significant adverse impacts on the Roosevelt Island promenade since this barge technique would be used predominantly in the first year of Phase 1 construction and would not be in use continuously during this time.

As described above, use of the Harbor Barge technique would result in up to a 25 percent reduction in truck trips during construction of Phase 1. The reduction in truck trips would not notably affect the amount of noise generated at receptors immediately adjacent to the project site, where noise levels during construction are primarily a result of on-site equipment, but it could slightly decrease the magnitude of noise level increases at receptors on the Island along the truck routes to the project site. Consequently, with use of the Harbor Barge technique, the magnitudes and durations of construction noise impacts at some receptors on the Island along truck routes to and from the project site is anticipated to slightly decrease as compared to those described above.

Natural Resources

Potential impacts to natural resources from use of the Harbor Barge technique include temporary water quality effects resulting from resuspension of East River bottom sediment during pile installation, permanent loss of benthic macroinevertebrates and temporary loss of benthic habitat within the footprint of the piles, and temporary shading of aquatic habitat in the East River from the barges. Water depth in the area in which the barges would be located is greater than 6 feet at Mean Low Water (MLW), and as such, there would be no potential impacts to NYSDEC littoral zone tidal wetlands.

As described above, use of the Harbor Barge technique would involve the use of a spud or jack-up crane barge and one or two transport barges or scows to remove bulk materials from the project site during construction of Phase 1. No dredging would be required. The spud barge would be supported by 24 to 48 inch diameter spuds that would be installed using a vibratory hammer to drive the spud to rock then a rock socket drilled down through the pile. Alternatively, casings may be driven to rock using a vibratory hammer and sockets drilled into rock, then the spuds lowered into the hole and concreted into the socket. Piles would be cut below the mud line following the completion of Phase 1 construction. Pile installation and barge activity would have the potential to resuspend sediment in the immediate vicinity of the work, but any such increases in turbidity would be minor, short-term, and highly localized and would not result in significant adverse impacts to water quality or aquatic biota. The use of a collar during rock socket drilling would minimize the potential for discharge of soil, drillings, bentonite concrete or other drilling byproducts to the East River. As recommended by NOAA (2008)[7] for reducing the potential adverse impacts to marine fisheries habitat and fish due to pile driving, the proposed project would only drive spuds and piles using a vibratory hammer. Therefore, the installation of spuds or piles would not result in significant adverse impacts to aquatic biota, including threatened or endangered sea turtles and sturgeon that have the potential to occur within the vicinity of the project site as occasional transient individuals.

Implementation of a Pollution Prevention Plan would minimize the potential for discharge of other materials to the East River during use of the Harbor Barge technique. The small amount of river bottom occupied by the piles would represent temporary and negligible reductions in benthic habitat that would not have significant adverse impacts to benthic fauna or fish foraging within this portion of the East River. The anticipated crane barge and transport scows or barges (typical size range of 58 to 60 feet wide by 140 to 150 feet long, and 40 to 50 feet wide and up to 150 feet long, respectively) would permit some light to reach the water and mudline under them and would not be expected to result in significant adverse impacts to aquatic biota due to shading of aquatic habitat while the barges are in place. Therefore, use of the Harbor Barge technique would not result in significant adverse impacts to water quality or aquatic biota of the East River, including threatened or endangered aquatic species (i.e., sea turtles and sturgeon).

Historic and Cultural Resources

The Roosevelt Island seawall within the project site has not been formally evaluated to determine whether it meets the National and State Register of Historic Places (S/NR) eligibility

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[7] National Oceanic and Atmospheric Administration (NOAA), 2008. Impacts to Marine Fisheries Habitat from Nonfishing Activities in the Northeastern United States. NOAA Technical Memorandum NMFS-NE-209, US Department of Commerce, NOAA, National Marine Fisheries Service, Northeast Regional Office, Gloucester, Massachusetts.

criteria as an architectural resource; nor has the potential for the seawall and immediately adjacent areas to possess archaeological sensitivity been formally assessed. However, no permanent direct impacts to the physical fabric of the seawall or the upland area adjacent to it are anticipated with the use of the Harbor Barge technique. Therefore, no adverse effects to the seawall or any potentially archaeologically sensitive areas associated with the seawall (if any such resources should exist) are anticipated as a result of the use of the Harbor Barge technique. If the technique is advanced, further consultation with OPRHP and LPC would be undertaken to determine the S/NR-eligibility of the seawall, and if necessary, appropriate measures would be developed and implemented in consultation with OPRHP and LPC to protect the seawall from inadvertent construction-period activities.

Open Space

As discussed above, during those periods when barges are being loaded, a segment of the Roosevelt Island promenade on the east shoreline would be closed. While this would be a direct effect on open space, it would not be considered a significant adverse impact since it would be temporary and since only a small portion of the Roosevelt Island promenade would be affected. Access to South Point Park and the Four Freedoms Park would be provided by the Roosevelt Island promenade on the west side of the island, as well as the loop road to the west of the project site.

ROLL-ON/ROLL-OFF BARGE

Transportation

With the truck-based approach analyzed above, it was projected that for Phase 1 construction, there would be an average of about 37 trucks per day, with a peak of 67 in the third quarter of 2015 (see Table 20-3). Use of the Roll-On/Roll-Off Barge technique could result in an estimated reduction of between 25 and 35 percent of overall trucks trips. Therefore, use of the Roll-On/Roll-Off Barge technique would result in a reduction of the average daily truck number and a reduction of the peak number as well. While this barging technique would result in a notable reduction of construction truck traffic on Main Street, it is not expected to materially change the conclusions of the detailed construction traffic analysis in this chapter.

Because the Roll-On/Roll-Off Barge Option would affect truck trips and not construction worker trips, there would be no change to the conclusions presented above as they relate to parking, transit, and pedestrians.

Air Quality

Use Of the Roll-On/Roll-Off Barge technique would result in a reduction of overall truck trips on Main Street. Therefore, similar to the conclusions of the air quality mobile source analysis presented above, there would be no significant adverse construction impacts from mobile source emissions. Since air quality concentrations predicted at receptors immediately adjacent to the construction site are primarily a result of machinery assessed as on-site stationary sources, a reduction in truck trips would have minimal effects on the air quality concentrations predicted at these receptors.

Noise and Vibration

Use of the Roll-On/Roll-Off Barge technique would result in some localized increases in noise levels from barge operations that could potentially exceed CEQR noise impact criteria at open space locations near the barge activities (i.e., along the Roosevelt Island promenade to the east of the site) for approximately three years. These localized noise increases may result in significant noise impacts during Phase 1 construction on the east river promenade.

As described above, use of the Roll-On/Roll-Off Barge technique would result in up to a 35 percent reduction in truck trips throughout construction. This would not notably affect the levels of noise generated at receptors immediately adjacent to the project site, where noise levels during construction are primarily a result of on-site equipment, but it could affect noise levels at receptors on the Island along the truck routes to the project site. Use of the Roll-On/Roll-Off Barge technique would be expected to decrease the magnitude of noise level increases at these truck route receptors as compared to the predicted noise level increases presented above. At some receptors, it is expected that there would still be a significant noise level increase, although of lesser magnitude. Consequently, with use of the Roll-On/Roll-Off Barge technique, the magnitudes and durations of construction noise impacts at some receptors on the Island along truck routes to and from the project site would decrease as compared to those described above.

Natural Resources

The Roll-On/Roll-Off Facility would be used for the delivery of structural steel and other construction materials, and consist of a temporary pile-supported platform, bridge, spudded barge, and mooring dolphins, also located along the east side of the project site for the duration of the Phase I construction. As discussed above under the Harbor Barge option, piles would be installed and there would be overwater coverage of aquatic habitat. Sediment resuspension during installation of piles using a vibratory hammer followed by rock drilling, as described under the Harbor Barge option, followed by cutting of piles at the completion of Phase 1 construction would be minor, temporary, and localized and would not result in significant adverse impacts to aquatic resources.

Similarly, the river bottom that would be occupied by the piles required for the Roll-On/Roll-Off scenario would represent a temporary and negligible loss of benthic habitat that would not have significant adverse impacts to aquatic biota. The approximately 40-foot wide moored barges, and the high level platform would be expected to permit some light to reach the aquatic habitat below the barges and would not be expected to result in significant adverse impacts to aquatic biota due to shading.

Historic and Cultural Resources

As discussed above, the Roosevelt Island seawall within the project site has not been formally evaluated to determine whether it meets the S/NR eligibility criteria as an architectural resource; nor has the potential for the seawall and immediately adjacent areas to possess archaeological sensitivity been formally assessed. However, no permanent direct impacts to the physical fabric of the seawall or the fast land adjacent to it are anticipated during construction of the Roll-On/Roll-Off Facility. Therefore, no adverse effects to the seawall or any potentially archaeologically sensitive areas associated with the seawall (if any such resources should exist) are anticipated as a result of the Roll-On/Roll-Off Facility. If the Roll-On/Roll-Off Facility approach is advanced, further consultation with OPRHP and LPC would be undertaken to determine the S/NR-eligibility of the feature, and if necessary, appropriate measures would be developed and implemented in consultation with OPRHP and LPC to protect the seawall from inadvertent construction-period activities.

Open Space

As discussed above, with this option, a segment of the Roosevelt Island promenade on the east shoreline would be closed for the duration of Phase 1 construction. While this would be a direct effect on open space, it would not be a significant adverse impact since it would be temporary and since it would affect a limited area of the much larger Roosevelt Island promenade. Access to South Point Park and the Four Freedoms Park would be provided by the Roosevelt Island promenade on the west side of the island as well as the loop road.

COMBINED USE OF THE HARBOR BARGE AND ROLL-ON/ROLL-OFF BARGE

If Cornell were to use both the Harbor Barge and the Roll-On/Roll-Off Barge techniques during construction, it is estimated that there would be a total reduction in overall truck trips of between 45 and 55 percent over the duration of Phase 1 construction. The duration and magnitude of noise level increases at these receptors would be further decreased, although significant noise level increases would still be expected to occur at some of these receptors.

Use of both techniques would also result in localized increases in noise levels from barge operations that could potentially exceed CEQR noise impact criteria at open space locations near the barge activities (i.e., along the Roosevelt Island promenade to the east of the site) for approximately three years. These localized noise increases may result in significant noise impacts during Phase 1 construction on the east river promenade.

H. CONCLUSIONS

The analysis concludes that the proposed project would result in significant adverse construction impacts related to transportation and noise on open space.

TRANSPORTATION

During Phase 1 construction of the proposed project, significant adverse impacts are expected to result for traffic and transit conditions. During Phase 2 construction, significant adverse impacts are expected to result for traffic, transit, and pedestrian conditions. These findings are summarized below.

TRAFFIC

The maximum Phase 1 construction activities would result in 397 passenger car equivalents (PCEs) between 6 and 7 AM and 345 PCEs between 3 and 4 PM on weekdays in the fourth quarter of 2015. Therefore, a detailed analysis of the construction peak hours of 6 to 7 AM and 3 to 4 PM was conducted at seven key study locations to identify potential traffic impacts during Phase 1 construction. According to these analyses, significant adverse traffic impacts are projected to occur during Phase 1 construction at four of the seven study locations analyzed. ~~Two~~ Three of these impacted locations could be mitigated using standard mitigation measures typically implemented by NYCDOT~~,~~ while impacts at the one location would be partially mitigated. ~~but additional review of potential mitigation measures will be undertaken for the Final EIS that may fully or partially mitigate these significant impacts~~. The mitigation measures ~~for the two impacted locations that could be mitigated~~ would ~~also~~ be ~~consistent with~~ similar to those proposed to mitigate the intersection impacts associated with the project's build-out and occupancy.

For Phase 2 construction, the cumulative operational and construction traffic would be of lower magnitudes than what the overall project would generate when completed in 2038. Therefore, the potential traffic impacts during peak Phase 2 construction would be within the envelope of significant adverse traffic impacts identified for the 2038 With Action condition in Chapter 14, "Transportation," and mitigatable and unmitigatable impacts identified in Chapter 22, "Mitigation" would apply to Phase 2 construction conditions as well. The required mitigation measures for those locations that could be mitigated are expected to be part of those presented for the 2038 full build-out of the proposed project. These mitigation measures could be implemented at the discretion of RIOC and/or NYCDOT during construction of Phase 2.

PARKING

With approximately 100 parking spaces expected to be allocated on-site and assuming the use of the available parking at the Motorgate garage, or that other parking resources are provided, the projected construction worker parking demand during both Phase 1 and Phase 2 construction is expected to be fully accommodated at one of these parking locations. Cornell has committed to pay for the costs of snow removal on the upper deck of the Motorgate garage in the event that construction worker parking requires that the upper deck of the garage be opened during winter months.

TRANSIT

Transit trips generated by construction workers are not expected to result in significant adverse subway and Q102 bus line-haul impacts during Phase 1 construction. However, because most construction workers parking at the Motorgate garage would rely on the Red Bus for travel to/from the project site, during off-peak hours when the Red Bus operates at comparatively lower frequencies, there is a potential for a significant adverse line-haul impact on the Red Bus that would warrant an increase in its service during off-peak hours (three additional buses during the 6 to 7 AM and 3 to 4 PM construction peak hours). After the completion of the Phase 1 and Phase 2A components of the proposed project, the Roosevelt Island subway station and bus routes would experience increases in passengers generated by the completed uses. However, during the commuter peak periods, the combination of the Phase 2 construction worker trips with those generated by the completion of Phase 1 and/or Phase 2A would be less than the total projected for the operational Phase 2 full build-out condition. As a result, Phase 2 construction efforts would not result in any significant adverse subway impacts. And although Phase 2 construction workers parking at the Motorgate garage would also generate additional demand for Red Bus service, the existing Red Bus service is expected to be adequate in fully accommodating construction worker travel between the Motorgate garage and the project site. However, because the Q102 bus route would be significantly impacted by the projected increase in demand from the completed Phase 1 buildings, this impact would also occur during Phase 2 construction.

PEDESTRIANS

Pedestrian trips generated by construction workers are not expected to result in significant adverse pedestrian impacts during Phase 1 construction. After the completion of the Phase 1 and Phase 2A components of the proposed project, the combination of the Phase 2 construction worker pedestrian trips with those generated by the completed Phase 1 and Phase 2A buildings during the commuter peak hours may result in similar significant adverse pedestrian impacts as those discussed in Chapter 14, “Transportation,” and may warrant the earlier implementation of the recommended sidewalk widening described in Chapter 21, “Mitigation.” ~~In the event the sidewalk widening is determined to be infeasible, the projected impacts would be deemed unmitigatable.~~

AIR QUALITY

No significant adverse air quality impacts would be expected at any sensitive receptor locations due to the on-site construction activities of the proposed project. To ensure that the construction of the proposed project would result in the lowest practicable diesel particulate matter (DPM) emissions, the project would implement an emissions reduction program for all construction activities, including: diesel equipment reduction; clean fuel; best available tailpipe reduction technologies; utilization of newer equipment; source location; dust control; and idle restriction.

The project site is generally located at some distance away from sensitive uses, with the nearest existing residential building located more than 600 feet north of the project site. The nearest sensitive locations are South Point Park, located to the south of the project site, and the waterfront promenades along the east river, located to the east and west of the project site. In addition, construction activities induced by the proposed project during Phase 2 may occur near the completed Phase 1 project buildings and the associated open spaces. Given the size of the project site and space available, most of the heavy diesel engines, deliveries, and intense activities such as concrete pumping would take place away from South Point Park, the waterfront promenades, and the Phase 1 completed buildings and the associated open space locations to the extent practicable.

A detailed analysis of the off-site emissions determined that the CO, $PM_{10,}$ and $PM_{2.5}$ concentrations would be below their corresponding NAAQS and interim guidance criteria. Therefore, no significant adverse air quality impacts are expected from off-site construction sources.

NOISE AND VIBRATION

NOISE

The proposed project would result in significant adverse impacts with respect to construction noise on open space.

Construction on the proposed development sites would include noise control measures as required by the New York City Noise Control Code, including both path and source controls. Even with these measures, the results of detailed construction analyses indicate that the proposed project would result in significant adverse impacts with respect to construction noise, as follows:

- During construction of Phase 1, the open space areas along Main Street would experience exceedances due to trucks and workers travelling on Main Street to and from the project site during the AM construction traffic peak hour (6 to 7 AM);
- During construction of Phase 2, South Point Park and the waterfront promenades on the east and west sides of the Island adjacent to the project site would experience noise levels in the mid to high 70s of dBA for over 24 months. These exceedances would be due to the operation of on-site construction equipment.

VIBRATION

Development pursuant to the proposed actions is not expected to result in significant adverse construction impacts with respect to vibration. Use of construction equipment that would have the most potential to exceed the 65 VdB criterion within a distance of 600 feet of sensitive receptor locations (e.g., equipment used during pile driving) would be perceptible and annoying. Therefore, for limited time periods, perceptible vibration levels may be experienced by occupants and visitors to all of the buildings and locations on and immediately adjacent to the construction sites. However, the operations which would result in these perceptible vibration levels would only occur for finite periods of time at any particular location and, therefore, the resulting vibration levels, while perceptible, would not result in any significant adverse impacts.

OTHER TECHNICAL AREAS

HISTORIC AND CULTURAL RESOURCES

The proposed project would demolish the Goldwater Hospital complex, which would constitute a significant adverse impact on this architectural resource. Cornell ~~is consulting~~ has consulted with OPRHP and LPC regarding appropriate measures to partially mitigate the significant adverse impact on this architectural resource. These measures ~~are being developed and will~~ would be implemented by Cornell in consultation with OPRHP and LPC, as set forth in a Letter of Resolution (LOR) ~~to be signed by~~ among Cornell, OPRHP, LPC, and the Roosevelt Island Operating Corporation (RIOC). These measures are described in Chapter 22, “Mitigation.”

HAZARDOUS MATERIALS

Studies of the project site indicate that existing buildings may contain hazardous materials such as ACM and lead-based paint. Soil that would be disturbed by the proposed project includes urban fill materials with elevated concentrations of certain metals and SVOCs. Demolition and excavation activities could disturb these hazardous materials and potentially increase pathways for human or environmental exposure. To reduce the potential for human or environmental exposure to known or unexpectedly encountered contamination during the construction of the proposed project, a RAP and an associated CHASP ~~would be~~ were prepared and submitted to NYCDEP ~~for review and approval~~ and were approved by NYCDEP. The RAP and CHASP would be implemented during project construction. The RAP ~~would~~ addresses requirements for items such as soil stockpiling, soil disposal and transportation; dust control; dewatering procedures; quality assurance; procedures for the closure and removal of the known petroleum storage tanks; and contingency measures, should petroleum storage tanks or contamination be unexpectedly encountered. The CHASP ~~would identify~~ identifies potential hazards that may be encountered during construction and specify appropriate health and safety measures to be undertaken to ensure that subsurface disturbance is performed in a manner protective of workers, the community, and the environment (such as personal protective equipment, air monitoring including community air monitoring, and emergency response procedures). In addition, during construction of the proposed project, regulatory requirements pertaining to ACM, lead-based paint, PCBs and chemical use and storage would be followed. With these measures in place, no significant adverse impacts related to hazardous materials would occur as a result of the proposed project.

NATURAL RESOURCES

Natural resources within and around the project site are highly limited, and construction of Phase 1 and Phase 2 are not considered to have the potential to cause significant adverse impacts to those resources. Groundwater within the project site is not potable and soil levels of some compounds are elevated; construction of the proposed project would not be expected to have adverse impacts to groundwater quality or result in human or environmental exposure to contaminants. Re-grading and filling of the small area of 500-year floodplain within the project site during Phase 1 and the Phase 2 would not increase local flood risk. No in-water construction activities would occur during Phase 1 or Phase 2, and soil disturbing activities associated with Phase 1 activities would be conducted in accordance with the NYSDEC State Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activity. As such, no direct or indirect impacts to water quality, littoral zone tidal wetland, aquatic biota, or other aquatic resources of the East River (including state or federally protected species and Essential Fish Habitat) would occur as a result of Phase 1 or Phase 2 construction. Construction would require the disturbance of ecological communities present on site and the removal of certain trees that are of locally common and abundant species. Wildlife occurring in the area is composed of urban-adapted, disturbance-tolerant generalists that would not be affected by construction noise. Some wildlife would be temporarily displaced from the site during project construction, but would be expected to easily locate temporary alternative habitat nearby and return to the project site upon completion. Threatened or endangered species have low potential to occur within the project site or offshore, and would not be significantly impacted by the minimal and temporary land disturbance that would occur during Phase 1 and Phase 2 construction.

OPEN SPACE

Construction of the proposed project would occur in close proximity to South Point Park, an open space resource located immediately south of the Goldwater Hospital site and immediately north of Four Freedoms Park, and the waterfront promenade, a walkway for pedestrians that extends along the east and west sides of Roosevelt Island north of South Point Park. Both open spaces are expected to remain open during the entire construction period, and access to these open spaces would be maintained.

Construction activities would be conducted with the care mandated by the close proximity of several open spaces to the proposed project. Dust control measures—including watering of exposed areas and dust covers for trucks—would be implemented to ensure compliance with the New York City Air Pollution Control Code, which regulates construction-related dust emissions. At limited times over the course of the entire construction period, construction activities such as structural demolition, excavation, and foundations may generate noise that could impair the enjoyment of nearby open space users. Although construction fences around the project site may shield the open spaces from construction activities, as described above in noise, elevated noise levels are predicted to occur for two or more consecutive years at open space receptors immediately adjacent to the project site during Phase 2 construction. In addition, impacts are projected to occur on open spaces along Main Street during Phase 1 construction. Therefore, construction of the proposed project would result in significant adverse noise impacts on open spaces, as described above under “Noise.”

SOCIOECONOMIC CONDITIONS

Construction activities associated with the proposed project would not result in any significant adverse impacts on socioeconomic conditions. Construction of the proposed project would not block or restrict access to any facilities in the area or affect the operations of any nearby businesses, including Sportspark, which is located north of the project site. Lane closures are not expected to occur in front of entrances to any existing or planned retail businesses, and construction activities would not obstruct major thoroughfares used by customers or businesses. Utility service would be maintained to all businesses. Overall, construction of the proposed project is not expected to result in any significant adverse impacts on surrounding businesses.

COMMUNITY FACILITIES

No community facilities are located near the construction site. Construction workers would not place any burden on public schools and would have minimal, if any, demands on libraries, child care facilities, and health care facilities. Construction of the proposed project would not block or restrict access to any facilities in the area, including Sportspark, which is located north of the project site, and would not materially affect emergency response times. New York Police Department (NYPD) and FDNY emergency services and response times would not be materially affected due to the geographic distribution of the police and fire facilities and their respective coverage areas.

LAND USE AND NEIGHBORHOOD CHARACTER

Construction activities would affect land use on the project site but would not alter surrounding land uses. As is typical with construction projects, during periods of peak construction activity there would be some disruption, predominantly noise, to the nearby area. There would be construction trucks and construction workers coming to the site. There would also be noise, sometimes intrusive, from construction work as well as trucks and other vehicles backing up, loading, and unloading. These disruptions would have minimal effects on land uses within the study area, particularly as most construction activities would take place within the project site, which is located south of the Queensboro Bridge and not within a Central Business District or along a major thoroughfare, and generally located at some distance away from sensitive uses. Nevertheless, throughout the construction period, measures would be implemented to control noise, vibration, and dust on construction sites, including the erection of construction fencing and in some areas fencing incorporating sound-reducing measures. Construction activity associated with the proposed project would be localized and would not alter the character of the larger neighborhoods surrounding the project site.

BARGING ALTERNATIVE TO TRUCK MATERIAL DELIVERIES

The EIS analysis of construction-period effects represents a reasonable worst-case construction scenario in which all materials are delivered to and removed from the Cornell NYC Tech project site by truck. However, Cornell is considering alternatives to this truck-based approach and is exploring the feasibility of employing barges during the Phase 1 construction period. Two barging techniques are under consideration—a Harbor Barge and a Roll-On/Roll-Off Barge. The Harbor Barge could be used for the removal of bulk materials from the project site, such as gravel, soil, and demolition materials, and for the delivery of bulk materials. The Roll-On/Roll-Off Barge could be used for the delivery of materials typically loaded on trucks, such as structural steel; cladding materials; materials for interior work (partition systems; mechanical, electric and plumbing materials; finishes; furniture, fixtures, and equipment [FF&E]); and sitework materials (e.g., planters, pavers, trees, sod, solar panels, among other materials).

Additional actions/approvals would be required for use of either barging technique and would include actions from USACE, the U.S. Coast Guard, NYSDEC, OPRHP and LPC, and RIOC. In addition, use of barges would have to be consistent with the Coastal Zone Management Act, through the New York State Department of State's Coastal Management Program and approved Local Waterfront Revitalization Plans (i.e., the City's Waterfront Revitalization Program).

Use of barging (either technique) would require some closure of a segment of the Roosevelt Island promenade to the east of the site. Cornell is committed to maintaining access—both pedestrian and vehicular—to South Point Park and the Four Freedoms Park at all times during construction of the proposed project.

Use of the Harbor Barge technique would result in an estimated reduction of between 20 and 25 percent of overall trucks trips over the Phase 1 construction period. Use of the Roll-On/Roll-Off Barge technique could result in an estimated reduction of between 25 and 35 percent of overall trucks trips. Therefore, use of either technique would result in a reduction of the average daily truck number and would result in a reduction of the peak number as well. While use of barging technique would result in a reduction of construction truck traffic on Main Street, it is not expected to materially change the conclusions of the detailed construction traffic or air quality analyses.

Use of either barging technique would result in some localized increases in noise levels from barge operations that could potentially exceed CEQR noise impact criteria at open space locations near the barge activities (i.e., along the Roosevelt Island promenade to the east of the site). For the Harbor Barge, these localized noise increases would not be expected to result in significant adverse impacts on the Roosevelt Island promenade since this barge technique would be used predominantly in the first year of Phase 1 construction and would not be in use continuously during this time. For the Roll-On/Roll-Off Barge, localized increases in noise levels could potentially exceed CEQR noise impact criteria at open space locations near the barge activities for approximately three years. These localized noise increases may result in significant noise impacts during Phase 1 construction on the Roosevelt Island promenade to the east of the project site.

Neither barging option would be expected to result in significant adverse impacts on natural resources. Neither barging option would result in conclusions different than the truck-based approach in the areas of socioeconomic conditions, community facilities, and land use and neighborhood character. ✷