Chapter 19: Construction

A. INTRODUCTION

This chapter summarizes the construction plan for Fordham University's proposed Master Plan for its Lincoln Center campus (the proposed action) and considers the potential for significant adverse impacts during its construction periods. Construction stages are described, as are the types of activities likely to occur during construction. Next, an assessment of potential impacts of construction activity and the methods that may be employed to minimize these potential impacts are discussed.

As previously noted, Fordham intends to sell or lease Sites 3 and 4 to private developers for the construction of new residential developments. Upon gaining control of the site, each such developer would be bound to perform all of the planning and mitigation measures described in this chapter and required to be implemented as part of the approval of the proposed action. It is anticipated that, once title to each site has been transferred, Fordham would no longer control the development of the transferred sites and that each of the private developers would implement the construction practices described in this chapter on a site-specific basis. At the same time, the private developers would have no control over Fordham's implementation of the mitigation required for its sites, which would be Fordham's sole responsibility.

PRINCIPAL CONCLUSIONS

Construction would occur in two phases. Phase I (scheduled to be complete in 2014) would involve building on Sites 3, 3a, 4, and 5/5a. Phase II (scheduled to be complete in 2032) would involve building on Sites 1, 2, 6, and 7.

In the absence of approvals for the proposed action, Fordham would lease or otherwise convey portions of its site on Amsterdam Avenue to private developers for the construction of three new residential buildings to increase Fordham's endowment. The resulting residential buildings would be built as-of-right and would not be dependent on the land use approvals currently being sought by Fordham. Construction of these buildings would likely produce impacts similar to those anticipated for Phase I construction. However, the avoidance and mitigation measures required with the proposed action would not be required with the as-of-right construction.

Construction of the buildings in the Master Plan is not expected to cause significant adverse impacts on land use, zoning, and public policy; socioeconomic conditions; open space; community facilities; shadows; urban design and visual resources; neighborhood character; infrastructure; solid waste and sanitation services; energy; or transit and pedestrians. For the analysis areas listed below, further evaluation of conditions during construction were warranted:

- Historic Resources. A Construction Protection Plan would be developed and submitted to the New York State Office of Parks, Recreation, and Historic Preservation and to the New York City Landmarks Preservation Commission for approval. The Construction Protection

Plan would protect off-site fragile buildings that are located within 90 feet of the construction.

- Hazardous Materials. To avoid adverse impacts, remedial measures would be undertaken during excavation required for the first phase of construction and during excavation and demolition required for the second phase of construction. These measures would include development and implementation of a Remedial Action Plan (incorporating an environmental Health and Safety Plan. These plans would be submitted to New York City Department of Environmental Protection (DEP) for approval, and their implementation would prevent contaminated materials from adversely affecting workers, passer-bys, and residents.
- Traffic. The analysis concluded that one significant adverse traffic impact would be expected from peak 2011 construction in Phase I during the early afternoon peak traffic hour. In 2021, significant adverse impacts at one intersection and five intersections could occur during the early afternoon and afternoon peak traffic hours, respectively. In 2031, significant adverse impacts at two intersections and five intersections could occur during the early afternoon and afternoon peak traffic hours, respectively. These impacts can be mitigated with either an early implementation of mitigation measures for operational traffic impacts or by applying variations of these measures, such as different signal timing shifts. The need for these variations on proposed mitigation measures to address the projected construction traffic impacts in 2011, 2021, and 2031 would be determined by NYCDOT during those years.
- Air Quality. No significant adverse impacts on air quality are expected from construction equipment and trucks. In order to prevent significant adverse impacts, all measures required for New York City-sponsored projects under Local Law 77 of 2005 would be implemented. A Restrictive Declaration would be prepared as part of the approval and would bind Fordham University to all construction mitigation measures. In addition, early electrification and special placement of construction equipment are required.
- Noise. During Phase I construction, significant adverse noise impacts are expected at four locations and during Phase II, significant adverse noise impacts are not expected to occur. These impacts would occur at locations that have double-glazed windows and some form of alternative ventilation (i.e., air conditioning and packaged terminal air condition units). The double-glazed windows and ventilation would reduce interior noise levels to below the CEQR acceptable interior noise level criteria for much of the time.
- Public Health. Construction contracts would include provisions for a rodent (mouse and rat) control program implemented by the contractor and approved by the appropriate agencies.

B. METHODOLOGY

For Phase I construction, this analysis conservatively includes consideration of the impacts associated with the private residential construction. This discloses the full cumulative impacts during construction but does not take credit for the construction that would occur with construction of three private residential buildings in the future without the proposed action.

Construction of the same amount of floor area in three rather than two buildings would decrease the construction schedule particularly in the period during which any individual structure is being erected. However, construction at three rather than two sites would increase the number of cranes in use and might well lengthen the overall construction period depending on start dates.

Most important, as-of-right construction in the future without the proposed action would not include any of the mitigation measures that Fordham University would put in place such as early electrification.

These three buildings could be built as-of-right by private developers who would not have to follow New York City Local Law 77 of 2005, which only applies to City-sponsored projects. Fordham University has committed through a Restrictive Declaration to follow Local Law 77 and other stringent construction practices (discussed below) to reduce air emissions and noise from construction equipment and trucks. None of these commitments to prevent impacts on air quality and noise would have an enforcement mechanism for private developers under the as-of-right conditions. Therefore, air quality impacts that would be prevented with the proposed action could occur with private developers without the proposed action, and the number of significant adverse noise impacts would likely increase. This chapter compares potential construction impacts with existing conditions and not with conditions that would occur with private developers constructing as-of-right buildings.

C. CONSTRUCTION OF BUILDINGS

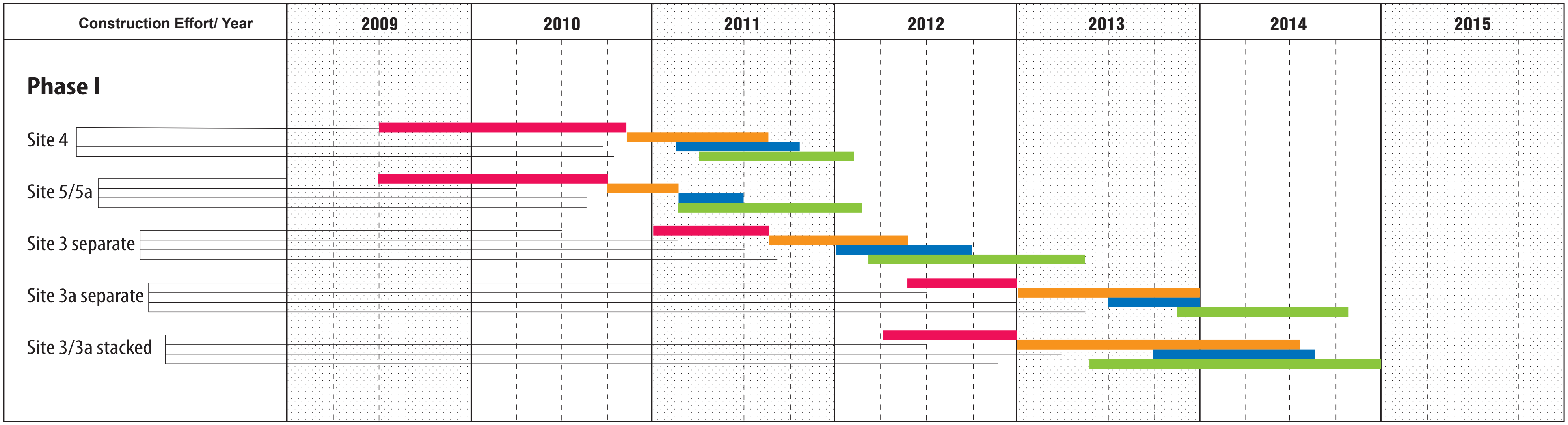
INTRODUCTION

If the proposed actions are approved, construction would occur over a number of years, with complete build-out planned for 2032. This section of the chapter first describes the schedule and sequencing of the construction, and then provides a detailed description of each type of construction activity. The activities discussed include demolition, excavation and foundations, construction of the superstructure of the buildings, installation of the exteriors, and interior finishes. General construction practices, including those associated with deliveries and access, hours of work, and sidewalk and lane closures, are presented. Following the discussion of construction techniques, individual sections of this chapter discuss potential impacts with regard to land use and neighborhood character, historic resources, socioeconomic conditions, hazardous materials, infrastructure, traffic and transportation, air quality, noise and vibration, and rodent control.

CONSTRUCTION SCHEDULE

Construction would be done in two phases. Phase I would involve building on Sites 3, 3a, 4, and 5/5a. Figure 19-1 presents the preliminary construction schedule, and Table 19-1 contains the expected start and completion dates of each of the buildings.

10.20.08



NOTE: Site 3 and 3a separate and 3/3a stacked are mutually exclusive alternatives

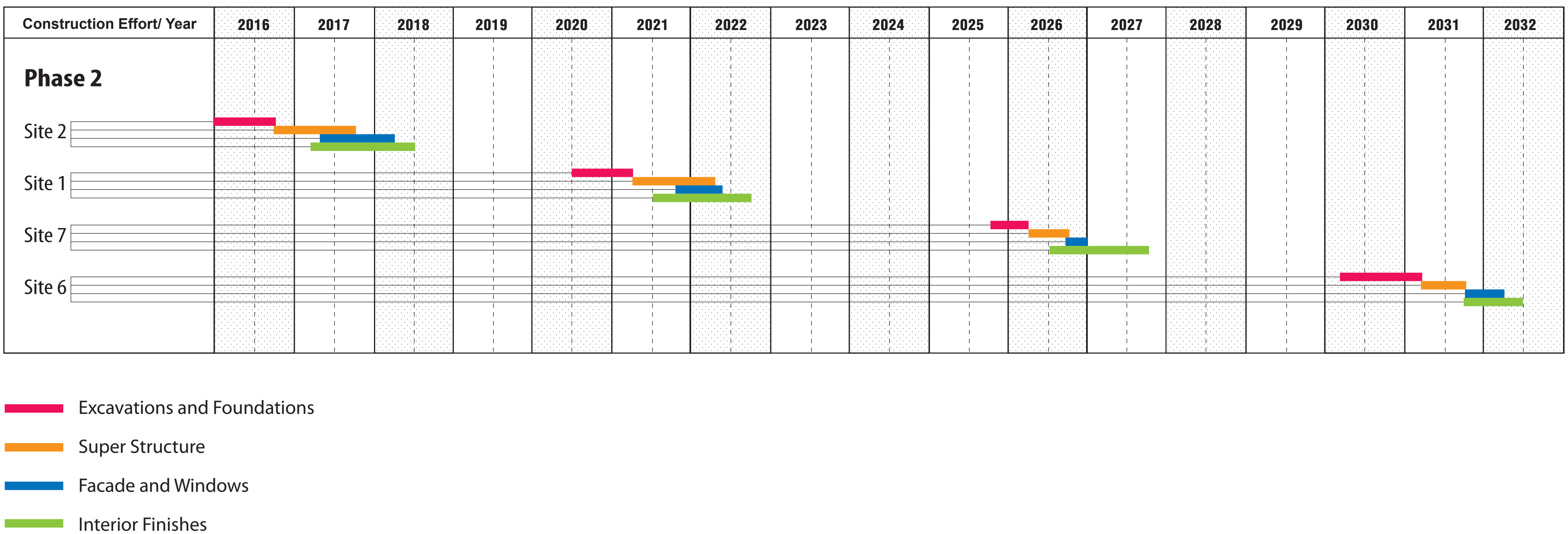


Figure 19-1
Preliminary Construction Schedule

Table 19-1
Preliminary Construction Schedule and Projected Durations

Building	Estimated Duration	Start Date	Finish Date
Phase I			
Site 4	36 months	3rd quarter 2009	2nd quarter 2012
Site 5/5a	33 months	3rd quarter 2009	1st quarter 2012
Sites 3 and 3a separate			
Site 3	28 months	1st quarter 2011	4th quarter 2013
Site 3a	28 months	2nd quarter 2012	4th quarter 2014
Sites 3 and 3a stacked			
Site 3/3a	34 months	1st quarter 2012	4th quarter 2014
Phase II			
Site 2	30 months	1st quarter 2016	3rd quarter 2018
Site 1	24 months	3rd quarter 2020	3rd quarter 2022
Site 7	26 months	3rd quarter 2025	3rd quarter 2027
Site 6	28 months	2nd quarter 2030	3rd quarter 2032

Source: Gotham Construction.

This analysis conservatively assumes construction would begin in the third quarter of 2009 on Sites 4 and 5/5a. These buildings would be completed by the first and second quarter of 2012. As described in Chapter 1, "Project Description," two mutually exclusive alternative approaches are being considered for building on Sites 3 and 3a. The first assumes that the two buildings are constructed separately, and the second alternative has the buildings "stacked" on one another. A decision has not yet been made which alternative would be selected. As described below, the alternative that would likely generate the greatest potential impacts was used to assess the potential impacts. If the buildings on Sites 3 and 3a were built separately, construction on Site 3 would begin in the first quarter of 2011 and would be completed in the fourth quarter of 2013, while the building on Site 3a would start in the second quarter of 2012 and be finished in the fourth quarter of 2014. If the stacked building were chosen, construction on Sites 3/3a would run from the first quarter of 2012 to the fourth quarter of 2014. Building on Site 3 and 3a separately would cause the greatest overlap of construction activity. During early 2011, three buildings would be at various stages of construction at one time. If the building on Site 3/3a were stacked, the only overlap in construction would be Sites 4 and 5/5a. In either case, Phase I would be completed in late 2014.

During Phase II, only one building would be constructed at a time with about two years between the completion of a building and the start of the next building. All proposed buildings are expected to be completed by mid-2032.

GENERAL CONSTRUCTION PRACTICES

Certain activities would occur throughout the construction period. Fordham University would have a field team on-site during the construction period. This team would serve as the contact point for the community to voice any concerns about construction activities. Members of the team would be available to meet and work with the community to resolve any concerns or problems that arise during the construction process. As appropriate, presentations would be made to the Community Board and community groups to keep them informed about the progress of the construction. Security staff would monitor the active construction sites 24 hours a day, 365 days a year in the case of Fordham sites, and in the case of private developers, the construction sites would be monitored when workers are on site and would be secured when the site is inactive.

The following describes typical construction practices in New York City. In certain instances, specific practices may vary from those described below. Different construction management firms are expected to manage construction on the different sites; at the least, different construction management firms would be used by Fordham University and by private developers. Each construction management firm has its own operating procedures, and these procedures vary to some degree. However, the typical practices are expected to be used because they have been developed over many years and have been found to be necessary to successfully complete large projects in a confined urban area. All deliveries, material removals, and hoist uses have to be tightly scheduled to maintain an orderly work area and to keep the construction on schedule and within budget.

DELIVERIES AND ACCESS

Because of site constraints, the presence of large equipment, and the type of work, access to the construction sites would be tightly controlled. The work areas would be fenced off, and limited access points for workers and trucks would be provided. Worker vehicles would not be allowed into the construction area. Security guards and flag-persons would be posted, and all visitors, workers, and vehicles 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.

As is the case with almost all large urban construction sites, material deliveries to the site would be highly regimented and scheduled. Because of the high level of construction activity and constrained space, unscheduled or haphazard deliveries would not be allowed. For example, during excavation, each dump truck would be assigned a specific time that it must arrive on the site and a specific allotment of time to receive its load. If a truck is late for its turn, it would be accommodated if possible, but if not, the delivery would be assigned to a later time. A similar regimen would be instituted for concrete deliveries, but the schedule would be even 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 contract 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 possible. Studs for the partitions, drywall, electrical wiring, mechanical piping, ductwork, and other mechanical equipment are a few of the myriad materials that must be delivered and moved within each building. Each building under construction would have one or two hoists, and the available time for the hoist would be fully and tightly scheduled. A 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. However, if other scheduled deliveries would be disrupted, the out-of-turn truck would be turned away. This is a penalty for the contractor, because if its materials are not on-site, it cannot complete the task. Therefore, the contractor has a strong incentive to stay on schedule.

To aid in adhering to the delivery schedules, flag-persons would be employed at each of the gates. The flag-persons would control trucks entering and exiting the site, so that they would not interfere with one another. In addition, they would provide an additional traffic aid as the trucks enter and exit the on-street traffic streams.

HOURS OF WORK

Construction activities for the buildings would generally take place Monday through Friday, with exceptions that 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 some workers arriving to prepare work areas between 6:00 AM and 7:00 AM. Normally, work would end at 3:30 PM, but it can be expected that to meet the construction schedule, the workday would be extended to complete some specific tasks beyond normal construction work hours. Work done during extended hours could include such tasks as completing the drilling of a pile, finishing a concrete pour for a floor deck, completing the bolting of a steel frame erected that day, or safety-related items. The extended workday would generally last until about 5:00 to 6:00 PM and would not include all construction workers on-site; however, the number of workers on site during extended work hours could be a substantial percentage of the workers then employed. Extended workdays are expected to occur on weekdays over the course of construction.

At limited times over the course of constructing a building, weekend work may be required. Weekend work would typically be limited to specific tasks that are either better accomplished during times of limited on-site activity or are required to be performed on weekends. An example would be rigging a crane. 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 (number of workers, number of machines operating, and number of deliveries) would be reduced from the normal workday.

A few tasks may have to be completed without a break, and the work can extend more than a typical 8-hour day. For example, in certain situations, concrete must be poured continuously to form one structure without joints. If the concrete is poured and then stopped for a period of time before more concrete is poured, a weak joint is formed. This weak joint may not be structurally sound.

An example of this is pouring concrete for the foundations, which would be poured in sections. Those sections could require 100 concrete trucks per day, which would necessitate at least 12 hours to complete. The plans for each long concrete pour would be coordinated with the New York City Department of Transportation (NYCDOT). In addition, a noise mitigation plan would be developed and implemented to minimize intrusive noise emanating into nearby areas and affecting sensitive receptors. A copy of the noise mitigation plan would be kept on-site for compliance review by the New York City Department of Environmental Protection (DEP) and New York City Department of Buildings (DOB).

STORMWATER POLLUTION PREVENTION PLAN

A construction stormwater pollution prevention plan (SWPPP) would be developed for the overall project construction activity in accordance with the requirements of the New York State Department of Environmental Conservation’s (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-02-01). The SWPPP would include fully designed and engineered stormwater management practices with all necessary maps, plans, and construction drawings, providing the site-specific erosion and sediment control plan and best management practices. The SWPPP would include designation of responsible parties and personnel who would have a role in management of construction stormwater runoff. The SWPPP would outline a routine site inspection and reporting program for identification and prompt repair of any deficiencies for the erosion and sediment control structures or practices.

Stormwater management during construction activities would be performed through implementation of a site-specific erosion and sedimentation control plan. In accordance with NYSDEC guidance, the SWPPP would include both structural and non-structural components. The structural components are expected to consist of silt fencing, inlet protection, and installation of a stabilized construction entrance or other appropriate means to limit potential off-site transport of sediment. The non-structural "best management practices" would include routine inspection, dust control, cleaning, and maintenance programs; instruction on the proper management, storage, and handling of potentially hazardous materials; and identification of parties responsible for implementation and ongoing maintenance programs. All temporary control measures would be maintained until disturbed areas of the site are stabilized.

STAGES OF CONSTRUCTING A BUILDING

DEMOLITION

The only large scale demolition would be the four-story Law School building, which would be removed during Phase II to make space for the building on Site 6. The first step in general demolition is to remove any economically salvageable materials, and then large equipment is used to deconstruct the building. Typically during demolition, temporary walls are placed around the building to prevent accidental dispersal of building materials into areas accessible to the general public. After the building is deconstructed, bulldozers and front-end loaders would be used to load materials into dump trucks. The demolition debris would be sorted prior to being disposed at landfills to maximize recycling opportunities. About 30 to 50 workers are expected to be on site, and 10 loads of debris would be removed on average per day. At a maximum, up to two to three truckloads of debris could be removed per hour. The demolition is expected to last about six months.

EXCAVATION AND FOUNDATIONS

After the site is cleared, soil and rock would be excavated. Excavators and backhoes would be used to dig the loose soil and load it onto dump trucks for removal from the site. The soil could be sold for clean fill or used as daily cover at a landfill unless determined to be contaminated, as discussed below. When rock is encountered a ram hoe on the excavator would be used to break the rock. If the rock is too hard for the ram hoe, a rock drill would drill a line of holes so that the rock is easier to break. Blasting may also be required (as described below). The broken rock would then be loaded onto trucks for carting from the site. As the excavation becomes deeper, a temporary ramp would be constructed for the dump trucks to reach the floor of the excavation. Removal of the ramp would be the last act of the excavation.

If any unreported underground tanks are uncovered, they would be removed in accordance with applicable NYSDEC regulations. The excavation would involve excavators, loaders, backhoes and dump trucks.

As the excavation is being completed, foundation elements would be installed into competent bearing material (e.g., drilled piles). If competent bearing materials are shallow, a foundation mat (a reinforced concrete slab, bearing directly on soil and/or rock, with no deep foundation elements) could be used replacing deep foundation elements. Concrete trucks would be used to pour the foundation and the below-grade structures. These trucks would use the closest parking lane, generally on the side streets, where they would pump the concrete. Several trucks could be pumping concrete at the same time. Foundation work would include the use of cranes, pumps, motorized concrete buggies, concrete pumps, jackhammers, pneumatic compressors, a variety of small tools, and concrete trucks. This phase of the work would employ several hundred workers employed on-site; up to 100 trucks could enter and exit the site daily at the peak of work.

Depending on the soundness of the rock and the depth to rock, which is variable with rock deeper on the western side of the block than on the eastern side, piles may have to be drilled to support the buildings. The construction technique for drilled piles is different from the techniques used to drive piles. A rotary boring machine bores a hole in the rock. This technique allows for larger diameter piles than any other piling method and permits pile construction through particularly dense or hard strata. A temporary casing is used to seal the pile bore through water-bearing or unstable strata. On reaching the design depth, a reinforcing cage is lowered into the hole, and concrete poured. The concrete is brought to the level where the grade beam or pile cap is to be constructed. The casing can be withdrawn or left in situ. In some cases, drilling fluids, such as bentonite, may be needed. Bentonite is a type of clay that is recycled and used again in the construction.

The length of time for excavation and construction of the foundations would vary by building. The shortest time to excavate and build the foundations would be approximately 9 months for Site 4, and the longest would be approximately 14 months for Site 5/5a. These phases of construction would take about 8 to 10 months for most of the buildings.

Blasting

In the areas where rock removal is necessary, and where other rock excavation methods (e.g., mechanical excavators, rock splitters, and expansive chemical rock-splitting methods) would not be feasible, some blasting may be employed. Blasting in New York City is tightly regulated and restricted. All blasting would conform to New York City Fire Department (FDNY) regulations and any other applicable regulations. Blasting would involve the use of timed multiple charges with limited blast intensity, which would reduce potential impacts. Blastmats would be placed over the blasting areas. The regulations are intended to prevent endangering the public and to minimize vibrations that could affect nearby buildings. In addition, some of the Phase II work on the east end of the site could be near the subway, and New York City Transit (NYCT) also regulates blasting.

In areas where a controlled drill-and-blast method would be used, there would typically be one or two controlled blasting periods per day, each lasting for only a few seconds. More frequent blasting using smaller charges could also occur. Properties near these activities would be documented and monitored before, during, and following each blasting period, and strict parameters would be established and maintained by a safety officer at all times. Blasting would not occur at night. The time between controlled blasts is required to remove debris and setup for the next blast. Some vibrations at the street and inside adjacent properties may be detected due to drilling and blasting activities. The extent of vibrations would vary based on the density of the material being mined, with hard rock the most efficient in transmitting vibrations; how deep below-ground blasting occurs; proximity to structures; the foundation configuration of the adjacent structures; and the response to vibration of the adjacent structures.

Dewatering

The excavation would have to be dewatered because of ground water infiltration and from rain, sleet, and snow. The water would be sent to an on-site sedimentation tank so that the suspended solids could settle out. The decanted water would be discharged into the New York City sewer system, and the settled sediment conveyed to a licensed disposal area. Discharge in the sewer system is governed by DEP regulations.

For water discharged into the New York City sewerage, DEP regulations specify the following maximum concentration of pollutants.

- Petroleum hydrocarbons 50 parts per million
- Cadmium 2 parts per million
- Hexavalent chromium 5 parts per million
- Copper 5 parts per million
- Amenable cyanide 0.2 parts per million
- Lead 2 parts per million
- Mercury 0.05 parts per million
- Nickel 3 parts per million
- Zinc 5 parts per million

In addition, DEP limits other pollutants, such as total suspended particles, in the discharge water. DEP also imposes project specific limits, depending on the location of the project and contamination that has been found in nearby areas. For large-volume discharges into the sewer system—which is not expected at the project site—DEP samples and tests the discharge water.

UTILITY AND SEWER CONNECTION

New water lines and sanitary sewers would connect the proposed buildings to existing utility lines in the streets. These connections are usually installed about the same time as the excavation and foundation work. It is expected that most of the connections would be in either West 60th or West 62nd Street. To install a water line, a trench would be dug, and the bottom of the trench lined with gravel to act as bedding material. Lengths of the water line would be laid and welded together. Gravel would be placed around the water line, and the trench would be filled with compacted soil. If the soil removed during the digging of the trench is suitable, it would be reused; if not, clean soil would be brought in.

Sewer construction work primarily uses a cut-and-cover technique. A trench would be excavated in the street, a bedding layer of gravel laid in the bottom of the trench, the sewer pipe placed in the trench, the trench backfilled, and the pavement patched. This work typically involves the use of jackhammers and pavement cutters to open the street, backhoes to excavate the trench and place the backfill, and cranes to lift the sewer pipes into place. Asphalt trucks and rollers are needed to patch the street.

The street would be repaved in accordance with NYCDOT specifications. Traffic control measures would be coordinated with NYCDOT and implemented while work is ongoing to protect the workers and to maintain traffic flow. The new water and sewer connections would be designed and constructed to DEP standards. DEP would review and approve the connections. The review process would include evaluation to ensure that service to users would not be disrupted or impaired while the temporary measures are in place.

BUILDING SUPERSTRUCTURE

The superstructure consists of the interior core of the building, the structural columns along the perimeter and interior of the building, and the floor decks. For most buildings, the plan is to use steel girders for the first 10 to 12 stories, and then reinforced concrete for the remaining stories. However, the superstructure of some buildings may be entirely reinforced concrete. In general, the construction of the superstructure would last approximately 10 to 16 months. During this period, the structure would be open, until the exterior façade is installed. For the larger buildings, the installation of the exterior and the interior finishes overlap with construction of the superstructure. While the upper stories of the superstructure are being built, the exteriors and interior finishes are being installed on the lower floors. Building the superstructure requires the use of the tower crane, compressors, personnel and material hoists, concrete pumps, on-site reinforcing bar bending jigs, welding equipment, and a variety of hand-held tools. About 10 to 20 delivery and concrete trucks per day would bring construction materials to the site. Each day, about 100 to 200 workers would be required for the construction of each building. The superstructure would take about 6 to 14 months to construct, depending on the building. On Site 7, just over five months would be required, and on Site 5/5a, 14 months would be required.

BUILDING EXTERIOR

Exterior work would involve the placement of wall panels and windows on the concrete-and-steel superstructure, and the completion of the roof enclosure. The exterior panels could be constructed either on-site or off-site and trucked to the site. The windows are purchased and trucked to the site. The exterior elements would be placed by cranes and local hoists on the superstructure. To complete the roof structure, concrete would be pumped to the roof level, and waterproofing would be laid over the concrete. As the exterior is installed, the building becomes enclosed, reducing noise and emissions from the construction work that is taking place on the interior finishes. As discussed above and shown on Figure 19-1, superstructure would be constructed on higher floors and interior finishing would take place while the exterior is being installed.

The installation of the exteriors would take about four to eight months, with most of the buildings taking seven to eight months. This work would begin after the start of the construction of the superstructure. The exteriors would be coordinated to be installed concurrently with elements of the interior finishing. This activity would involve approximately 100 workers and about 25 trucks per day. The equipment for erecting the curtain walls would be cranes and local hoists with hand tools used for anchoring the panels and installing the windows. Concrete pumps and hand tools would be used to complete the roof.

INTERIOR FINISHES

This stage would include the construction of interior partitions, installation of lighting fixtures, and interior finishes (flooring, painting, etc.), and mechanical and electrical work, such as the installation of elevators. Mechanical and other interior work would overlap for 4 to 6 months with the tower building core and shell construction. This activity would employ the greatest number of construction workers: up to 250 to 300 per building during the active periods. Equipment used during interior construction would include exterior hoists, pneumatic equipment, delivery trucks, and a variety of small hand-held tools. However, this stage of construction is the quietest and does not generate fugitive dust.

SIDEWALK AND LANE CLOSURES

During the course of construction, parking and/or traffic lanes and sidewalks would have to be closed or protected for varying periods of time. When construction is under way on a building, pedestrians would be guided around the construction area in safe, protected routes. Certain crosswalks may be redirected. Bus stops on the M11 route may have to be temporarily relocated. All temporary lane and sidewalk closures would be approved by NYCDOT, and relocation of bus stops would be coordinated with NYCT.

The following describes the expected lane closures and sidewalk protection during the construction of each building. The sequence of the descriptions is in chronological order.

SITES 4 AND 5/5A

The construction on these sites would occur at the same time, and they are described together. During the excavation and foundation phase, a total of three truck ramps along West 62nd Street are expected to be needed. The ramps would not be shared between sites; each site would have its own dedicated ramp. They would be located away from the intersections with Columbus and Amsterdam Avenues. The excavation and foundation phase for Site 4 would be about nine months, while the excavation and foundation phase for Sites 5/5a would last more than a year. During this phase, a construction fence would surround the sites. The construction fence would partially block the sidewalk on the east side of Amsterdam Avenue, but the sidewalk would still be passable. On the south side of West 62nd Street, the sidewalk would be blocked, and pedestrians would have to use the north side of West 62nd Street.

On Site 4, a construction crane for building the superstructure would be erected on Amsterdam Avenue about a month after the start of foundation construction. In addition, a personnel and materials hoist would be installed on West 62nd Street. A protected pedestrian walkway would be built along the curb lane of Amsterdam Avenue, where the crane would be located, and along the north side of West 61st Street. Therefore, one lane in Amsterdam Avenue would be blocked. The crane would remain in place for about 10 months while the superstructure is being constructed. When the crane is removed, the curb lane on Amsterdam Avenue would be reopened. During the final interior fit out work, the hoist on West 62nd Street would transport all materials and workers into the partially constructed building. Overall, construction on Site 4 would close the south side of the West 62nd Street sidewalk to pedestrians for about 20 months, and the eastern curb lane on Amsterdam Avenue for about 10 months, subject to NYCDOT approval.

On Sites 5/5a, two cranes and a hoist would be installed on West 62nd Street about 13 months after the start of construction. With concurrent construction on Site 4, the southern sidewalk on West 62nd Street would be closed, and pedestrians would have to use the sidewalk on the northern side of the street. The curb lane on the south side of West 62nd Street would be closed, and during the day, the southern travel lane would be closed for safety reasons while the cranes are in motion. These closures would last until the façade and roof have been installed, and only interior work is underway. During the interior work, only hoists would be needed to move workers and materials vertically.

SITES 3 AND 3A

Sites 3 and 3a Separate

During the excavation and construction of the foundations for Site 3, a ramp to/from the excavation would be on West 60th Street. The sidewalk would be closed at the site, and pedestrians would be directed to the south side of West 60th Street. One lane would be closed on West 60th Street. The excavation and foundations phase of construction would take about six months.

During erection of the building, a tower crane would be placed along West 60th Street and a hoist on Amsterdam Avenue. On West 60th Street, the sidewalk would be closed and two lanes would be occupied by the tower crane. On Amsterdam Avenue, the curb lane would be closed, and a sidewalk shed erected to protect pedestrians as they walk through the area. The erection of the superstructure and completion of the building would take about two years.

In the scenario where Sites 3 and 3a are constructed separately, work on Site 3a would start about 16 months later than the construction on Site 3. Therefore, there would be less overlap of construction activity with these sites constructed separately than if they were constructed in the stacked scenario. During the excavation and foundation phase, a ramp on Amsterdam Avenue would be in place for about six to seven months. The curb lane of traffic on the east side of Amsterdam Avenue would be closed, and pedestrian flow would be blocked sporadically when the trucks enter and exit the site. After the excavation and foundation phase, a tower crane and a hoist would be placed on West 61st Street, and a sidewalk shed erected to protect pedestrians. This phase would take about just over two years.

Sites 3 and 3a Stacked

The total construction period for Sites 3 and 3a constructed with the stacked option would be about three years. During the excavation phase, ramps from the excavation site would be on West 60th Street and Amsterdam Avenue for about eight months, and tower cranes and hoists on Amsterdam Avenue and West 61st Street for just over two years. While the ramps are being used, pedestrian flow would be sporadically stopped as the trucks enter and exit the excavation. When the tower cranes and hoist are in place, sidewalk sheds would be erected to protect pedestrians.

Whether Sites 3 and 3a are stacked or separate, an interim plaza of about 16,000 square feet would be constructed to the north of the Lowenstein Center. The interim plaza would be completed after the completion of the parking under Site 5. The interim plaza would remain in place through Phase 1.

SITE 2

Construction of Site 2 would be part of Phase II, and construction is anticipated to begin in 2016. During the excavation and foundation stages, a ramp from the excavation would enter on West 60th Street. This excavation and foundation are expected to take about seven months. After the excavation and foundations are completed, a tower crane would be erected on the east site of the site, inboard of Columbus Avenue and its sidewalk. A sidewalk shed would be built to protect pedestrians. For the most part, truck deliveries would take place on West 60th Street, but on occasion, the trucks would occupy the west curb lane of Columbus Avenue. Construction of the superstructure and interior finishings is expected to take about just under two years.

SITE 1

After the construction on Site 2, no construction would be expected for two years. Construction of Site 1 would be expected to begin in mid-2020. The excavation and foundation construction would involve a ramp onto West 62nd for a period of about eight months. One curb lane would be temporarily used for the construction, and pedestrian flow would be sporadically blocked as trucks entered and exited. After the foundations are constructed, a tower crane would be erected along West 62nd Street. A sidewalk shed would be erected to protect pedestrians.

SITE 7

Similar to construction on Site 1, a two-year hiatus is expected before construction would begin on Site 7. The excavation stage is expected to take about 10 months and would involve access from either or both West 60th and West 61st Streets. One curb lane would be temporarily used for the construction, and pedestrian flow would be blocked sporadically as trucks entered and exited. After the foundations are constructed, a tower crane would be erected within the project site.

SITE 6

A two-year hiatus would be expected before construction would begin on Site 6. The excavation stage is expected to take about 10 months and would involve a ramp entering on West 62nd Street. One curb lane would be temporarily used for the construction, and pedestrian flow would be sporadically blocked as trucks entered and exited the site. After the foundations are constructed, a tower crane would be erected along West 62nd Street. A sidewalk shed would be erected to protect pedestrians. A loading dock would also be opened on the mid-block of West 62nd Street.

D. FUTURE WITHOUT THE PROPOSED ACTION

Absent the proposed action, the northwest and southwest corners of the project site and a mid-block portion of the site along West 62nd Street would be developed as-of-right with three residential buildings. These 26-, 28-, and 39-story buildings would total 736,504 gross square feet and could contain as many as 876 dwelling units. They would replace a vacant parcel, an active recreation area, and a passive recreation area at the northwest, southwest, and mid-block portions of the project site, respectively. The existing Law School, Lowenstein Center, McMahon Hall, and other open space areas on the project site would continue to function as they do today. No further construction would be anticipated after the three residential buildings are completed. The construction activities described above would occur, but for a shorter period of time and with fewer buildings completed.

E. PROBABLE IMPACTS OF THE PROPOSED ACTION

When large development projects are undertaken in New York City, construction can be disruptive to the surrounding area for limited periods of time throughout the construction period. The following analyses describe potential construction impacts from the proposed Master Plan on land use, historic resources, socioeconomics, hazardous materials, traffic and transportation, air quality, noise and vibration, and rodent control.

Activities on a construction site vary continuously, which leads to large variations in the types and numbers of on-site equipment, the horizontal and vertical location of the work, and the number of workers. These variations cause the timing of greatest potential impacts to change depending on the technical area of analysis. As an example, air quality is mostly affected by large diesel engines operating close together on a small site. This situation occurs during the excavation and foundation stage. The largest number of workers and material deliveries occur during the interior finishing stage, and they generate the greatest traffic volumes. During the superstructure stage, the noise generating activities rise with the building and have the greatest potential impacts on nearby elevated receptors. In each of these technical areas, the selection of the reasonable worst case is explained in detail.

LAND USE

The proposed action would result in construction over a 24-year period, with successive phases of construction generally moving counterclockwise from the north of the campus. The inconvenience and disruption arising from the construction would include diversions of pedestrians, vehicles, and construction truck traffic to other streets. The construction will not be continuous throughout the full 24 years, nor will any one location on the campus or any portion of the surrounding area be continuously affected by the construction. It is anticipated there would be periods when no construction would occur. Throughout the construction period, access to surrounding residences, businesses, and institutions in the area would be maintained. In addition, 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. Because none of these impacts would be permanent or continuous in any one location, they would not result in significant adverse impacts on land use patterns or neighborhood character in the area.

HISTORIC RESOURCES

The study area for archaeological resources is the area to be disturbed for project construction, i.e., the project site itself. The New York City Landmarks Preservation Commission (LPC) has determined, in a letter dated July 9, 2007, that the project site has no archaeological significance.

It is not expected that the proposed action would have significant adverse impacts on any of the architectural resources located in the study area. There are no properties on the project site that are architecturally significant. The proposed action would implement a Construction Protection Plan for each site to protect resources, such as the portions of Lincoln Center for the Performing Arts along West 62nd Street and the Church of St. Paul the Apostle that are located within 90 feet of the proposed construction activities. The Construction Protection Plan would be developed in consultation with and approved by New York State Office of Parks, Recreation, and Historic Preservation (OPRHP) and New York City Landmarks Preservation Commission (LPC). The Construction Protection Plan would conform with the requirements of DOB's Technical Policy and Procedure Number 10/88 and LPC's Guidelines for Construction Adjacent to a Historic Landmark. The proposed action would not block significant views of any resource, significantly alter the visual setting of any resource, or introduce incompatible contextual elements to any resource's setting.

SOCIOECONOMIC CONDITIONS

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 direct activity. Construction would also contribute to increased tax revenues for the City and State, including those from personal income taxes. Construction would not displace any jobs or residential units, and thus no significant adverse socioeconomic impacts are expected.

HAZARDOUS MATERIALS

The Phase I Environmental Site Assessment (ESA) identified potential historical and present sources of contamination on- and off-site:

- On-site sources included spills from hydraulic oil tanks, potential historical fuel oil tanks, a print shop, and an Armory Drill Room. (Sites 1, 5, 5a, 6, and 7)
- Off-site (but on the same block) sources included a hospital and a laboratory on Lots 30 and 7501, respectively, both of which are presently occupied by The Alfred at 161 West 61st Street and a transformer vault in the central portion of the West 62nd Street sidewalk north-adjacent to the site.
- Off-site (but not on the same block) sources included a hospital with two laboratories to the south of the site across West 60th Street, an auto repair shop and garages with buried gasoline tanks to the east of the site across Columbus Avenue (between West 61st and West 62nd Streets), and a filling station to the east of the site across Columbus Avenue (at the northeast corner of Columbus Avenue and West 61st Street).

PHASE I

In order to avoid adverse impacts, remedial measures would be undertaken during the excavation required for the first phase of construction and during excavation and demolition required for the second phase of construction.

Phase I remediation measures would focus on excavation or soil disturbance. Excavation for Phase I building construction would be in the vicinity of the enclosure containing the 2,000-gallon aboveground diesel storage tank for the McMahon Hall backup generator, potential historical fuel oil tanks associated with historical on-site buildings, and the hospital and laboratory historically located off-site on the subject block. The construction of the interim plaza on a current parking lot between the Lowenstein Center and Columbus Avenue would result in only shallow excavation for bench installation and plantings. Although this construction would occur in the vicinity of a past hydraulic oil spill, the Phase I ESA indicated that soil contaminated by this spill had been removed to below the anticipated depth of excavation.

Soil Disturbance

- Prior to any soil disturbance, a Phase II Subsurface Investigation (including the collection of soil samples) of each area to be disturbed would be conducted to determine whether contamination is present. The scope of the Phase II would be reviewed and approved by the DEP prior to its implementation.
- If the Phase II indicates the presence of underground storage tanks or contaminated soil in the areas to be disturbed, all activities involving disturbance of existing soil would be conducted in accordance with a Health and Safety Plan (HASP), which would be reviewed by DEP. The HASP would detail measures to reduce the potential for exposure (e.g., dust control) and measures to identify and manage known contamination (e.g., petroleum storage tanks or contaminated soil) and unexpectedly encountered contamination. Any underground storage tanks in areas to be disturbed would be properly registered, if required, with

NYSDEC and the FDNY, and would be properly assessed, closed and removed in accordance with federal, state, and local regulations prior to, or as part of initial construction activities for the project.

- All material that needs to be disposed of (e.g., both contaminated soil and excess fill, including demolition debris) would be properly handled and disposed of off-site in accordance with all applicable federal, state, and local regulations.

PHASE II

The second phase of development would entail:

- Demolition of the Law School Building—containing a 220-gallon aboveground diesel storage tank and an approximately 75-gallon hydraulic tank—followed by excavation preceding new construction; and
- Demolition of all or part of the one-story portion of the Lowenstein Center. This portion of the Lowenstein Center does not contain any of the facilities identified in the Phase I ESA as potential sources of hazardous materials.

Potential sources of contamination as well as potential contamination from off-site sources would be a focus of concern. Prior to undertaking any measures listed above that involve soil disturbance, the following measures relating to demolition would be undertaken to avoid adverse impacts.

DEMOLITION

- Prior to demolition any aboveground storage tanks in the building would be removed from service, and all such tanks would be properly assessed, closed and removed in accordance with federal, state, and local regulations.
- Any remaining chemicals or cleaning/maintenance supplies would be removed and disposed of in accordance with all applicable regulations.
- Prior to demolition, unless there is labeling or test data which indicates that fluorescent lights are not mercury- and/or polychlorinated biphenyl (PCB)-containing, disposal would be performed in accordance with applicable federal, state, and local requirements.
- Prior to any disturbance of on-site buildings, unless the areas to be disturbed are known not to contain asbestos, such areas would be surveyed for asbestos prior to demolition. All asbestos-containing materials (ACMs) in such areas would be properly removed and disposed of in accordance with applicable federal, state, and local regulations prior to construction.
- Lead-based paint would be managed in accordance with applicable federal, state, and local requirements.
- All demolition debris would be properly handled and disposed of in accordance with all applicable federal, state, and local regulations.

With the implementation of these measures, no significant adverse impacts related to hazardous materials would result from construction activities. Following construction, there would be no potential for the proposed project to have significant adverse hazardous materials impacts.

TRAFFIC AND TRANSPORTATION

The construction of various components of the proposed Master Plan would be expected to result in intermittent surface disruptions and construction worker and truck traffic for a 24-year period, from 2009 to 2032. Because of the lengthy duration of these activities, a detailed traffic analysis was conducted to assess the potential construction-related traffic impacts in 2011, 2021, and 2031. This analysis concluded that one significant adverse traffic impact during the 3:00–4:00 PM peak hour would be expected in 2011; one significant adverse impact would occur during the 3:00–4:00 PM peak hour in 2021; three significant adverse traffic impacts at two intersections were identified in the 3:00-4:00 PM peak hour in 2031; and six significant adverse traffic impacts were identified at five intersections during the 5:00–6:00 PM peak hour in both the 2021 and 2031 analysis years. As discussed below, since the projected construction-generated traffic would be temporary and would mostly occur outside of the area's peak travel hours, the overall construction traffic impacts and required mitigation measures are expected to be implemented only for certain construction periods and would not be contradictory to the mitigation measures established for the proposed action's operational traffic analysis, as described in Chapter 15, "Traffic and Parking," and Chapter 21, "Mitigation," although adjustments on the mitigation measures at some locations would be temporarily required.

As discussed in Section A, "Introduction," the comparison to determine impacts is made to a future baseline condition and not to future conditions without the proposed action (No Build condition), where three buildings would be constructed as-of-right. Therefore, the conclusions summarized above are conservative because a private developer would not be bound by the commitments that Fordham University would make to prevent and reduce potential significant adverse traffic impacts.

CONSTRUCTION TRAFFIC PROJECTIONS

Average daily construction worker and truck activities by month, quarter, and rolling annual average were projected for the full 24 years of construction. These projections were further refined to account for worker modal splits and vehicle occupancy, arrival and departure distribution, and the passenger car equivalent (PCE) factor for truck traffic.

Daily Workforce and Truck Deliveries

For a conservative reasonable worst-case analysis of potential construction traffic impacts, the peak three-month levels of construction were used as the basis for estimating peak hour construction traffic volumes. Based on the current schedule, which conservatively assumes commencement of construction mid-year of 2009, it was determined that peak construction activities would occur in 2011, 2021, and 2031. During peak construction months in 2011 when Sites 3, 4, 5, and 5a would be under construction simultaneously, the daily averages of construction workers and truck traffic were estimated at 630 daily workers and 20 daily trucks. During peak construction months in 2021 when Site 1 would be under construction, the daily averages of construction workers and truck traffic were estimated at 423 daily workers and 11 daily trucks. During peak construction months in 2031 when Site 6 would be under construction, the daily averages of construction workers and truck traffic were estimated at 424 daily workers and 13 daily trucks. These estimates of daily construction activities are further discussed below.

Construction Worker Modal Splits

According to the U.S. Census reverse journey-to-work (RJTW) data, commuting to work via auto in New York City is more prevalent among workers in the fields of construction and excavation than for workers in other occupations. The census data showed that approximately 49 percent of construction workers would commute to the project site via auto, with an average auto-occupancy of 1.20. Recent experience and surveys conducted at actual construction sites showed that the census information on worker modal split is generally comparable to what actually takes place. However, carpooling has become substantially more prevalent, particularly at large construction sites. The likely reasons for this trend include: 1) more opportunities are available within a large workforce for workers to commute together; 2) parking spaces have become more difficult to find; and 3) the cost of driving has escalated in recent years as a result of increases in tolls and the price of gasoline and parking.

Although it is likely that the travel behaviors of future construction workers at the Fordham University Lincoln Center Campus would resemble those described above, the detailed construction traffic analysis conservatively applied the census statistics of 49 percent traveling via auto at an average auto-occupancy of 1.20.

Peak Hour Construction Worker Vehicle and Truck Trips

The construction schedule assumed that site activities would primarily take place during the typical construction shift of 7:00 AM to 3:30 PM, with the extended work, when required (as discussed above), ending between 5:00 and 6:00 PM. Construction worker travel would typically take place during the hours before and after the work shift, while construction truck trips would be made throughout the day (with more trips made during the early morning), and trucks would remain in the area for shorter durations. For analysis purposes, each worker vehicle was assumed to arrive in the morning and depart in the afternoon, while each truck delivery was assumed to result in two truck trips during the same hour. Furthermore, in accordance with the *CEQR Technical Manual*, the traffic analysis assumed that each truck has a PCE of 2. Hence, a truck delivery to the project site would result in an equivalent of four vehicle trips (two entering and two exiting) during the same hour of analysis.

The estimated daily vehicle trips were distributed to various hours of the day based on projected work shift allocations and conventional arrival/departure patterns of construction workers and trucks. For construction workers, the majority (80 percent) of the arrival and departure trips would take place during the hour before and after each shift. For construction trucks, deliveries would occur throughout the time period while the construction site is active. However, to avoid traffic congestion, construction truck deliveries would often peak also during the hour before the regular day shift (25 percent of shift total), overlapping with construction worker arrival traffic. Based on these assumptions, the peak hour construction traffic was estimated for the entire construction period. Since each truck delivery would account for four passenger car trip-ends during the same hour, the cumulative totals represent the total PCEs projected during different periods of construction.

Analysis Time Periods

In determining the appropriate time periods for analysis, consideration was given to the projected construction trip generation and background traffic levels. Although extended work days are likely to be infrequent, the projections below conservatively depict worst-case conditions when extended work days occur and when the end of construction activities overlaps with the evening commuter peak period. Based on the information and assumptions described above, it was concluded that quantitative traffic analyses would be appropriate for the weekday morning worker arrival and the afternoon worker departure time periods. A comparison of the projected construction and operational traffic during various critical hours and years of analysis is presented in Table 19-2.

Table 19-2
Operational and Construction Traffic Comparison

Year / Scenario	Operational Vehicle Trip Increment				Construction PCE* Increment		
	Operational AM Peak Hour	Operational Midday Peak Hour	Operational PM Peak Hour	Operational Pre-Theater Peak Hour	Worker Arrival Peak Hour**	Worker Regular-Shift Departure Peak Hour**	Worker Extended-Shift Departure Peak Hour**
	8 – 9 AM	1 – 2 PM	5 – 6 PM	7 – 8 PM	6 – 7 AM	3 – 4 PM	5 – 6 PM
2011 Construction					**221**	**128**	**97**
2014 Operational	35	72	82	36			
2021 Construction					**145**	**41**	**96**
2031 Construction					**149**	**52**	**89**
2032 Operational	68	111	140	81			

Notes:
* Construction-generated traffic was converted to PCEs.
** These projections reflect the worst-case extended shift conditions for quarters with the peak number of workers.

As shown in the summaries above, during the peak three-month period of 2011, 221 construction related PCEs, including 205 inbound construction worker vehicles and 4 truck deliveries (or 16 PCEs), would occur between 6 and 7 AM, 128 outbound construction worker vehicles would occur between 3 and 4 PM, and 97 outbound construction worker vehicles would occur between 5 and 6 PM. During the peak three-month period of 2021, 145 construction related PCEs, including 137 inbound construction worker vehicles and 2 truck deliveries (or 8 PCEs), would occur between 6 and 7 AM, 41 outbound construction worker vehicles would occur between 3 and 4 PM, and 96 outbound construction worker vehicles would occur between 5 and 6 PM. During the peak three-month period of 2031, 149 construction related PCEs, including 137 inbound construction worker vehicles and 3 truck deliveries (or 12 PCEs), would occur between 6 and 7 AM, 52 construction related PCEs, including 48 outbound construction worker vehicles and 1 truck delivery (or 4 PCEs), would occur between 3 and 4 PM, and 89 outbound construction worker vehicles would occur between 5 and 6 PM.

In comparison, the construction generated traffic in the construction 6:00–7:00 AM arrival peak hour would be higher than the operational traffic generated by the proposed action in the operational AM peak hour (8:00–9:00 AM). However, baseline traffic during 6:00–7:00 AM is approximately 60 percent of the baseline traffic during 8:00–9:00 AM. The construction generated traffic in the afternoon/evening departure hours, 3:00–4:00 PM and 5:00–6:00 PM, would be similar or lower than the operational traffic generated by the proposed action in the operational PM peak hour (5:00–6:00 PM).

CONSTRUCTION SEQUENCING

Aside from the construction trips described above, area roadway conditions would change as a result of the sequencing of various construction elements. Detailed maintenance and protection of traffic (MPT) plans would be developed for approvals by NYCDOT Office of Construction Mitigation and Coordination (OCMC). The MPT plans would also be coordinated with the expected construction at Lincoln Center.

The construction of the proposed action would progress from Sites 4, 5 and 5a on the northwest corner of the campus, with site delivery access provided on either Amsterdam Avenue or West 62nd Street. The construction would move toward Sites 3 and 3a on the southwest of the campus, with site delivery access provided on West 60th Street. The construction of Sites 3/3a, 4, and 5/5a would be completed by the end of 2014. At the southeast corner of the campus, Site 2 would be under construction between 2016 and 2018, with site delivery access provided on West 60th Street. Between 2020 and 2022, Site 1 would be under construction at the northeast corner of the block, with site delivery access provided on West 62nd Street. Site 7 construction, between 2025 and 2027, would be accessed from either or both West 60th and 61st Streets and Amsterdam Avenue. The construction at Site 6, located mid-block on the south side of West 62nd Street, would start in 2030 and end in 2032.

During construction, sidewalks adjacent to the construction sites would be temporarily replaced by protected walkways, while curb and travel lanes may be displaced for periods of time. During Phase 1 construction, loss of curb lanes are anticipated along the north side of West 60th Street near Amsterdam Avenue, the east side of Amsterdam Avenue between West 60th and West 62nd Streets, and the south side of West 62nd Street near Amsterdam Avenue. During Phase 2 construction, loss of curb lanes are anticipated along the north side of West 60th Street near Columbus Avenue, the west side of Columbus Avenue between West 60th and West 62nd Streets, and the south side of West 62nd Street near Columbus Avenue. Additional MPT measures, such as shifting centerlines along West 62nd Street, may be required to maintain adequate two-way travel on that street. It is also expected that curbside regulations would be altered throughout construction to maintain optimal use of available curbside areas surrounding the campus that do not need to be closed for construction. Specifically, daytime and off-hour parking restrictions may be lifted or modified to replace the loss of curbside parking spaces, and tour and franchised buses that currently lay over on the western two-thirds of West 62nd Street between Columbus and Amsterdam Avenues are expected to also be permitted, as needed, to have limited layover along the eastern one-third of the block.

Detailed analyses of 2011, 2021, and 2031 conditions, accounting for projected construction traffic and the anticipated roadway disruptions, were conducted to identify potential traffic impacts during construction. The analysis results are presented below and, where appropriate, measures to mitigate projected impacts are identified.

CONSTRUCTION TRAFFIC ANALYSES

As discussed above, detailed analyses of 2011, 2021, and 2031 conditions, accounting for projected construction traffic and the anticipated roadway closures, were conducted to identify potential traffic impacts during construction. The analysis approach, data application, and analysis results are presented below.

Peak Hour Traffic Volumes

To assess the potential impacts resulting from construction-generated traffic and the temporary roadway changes anticipated during different stages of construction, the appropriate baseline conditions were developed with which conditions during construction could be compared. Using the existing automatic traffic recorder (ATR) data and the future No Build peak period traffic volumes projected for the operational traffic analysis, baseline conditions were established for the weekday morning 6:00–7:00 AM, weekday early afternoon 3:00–4:00 PM, and typical 5:00–6:00 PM construction peak analysis hours for the 2011, 2021, and 2031 construction analysis years, as shown in Figures 19-2 through 19-10. The extrapolation of traffic volumes for these baseline traffic networks is conservatively based on the 2014 and 2032 No Build traffic volumes, although the

2.10.09

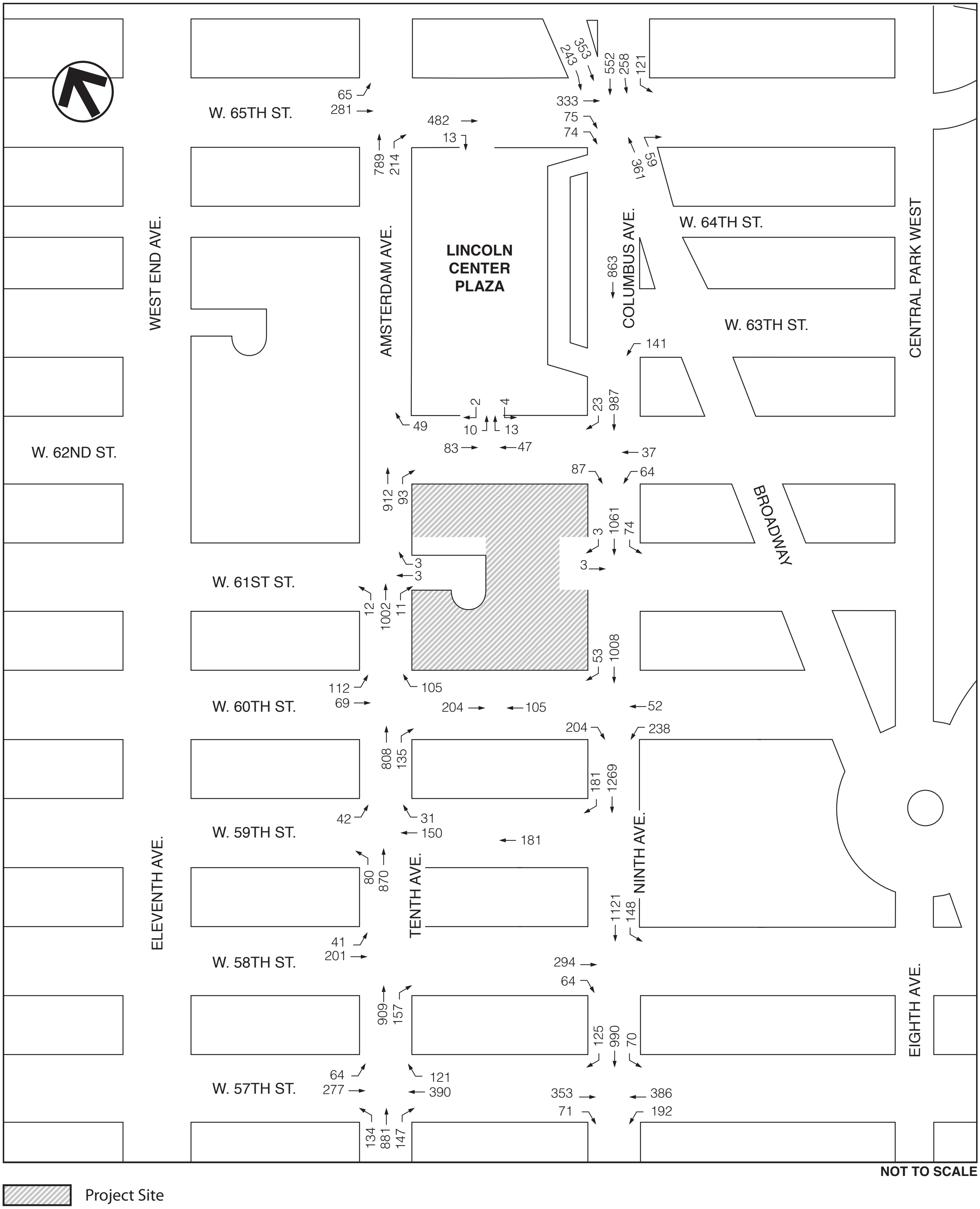


Figure 19-2

2011 No Build Traffic Volumes

6-7 AM Peak Hour

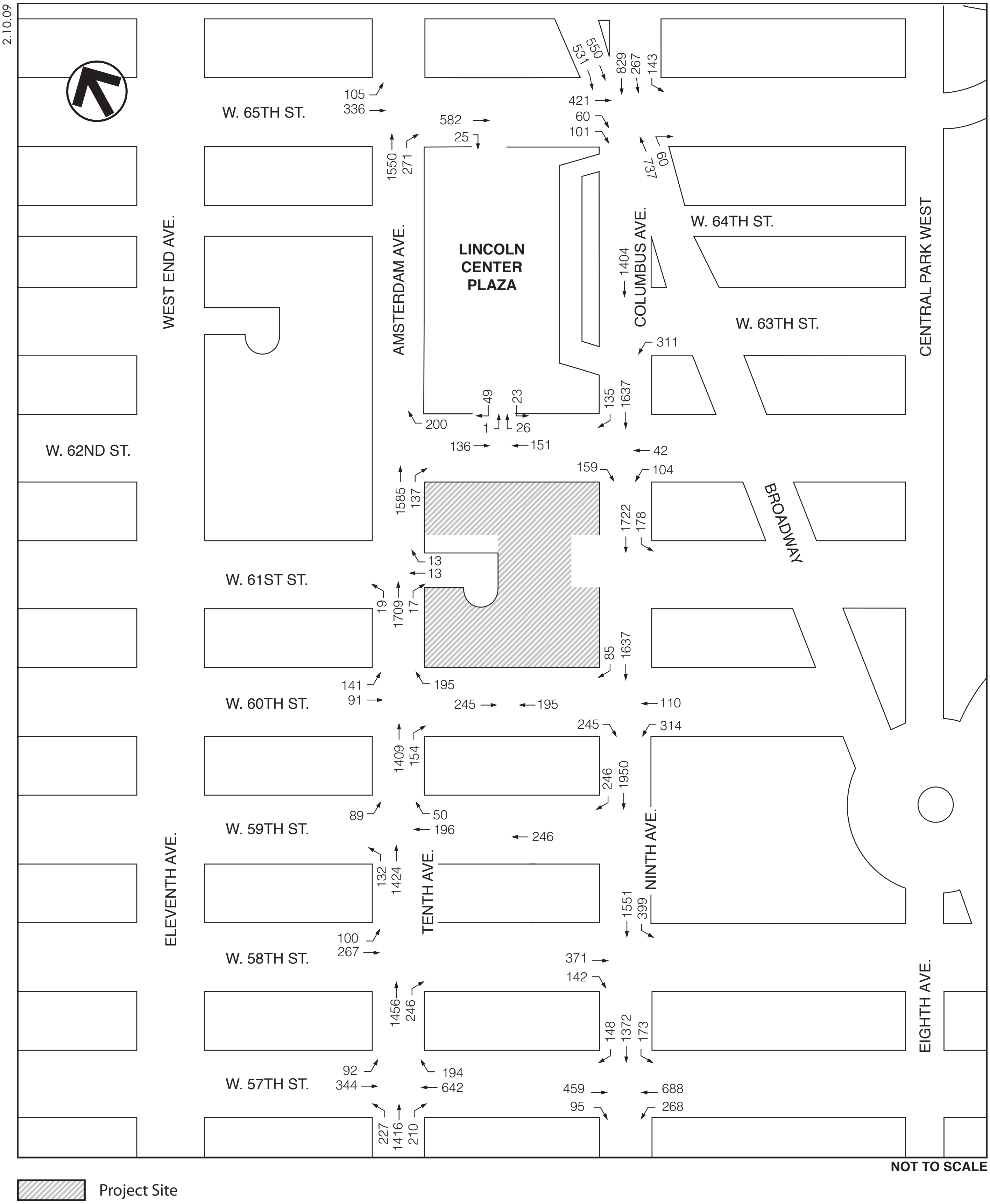


Figure 19-3
2011 No Build Traffic Volumes
3-4 PM Peak Hour

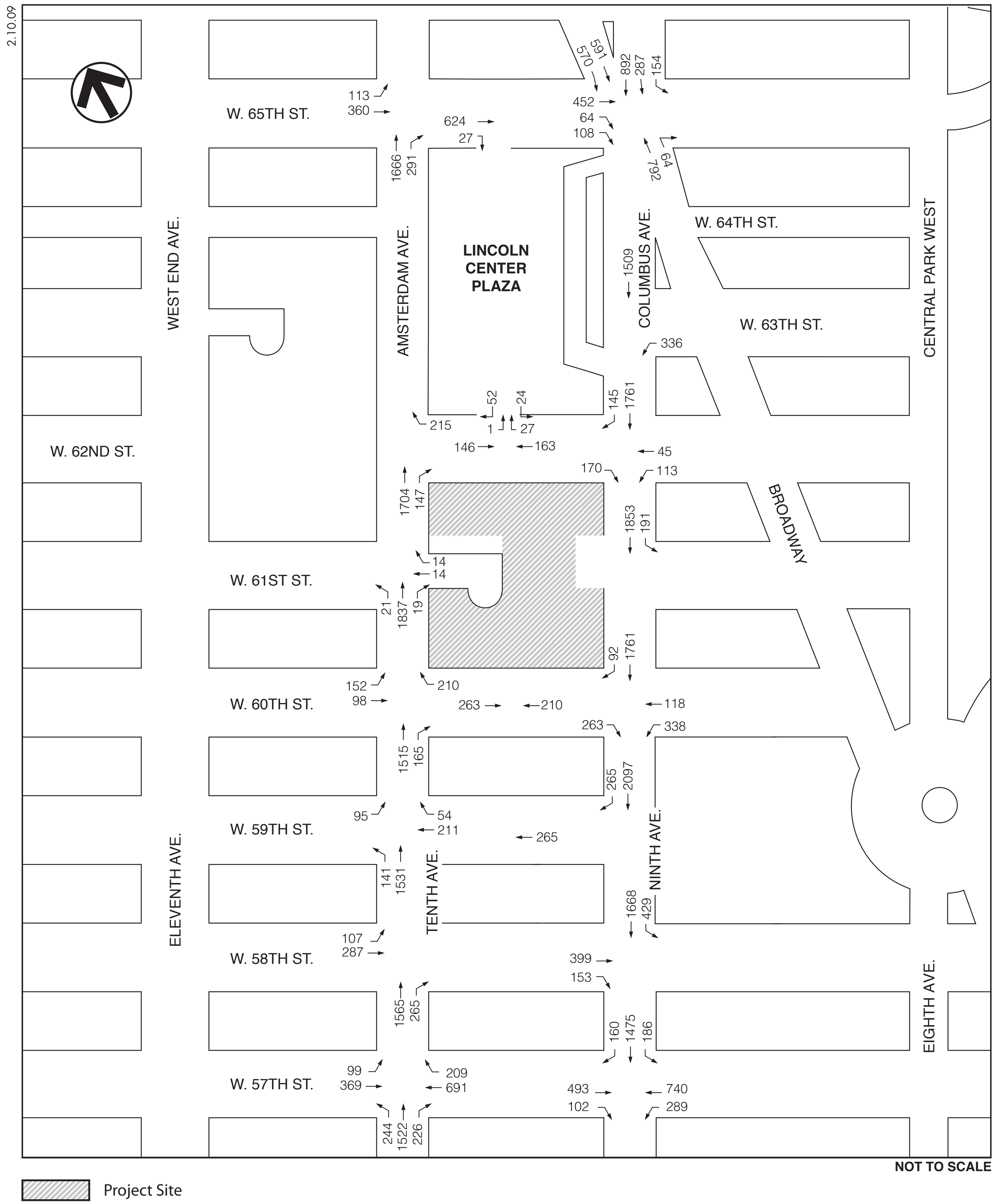


Figure 19-4
2011 No Build Traffic Volumes
5-6 PM Peak Hour

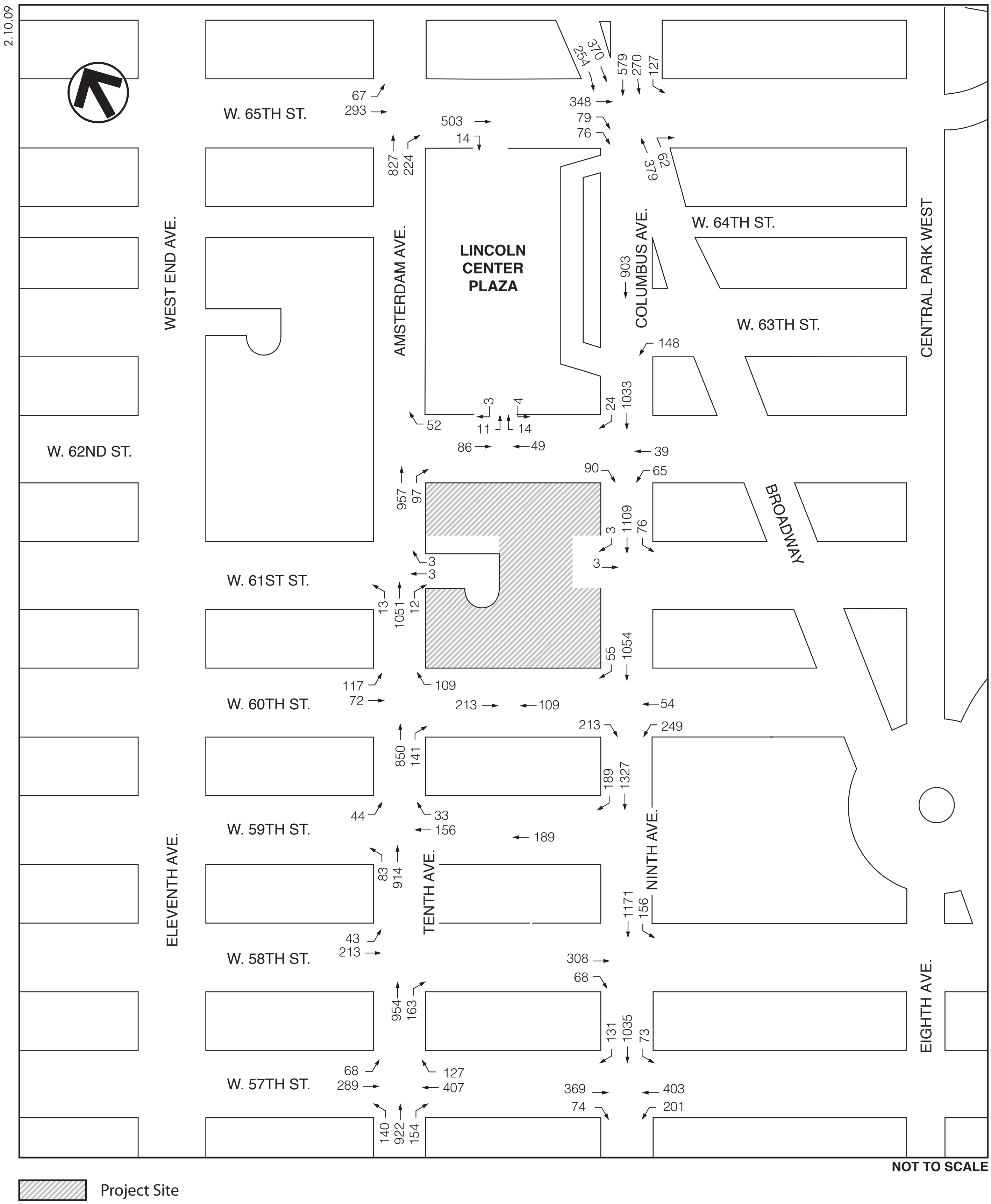


Figure 19-5
2021 No Build Traffic Volumes
6-7 AM Peak Hour

2.10.09

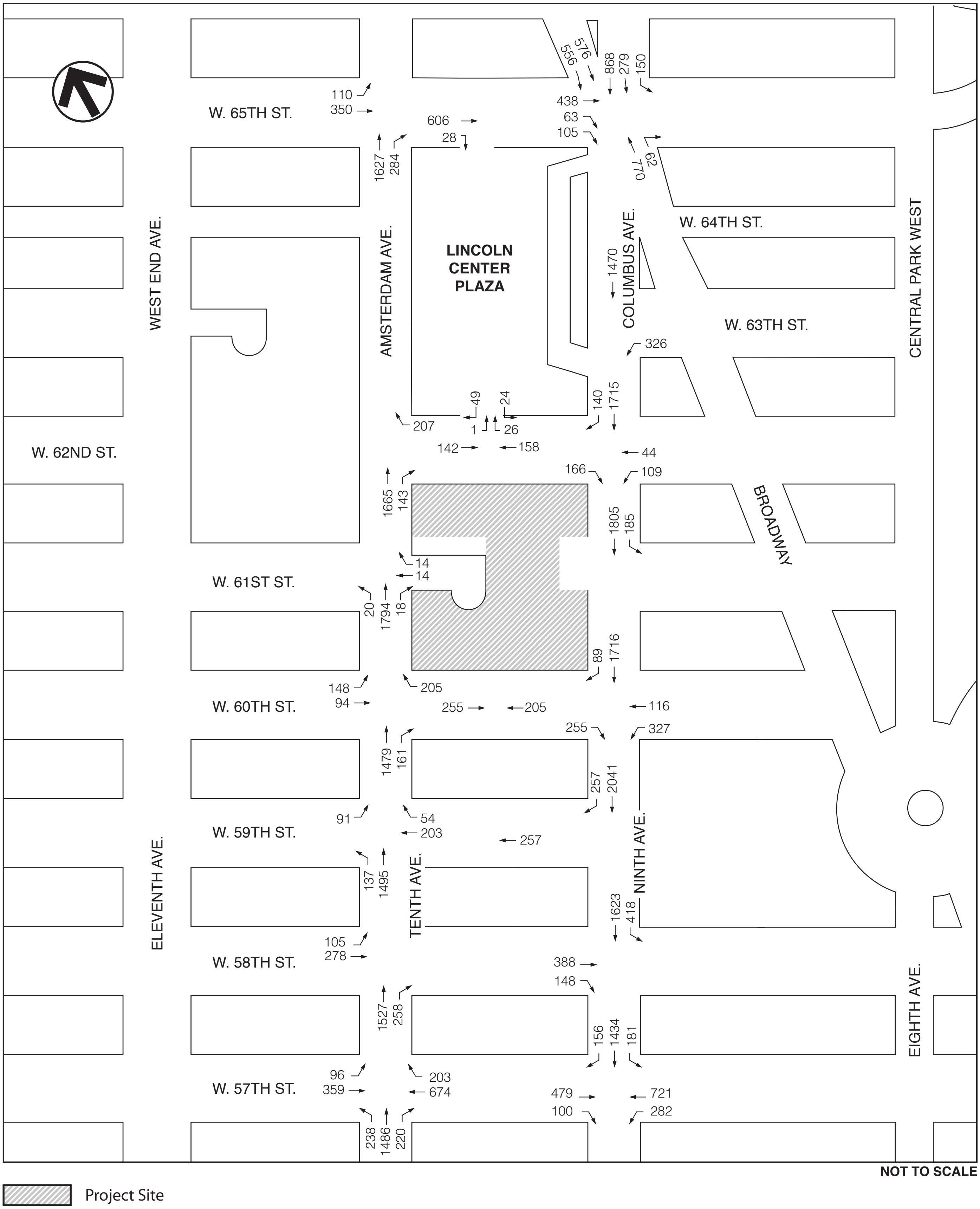


Figure 19-6
2021 No Build Traffic Volumes
3-4 PM Peak Hour

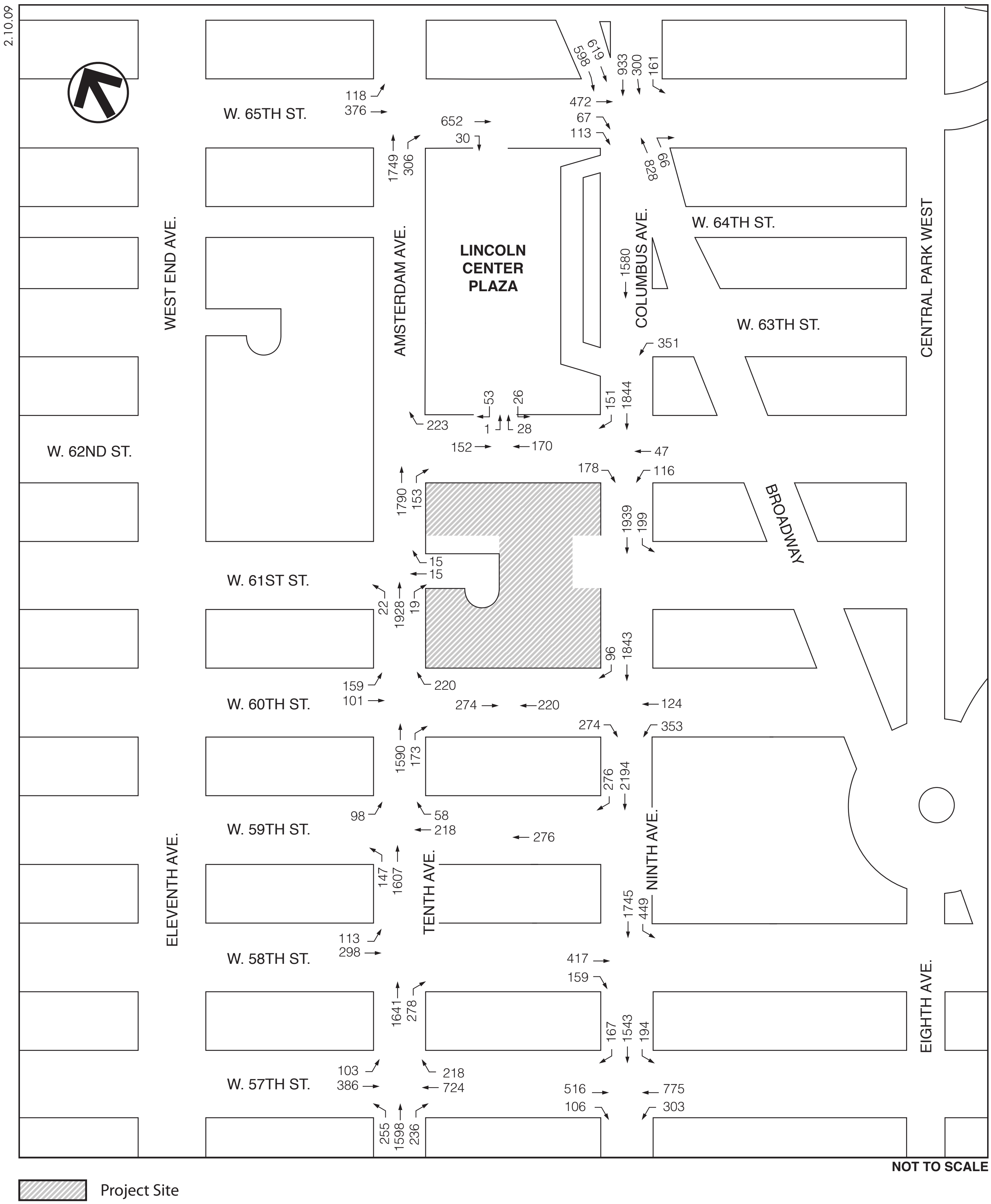
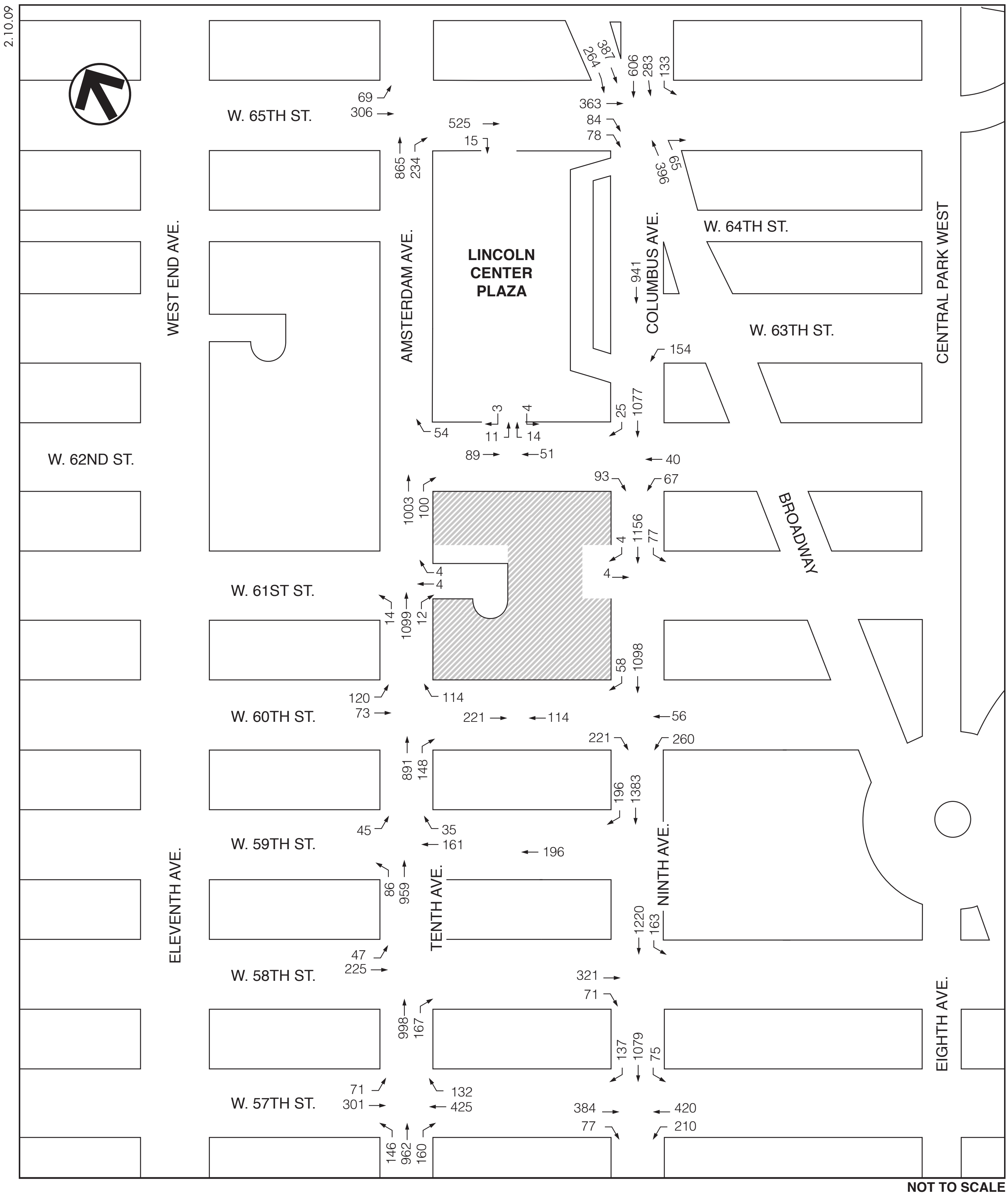


Figure 19-7
2021 No Build Traffic Volumes
5-6 PM Peak Hour



Project Site

Figure 19-8
2031 No Build Traffic Volumes
6-7 AM Peak Hour

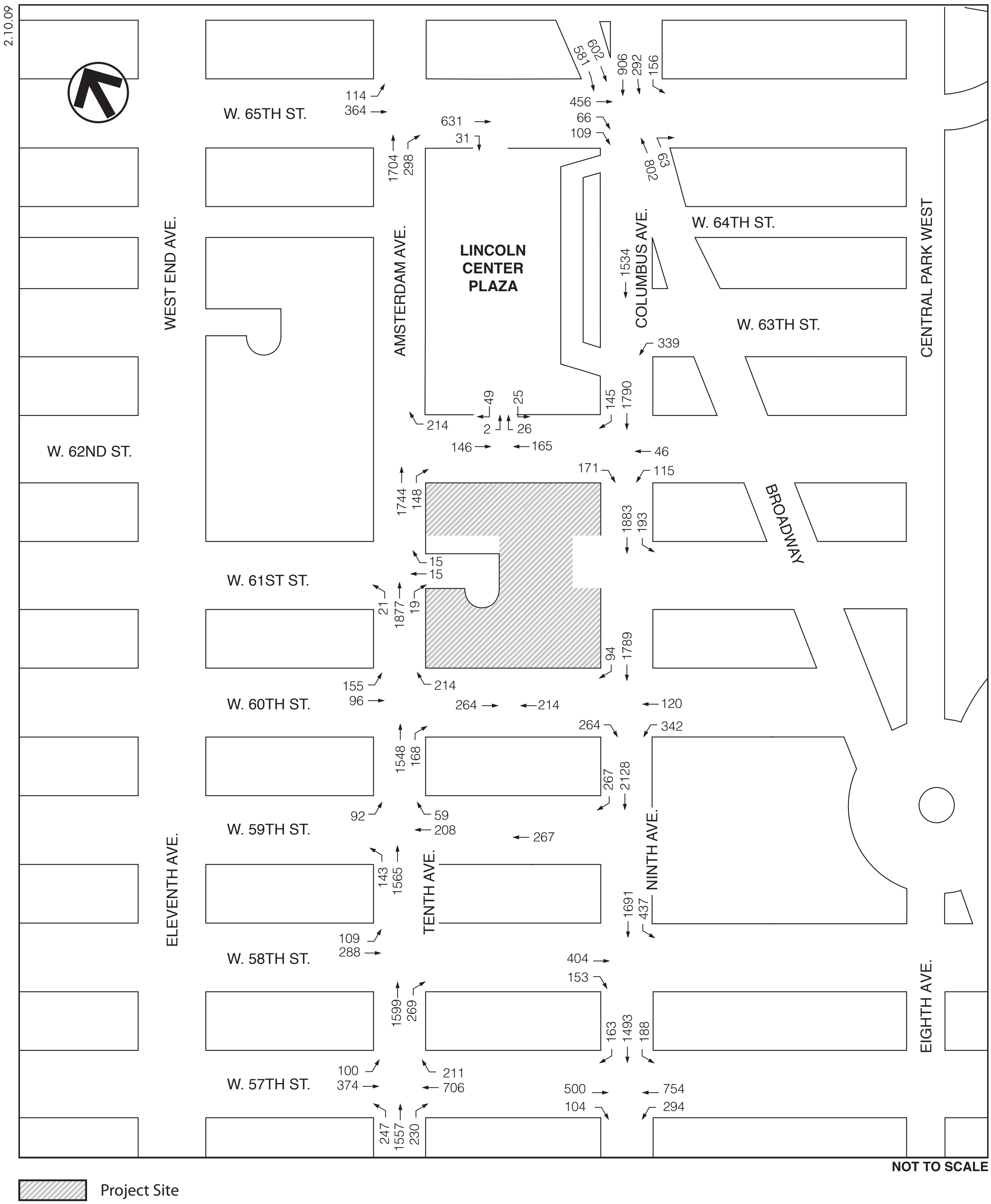


Figure 19-9
2031 No Build Traffic Volumes
3-4 PM Peak Hour

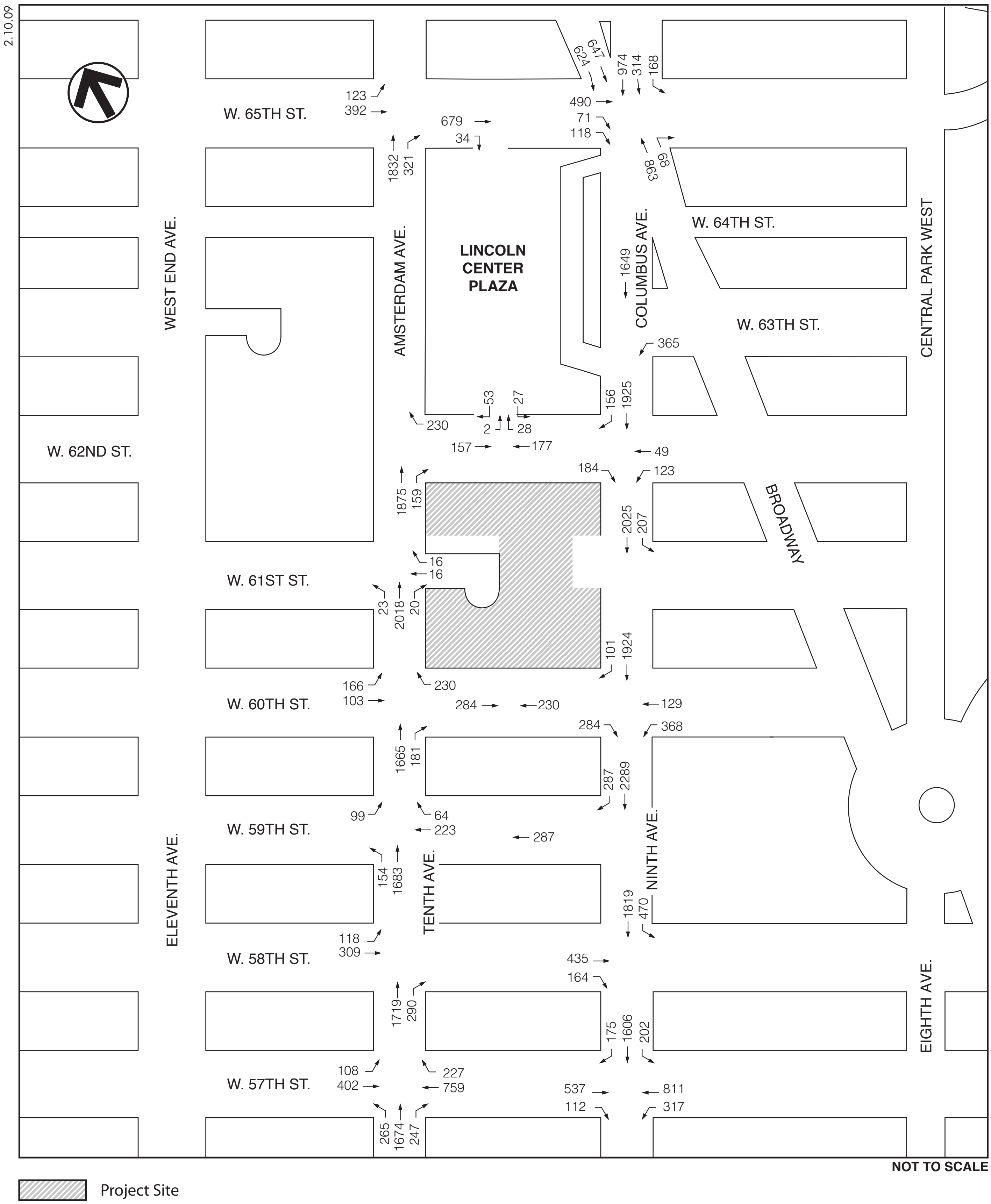


Figure 19-10
2031 No Build Traffic Volumes
5-6 PM Peak Hour

construction years analyzed are earlier, and will not have experienced the same degree of background growth.

Auto and truck traffic volumes were assigned to the study area traffic network based on travel patterns established in the operational traffic analysis, adjusted for likely origins and destinations of construction-related trips, and following NYCDOT-designated truck routes for delivery vehicles. These traffic assignments are presented in Figures 19-11 through 19-19 for construction worker vehicle trips and construction truck trips. The construction worker vehicle trips were assigned to nearby off-street parking facilities. A more detailed discussion of construction worker parking and curbside disruption issues is provided below, in “Parking.” The resulting construction traffic networks, accounting for incremental construction-related vehicle trips, including the doubling of projected truck traffic to account for PCEs, are shown in Figures 19-20 through 19-28. For the 2021 and 2031 construction traffic analyses, the project-generated traffic volumes from the operation of the completed Phase 1 development and partially completed Phase 2 development were also incorporated into the construction traffic network for impact assessment.

Traffic

A detailed analysis of the study area intersections was conducted for the time periods and analysis scenarios described above. For the peak 2011 construction, no significant adverse traffic impacts were identified for the 6:00–7:00 AM and 5:00–6:00 PM peak hours, while one significant adverse traffic impact was identified for the 3:00–4:00 PM peak hour. For the peak 2021 construction, no significant adverse traffic impacts were identified for the 6:00–7:00 AM peak hour, while significant adverse traffic impacts were identified at one intersection for the 3:00–4:00 PM peak hour and five intersections during the 5:00–6:00 PM peak hour. For the peak 2031 construction, no significant adverse traffic impacts were identified for the 6:00–7:00 AM peak hour, while significant adverse traffic impacts were identified at two intersections for the 3:00–4:00 PM peak hour and five intersections during the 5:00–6:00 PM peak hour. All projected impacts could be mitigated with either an early implementation of project mitigation strategies described in Chapter 21, “Mitigation,” or applying other operational mitigation measures.

Peak 2011 Construction Analysis

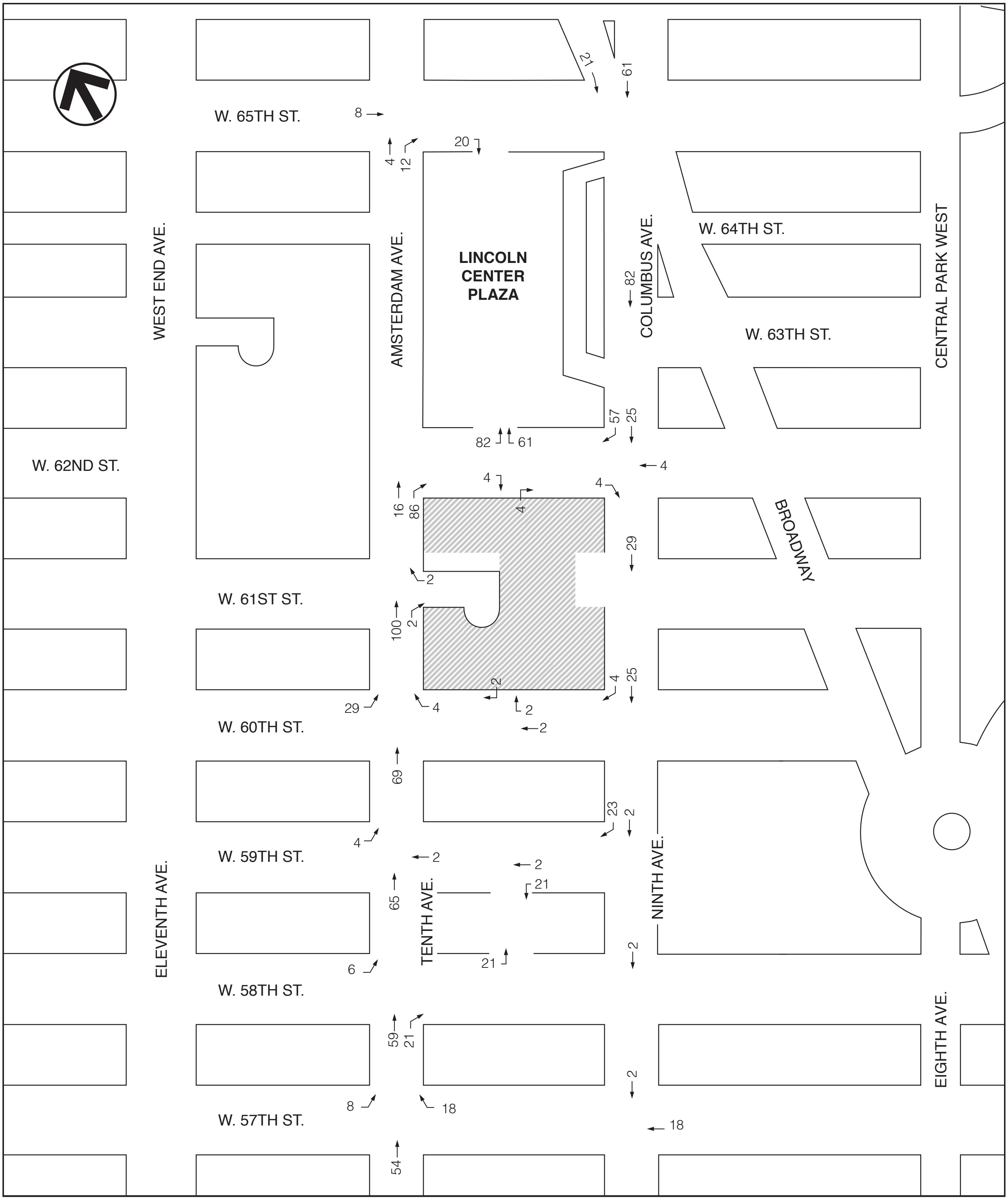
The traffic analysis conducted for the peak 2011 construction encompasses a study area of 15 intersections. For this analysis, construction worker vehicles were assigned primarily to the Lincoln Center Park & Lock, across from the Fordham University Lincoln Center Campus on West 62nd Street, while construction trucks were assigned to entrance ramps located along the perimeters of the construction sites. A summary of the analysis results, comparing the 2011 No Build and construction traffic conditions, is presented in Table 19-3.

During two of the analysis hours (6:00–7:00 AM and 5:00–6:00 PM), projected construction activities would not be expected to result in any significant adverse traffic impacts at the study area intersections. During the 3:00–4:00 PM peak hour, one significant adverse traffic impact was identified:

- Ninth Avenue and West 57th Street—The southbound approach would deteriorate from LOS E to LOS F, with average vehicle delay increasing from 74.1 to 83.7 seconds (v/c ratio increasing from 1.08 to 1.10).

Potential measures to mitigate these impacts, including project-specific mitigation strategies and other operational mitigation measures, are discussed below.

2.9.09



NOT TO SCALE

Project Site

Figure 19-11

2011 Construction Generated Traffic Volumes (PCEs)

6-7 AM Peak Hour

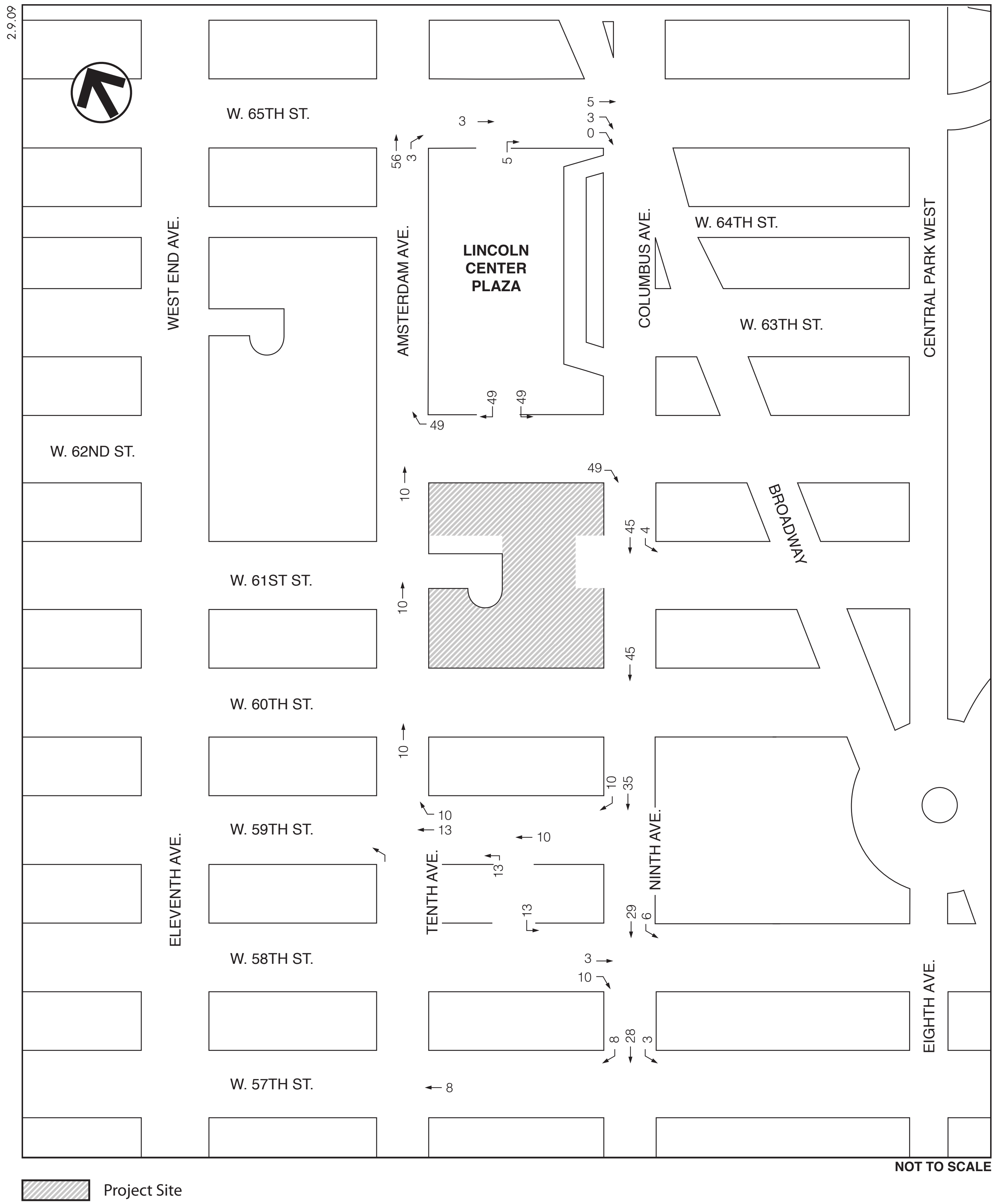
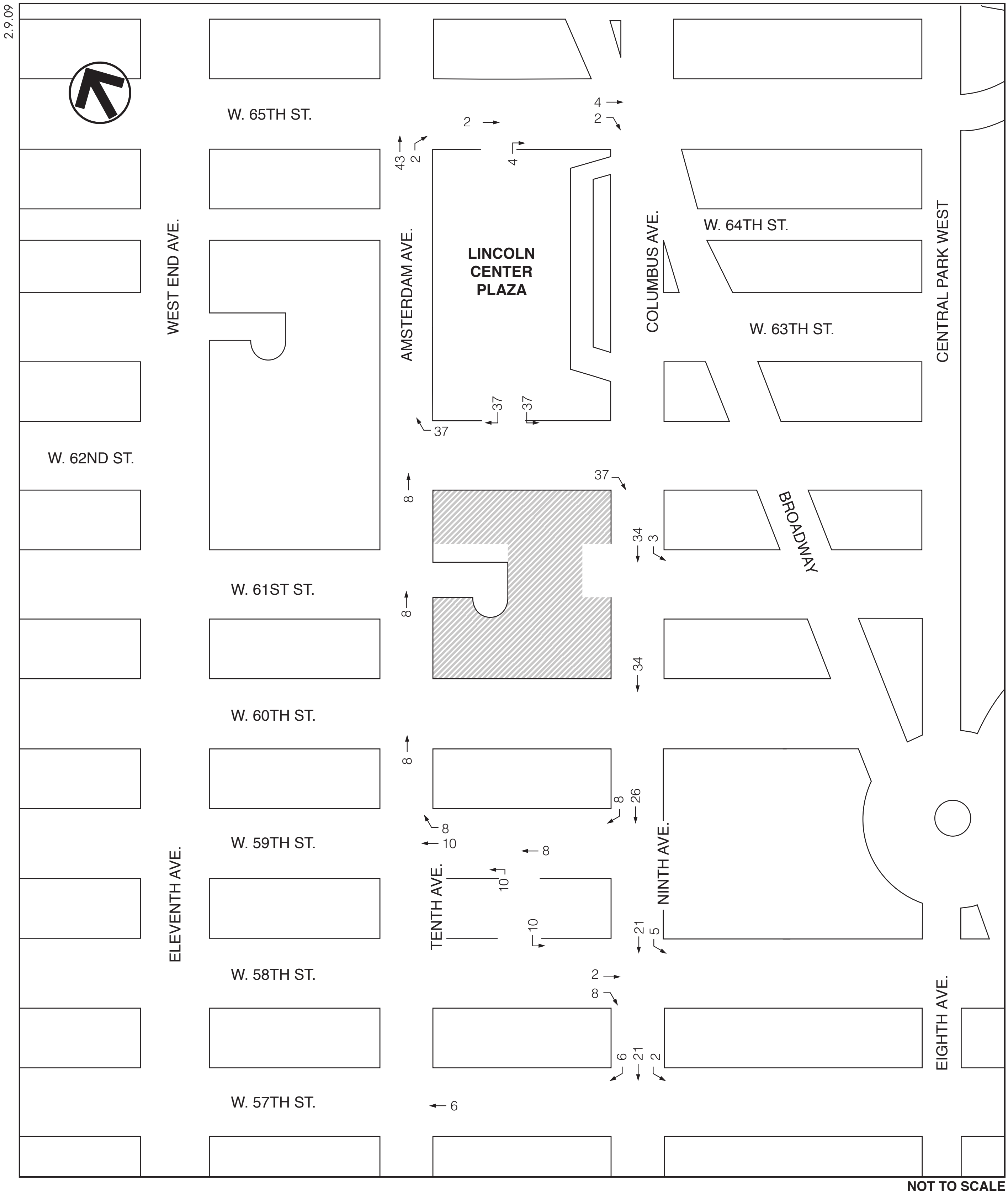


Figure 19-12

2011 Construction Generated Traffic Volumes (PCEs)

3-4 PM Peak Hour



Project Site

Figure 19-13

2011 Construction Generated Traffic Volumes (PCEs)
5-6 PM Peak Hour

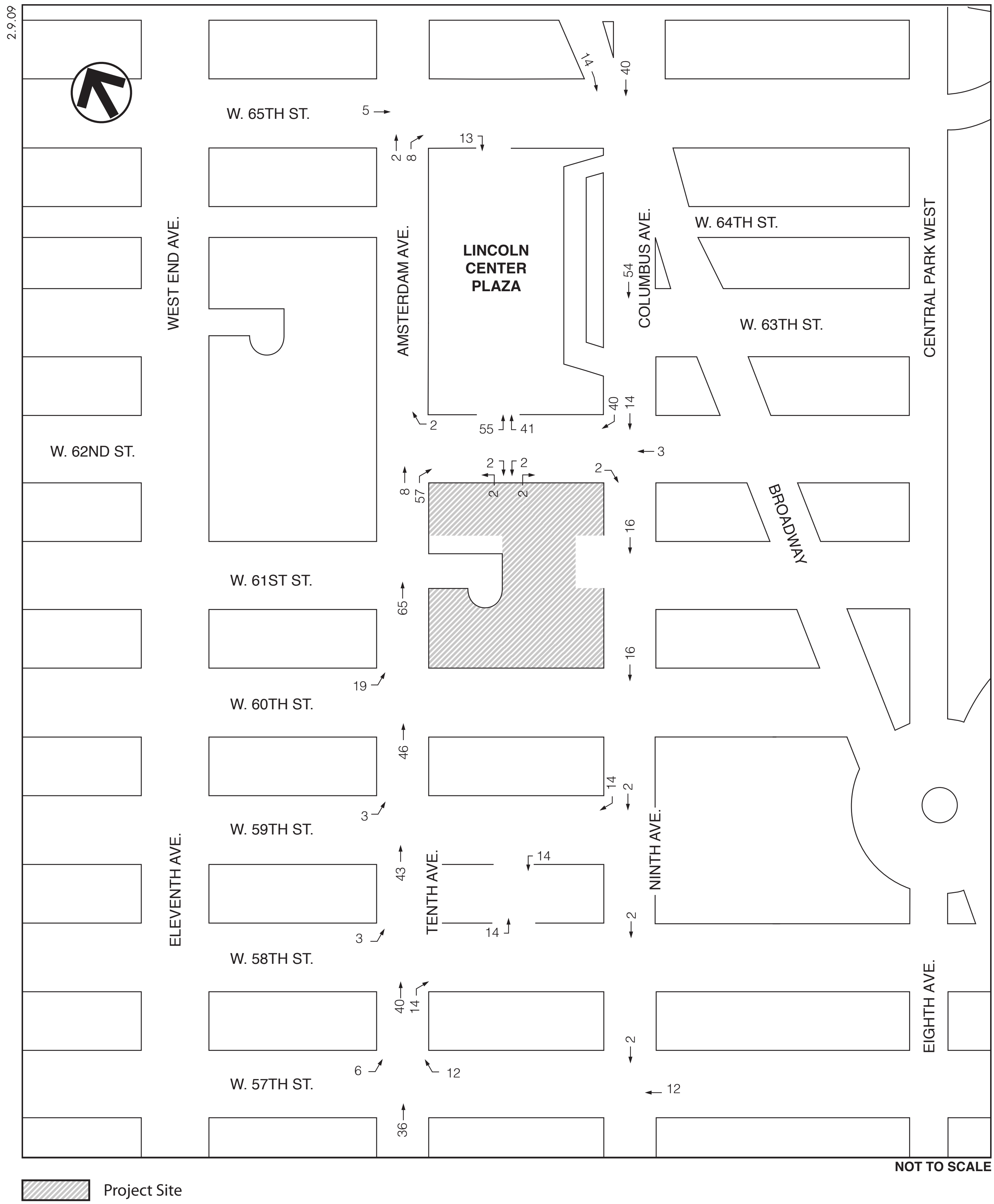


Figure 19-14
2021 Construction Generated Traffic Volumes (PCEs)
6-7 AM Peak Hour

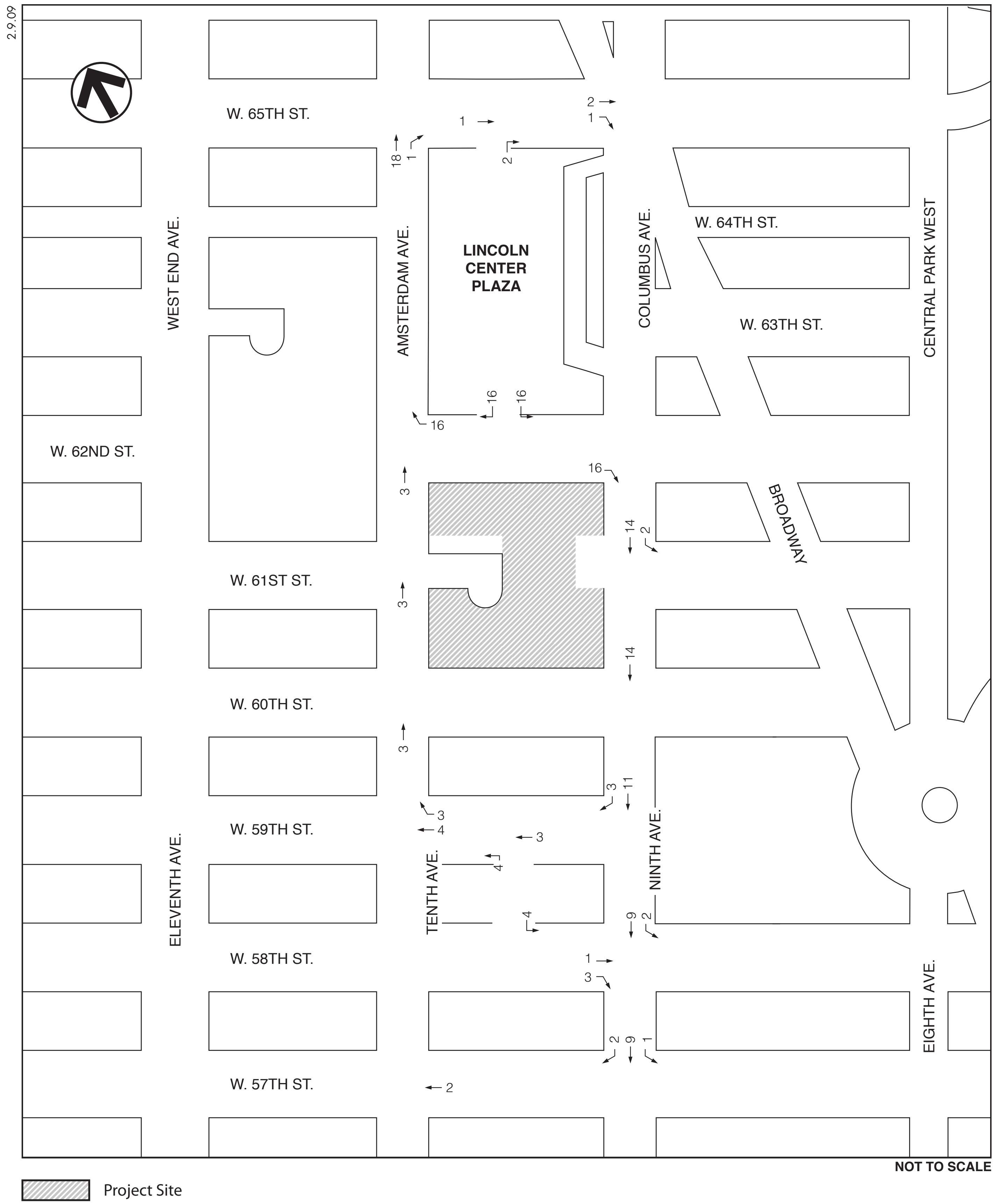


Figure 19-15

2021 Construction Generated Traffic Volumes (PCEs)

3-4 PM Peak Hour

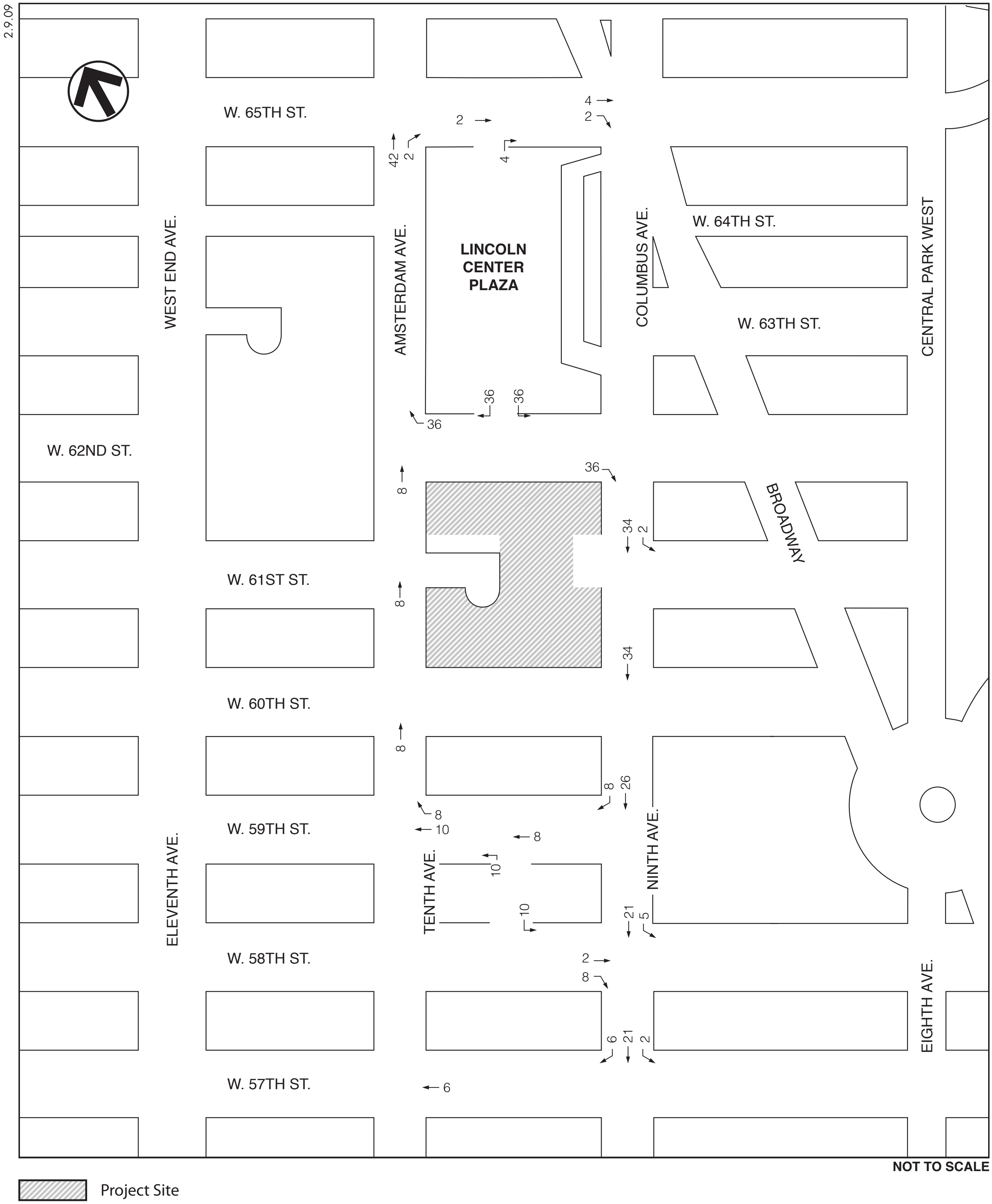


Figure 19-16
2021 Construction Generated Traffic Volumes (PCEs)
5-6 PM Peak Hour

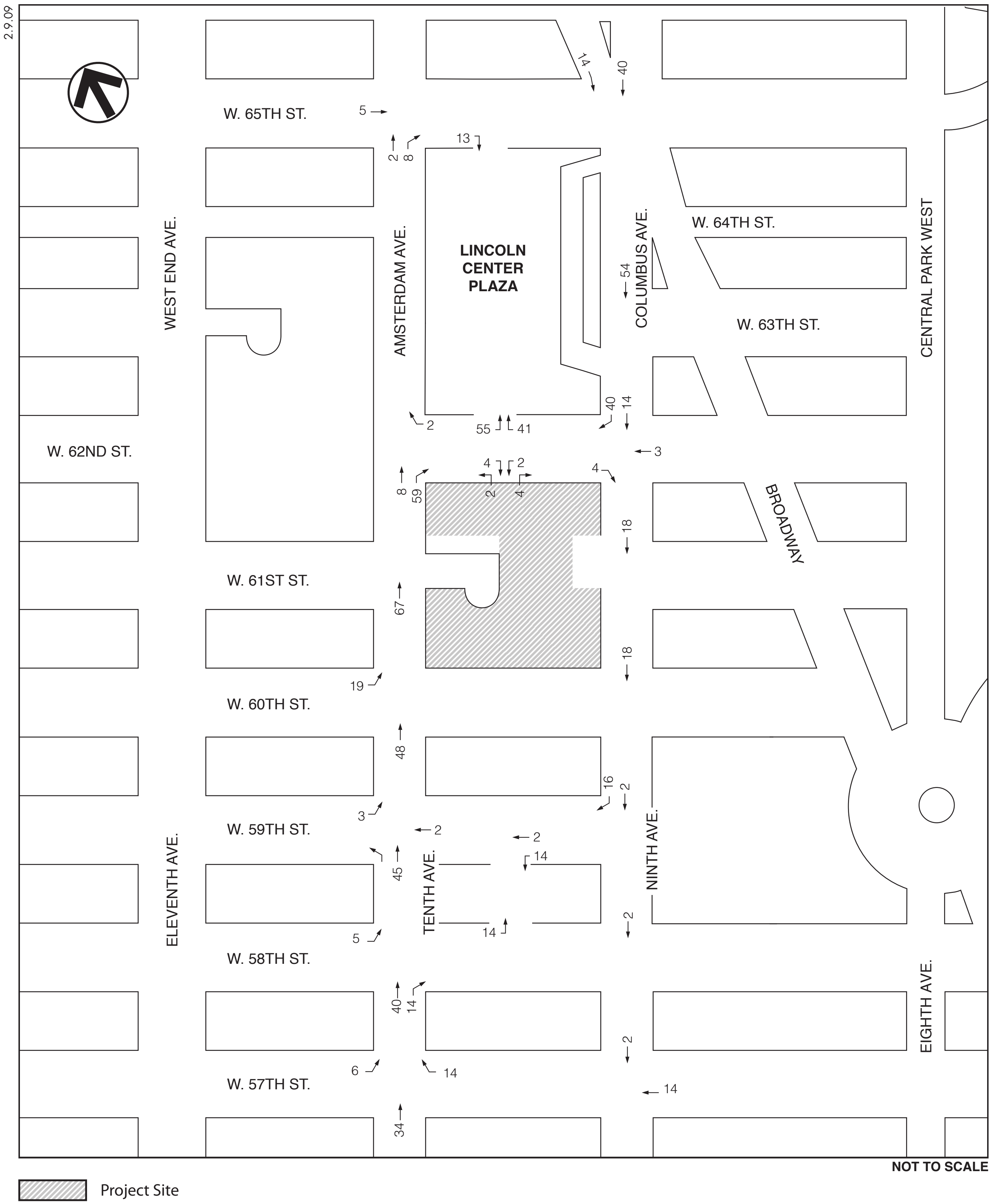


Figure 19-17
2031 Construction Generated Traffic Volumes (PCEs)
6-7 AM Peak Hour

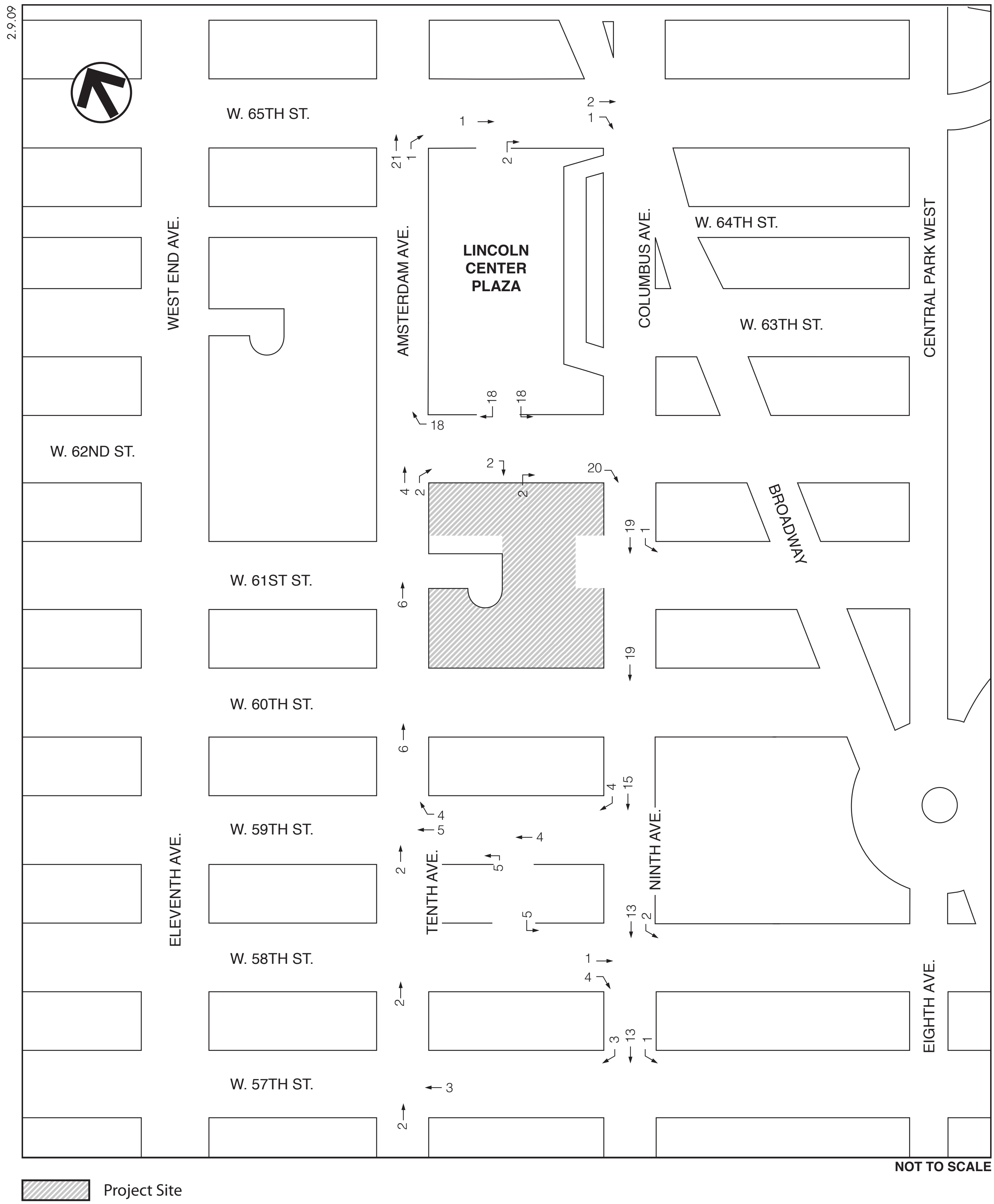


Figure 19-18
2031 Construction Generated Traffic Volumes (PCEs)
3-4 PM Peak Hour

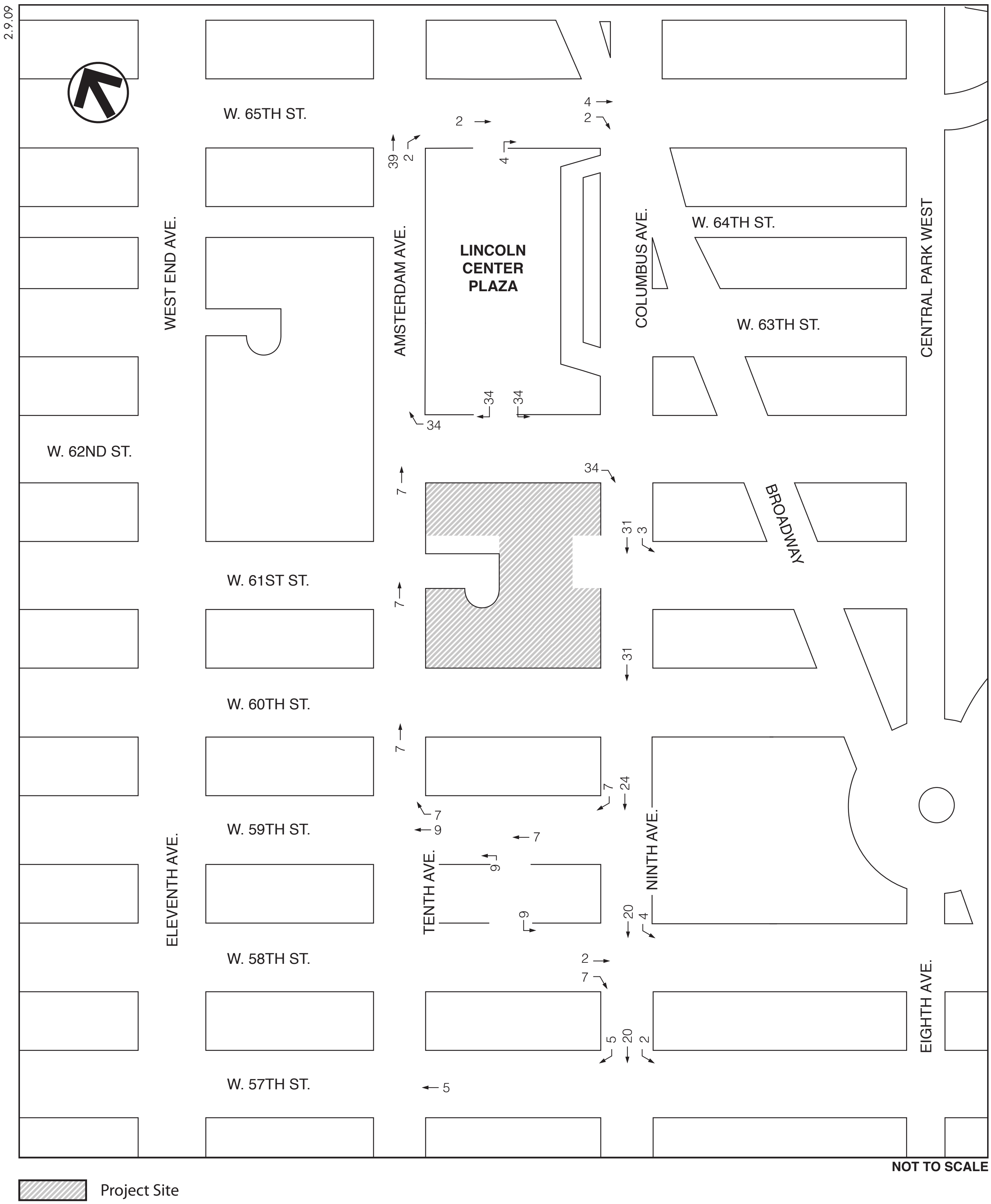
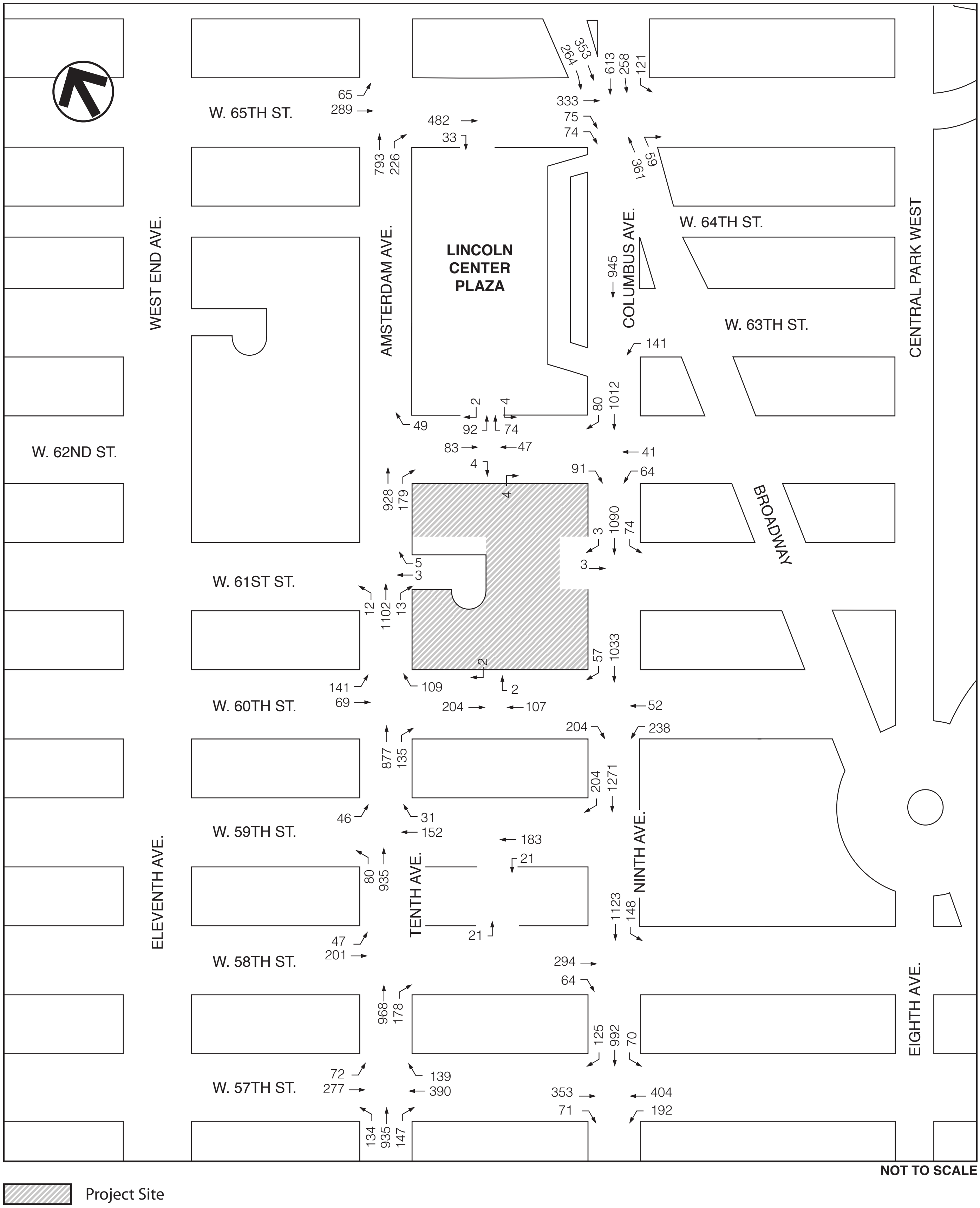


Figure 19-19

2031 Construction Generated Traffic Volumes (PCEs)

5-6 PM Peak Hour

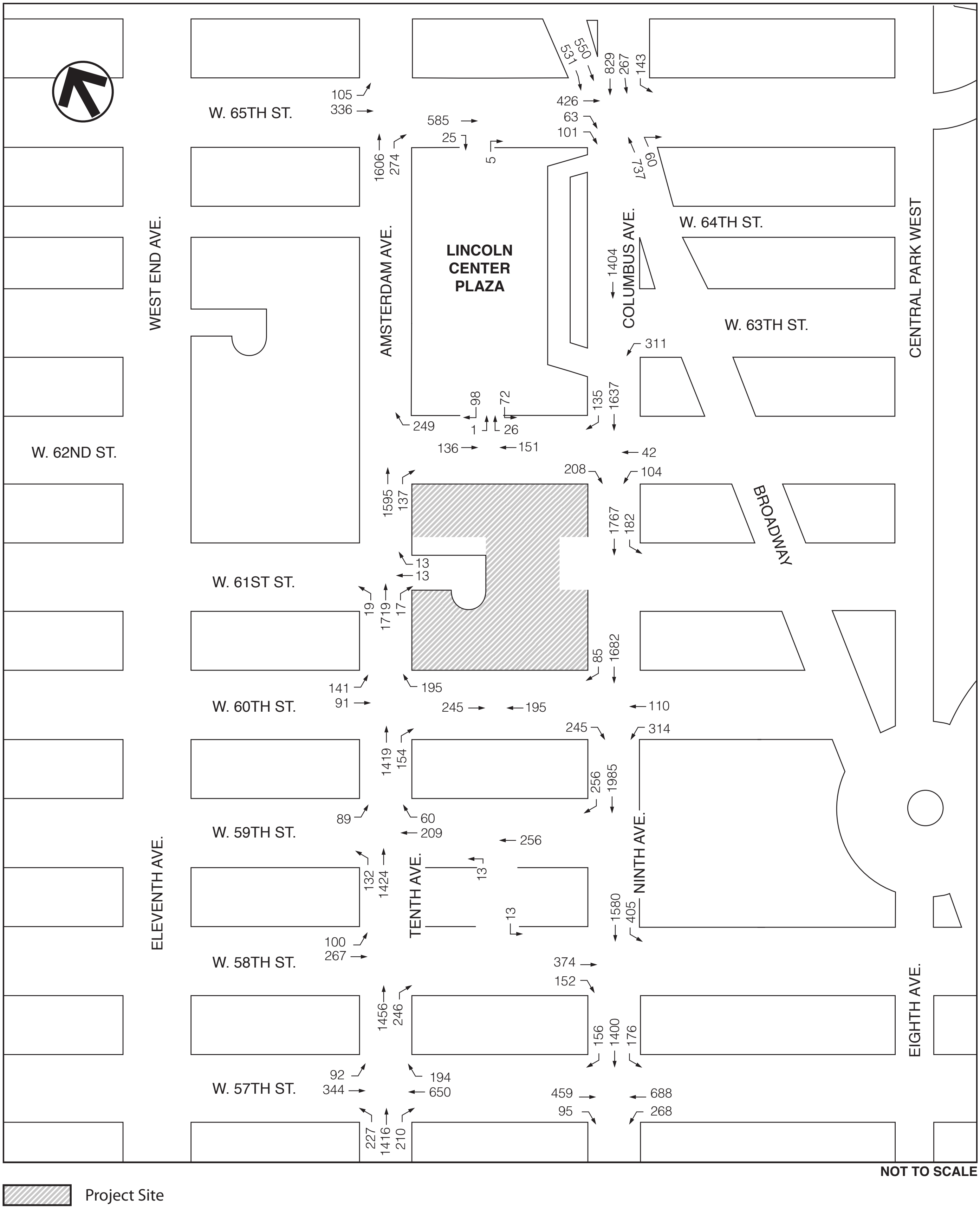
2.9.09



Project Site

Figure 19-20
2011 Construction Traffic Volumes (PCEs)
6-7 AM Peak Hour

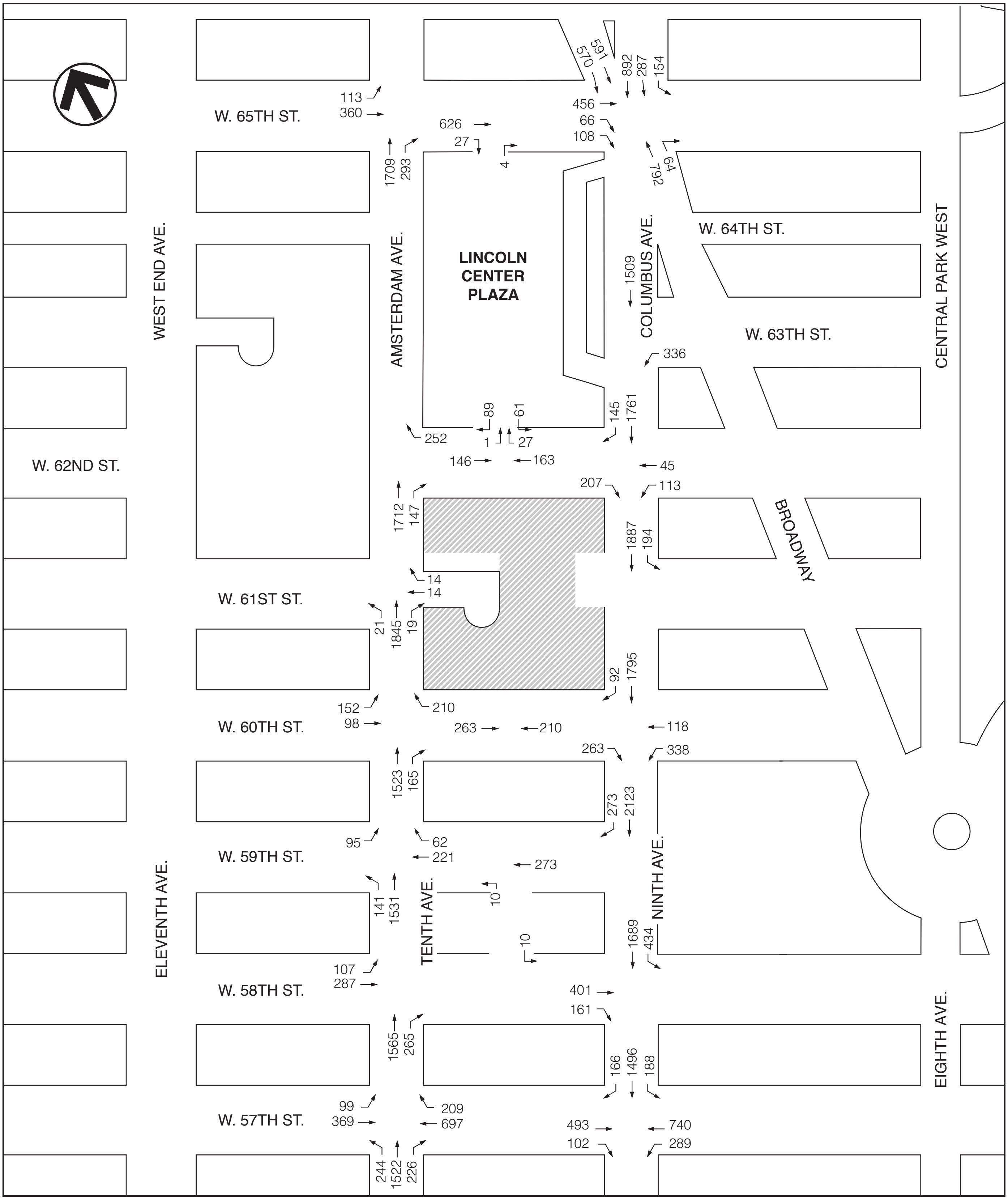
2.9.09



Project Site

Figure 19-21
2011 Construction Traffic Volumes (PCEs)
3-4 PM Peak Hour

2.9.09



NOT TO SCALE

Project Site

Figure 19-22

2011 Construction Traffic Volumes (PCEs)

5-6 PM Peak Hour

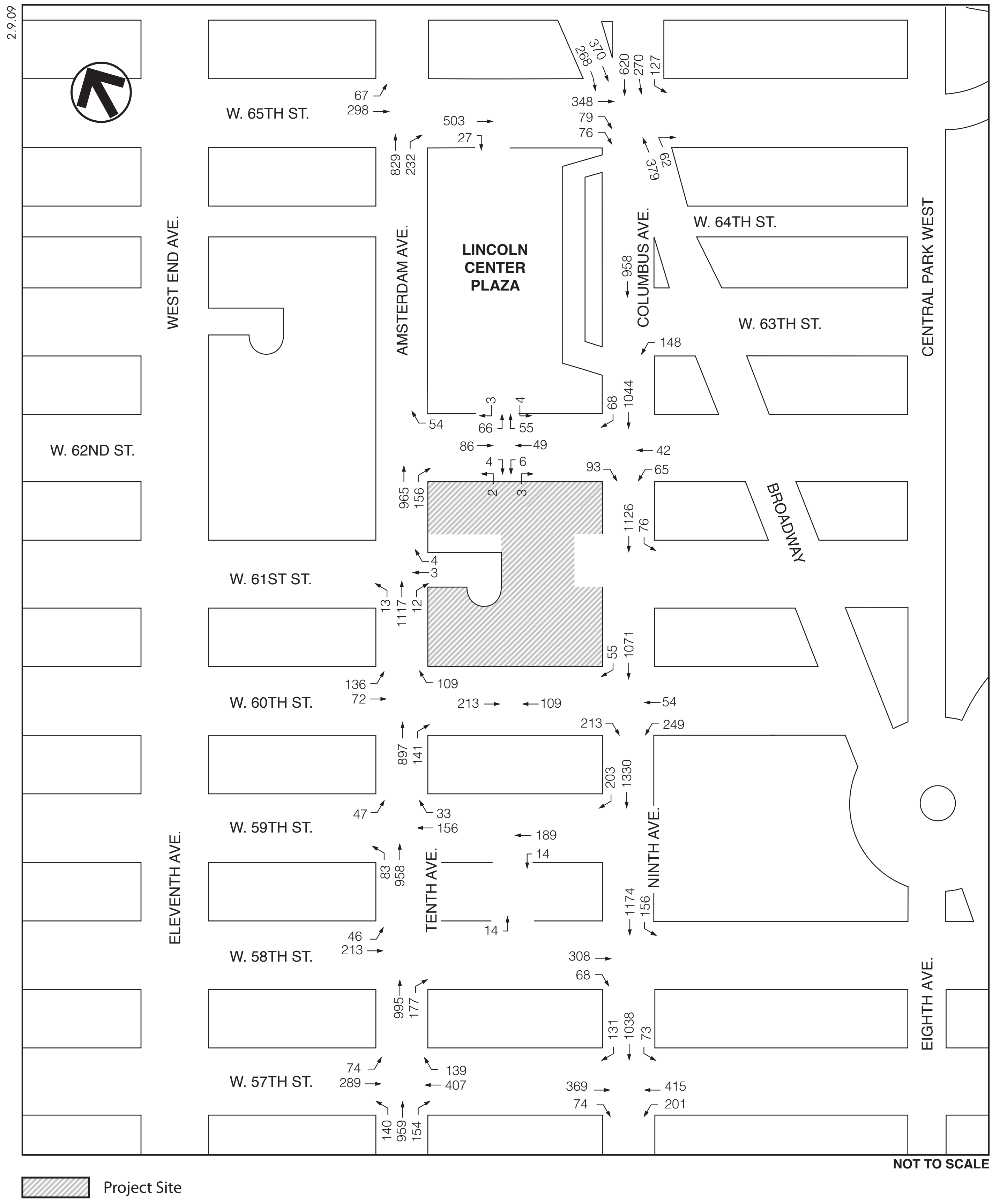


Figure 19-23
2021 Construction Traffic Volumes (PCEs)
6-7 AM Peak Hour

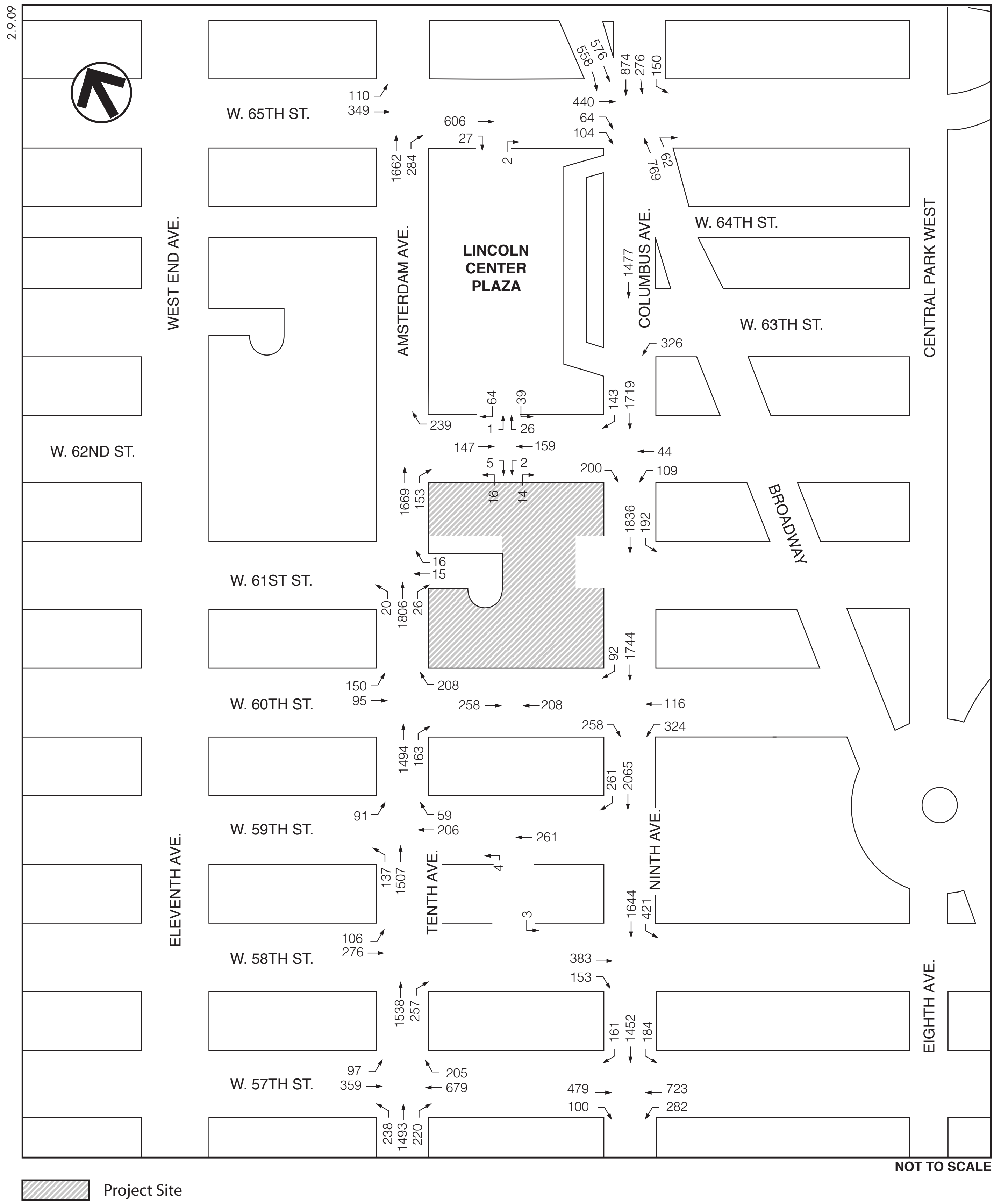


Figure 19-24

2021 Construction Traffic Volumes (PCEs)

3-4 PM Peak Hour

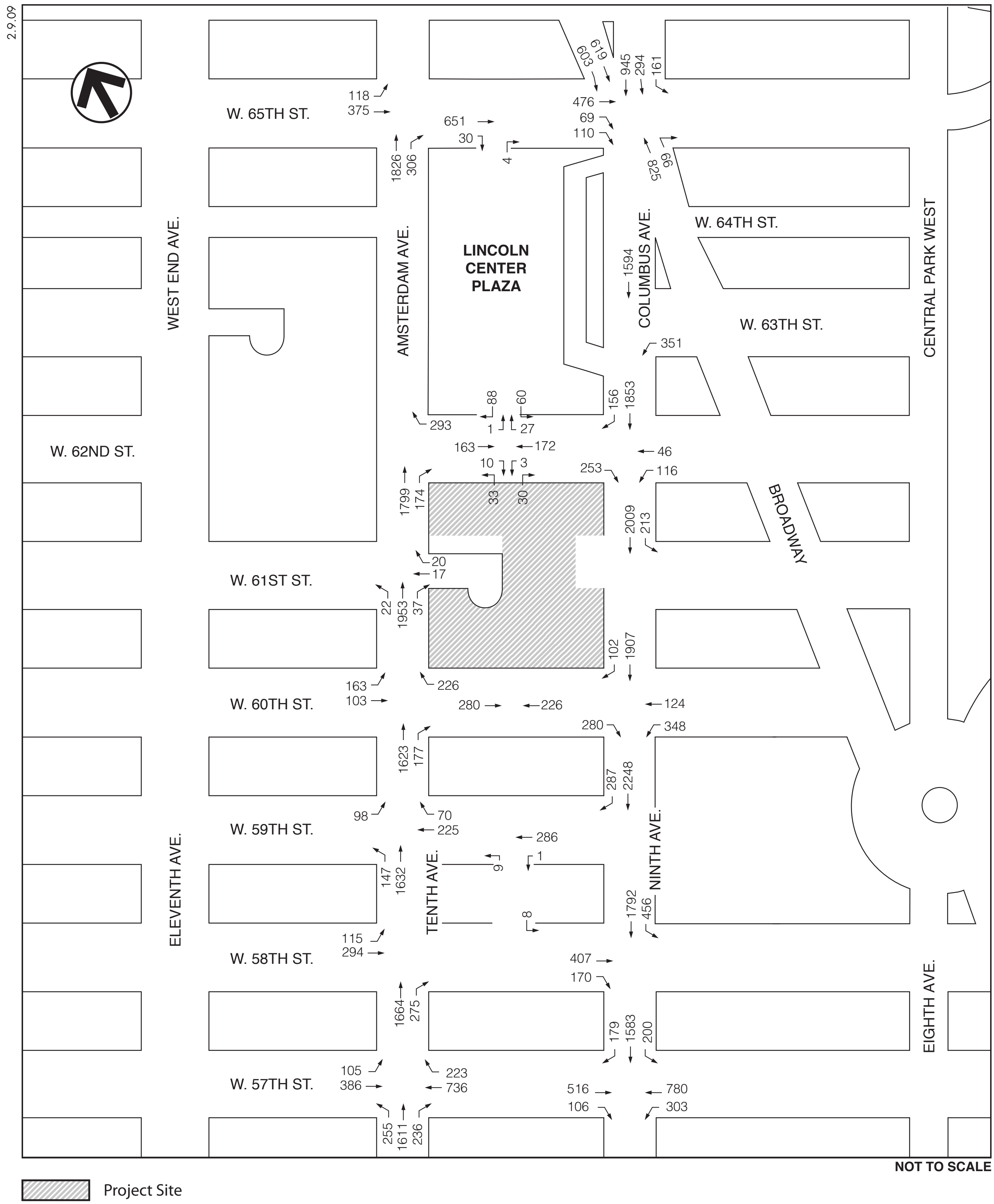


Figure 19-25
2021 Construction Traffic Volumes (PCEs)
5-6 PM Peak Hour

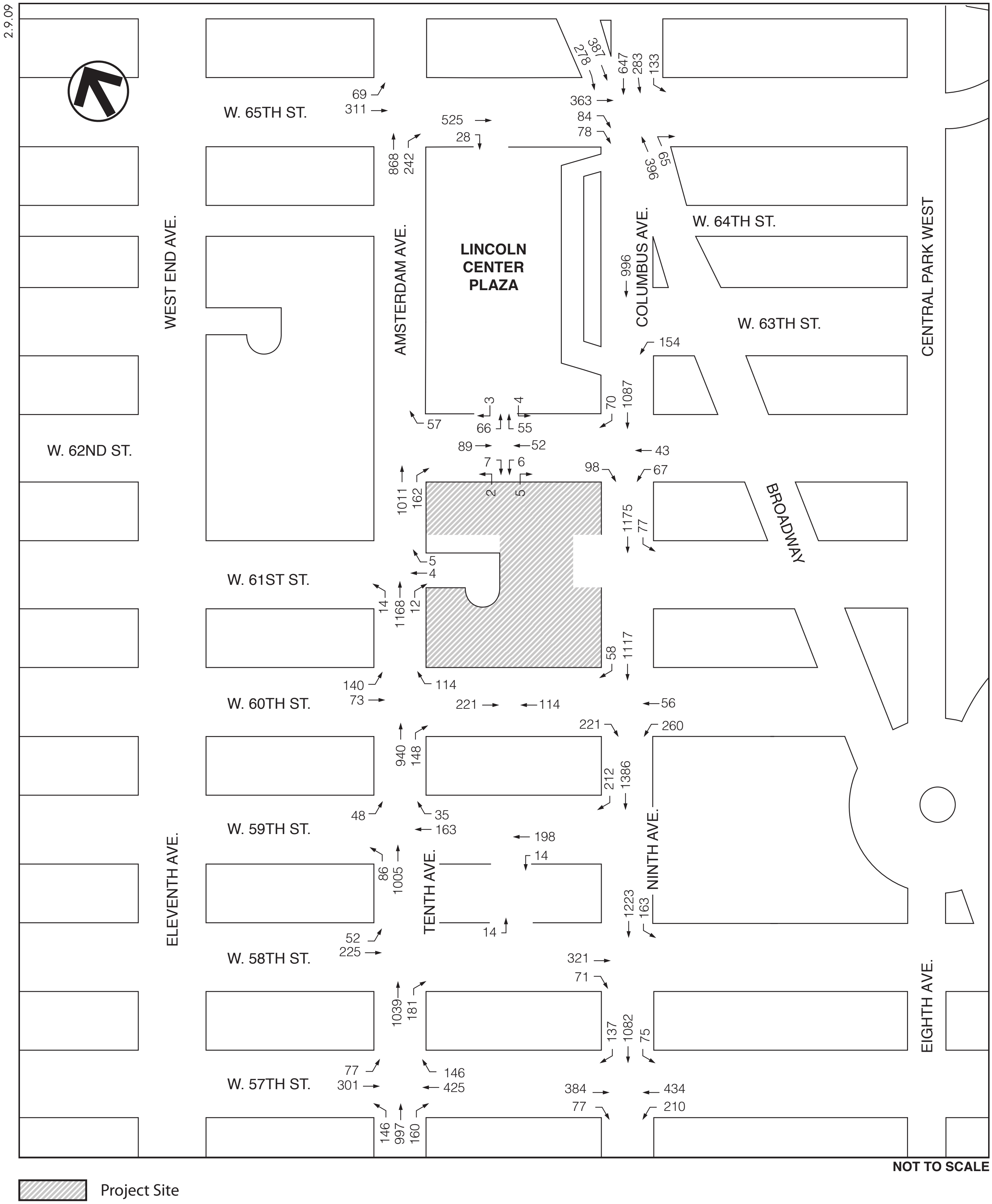


Figure 19-26
2031 Construction Traffic Volumes (PCEs)
6-7 AM Peak Hour

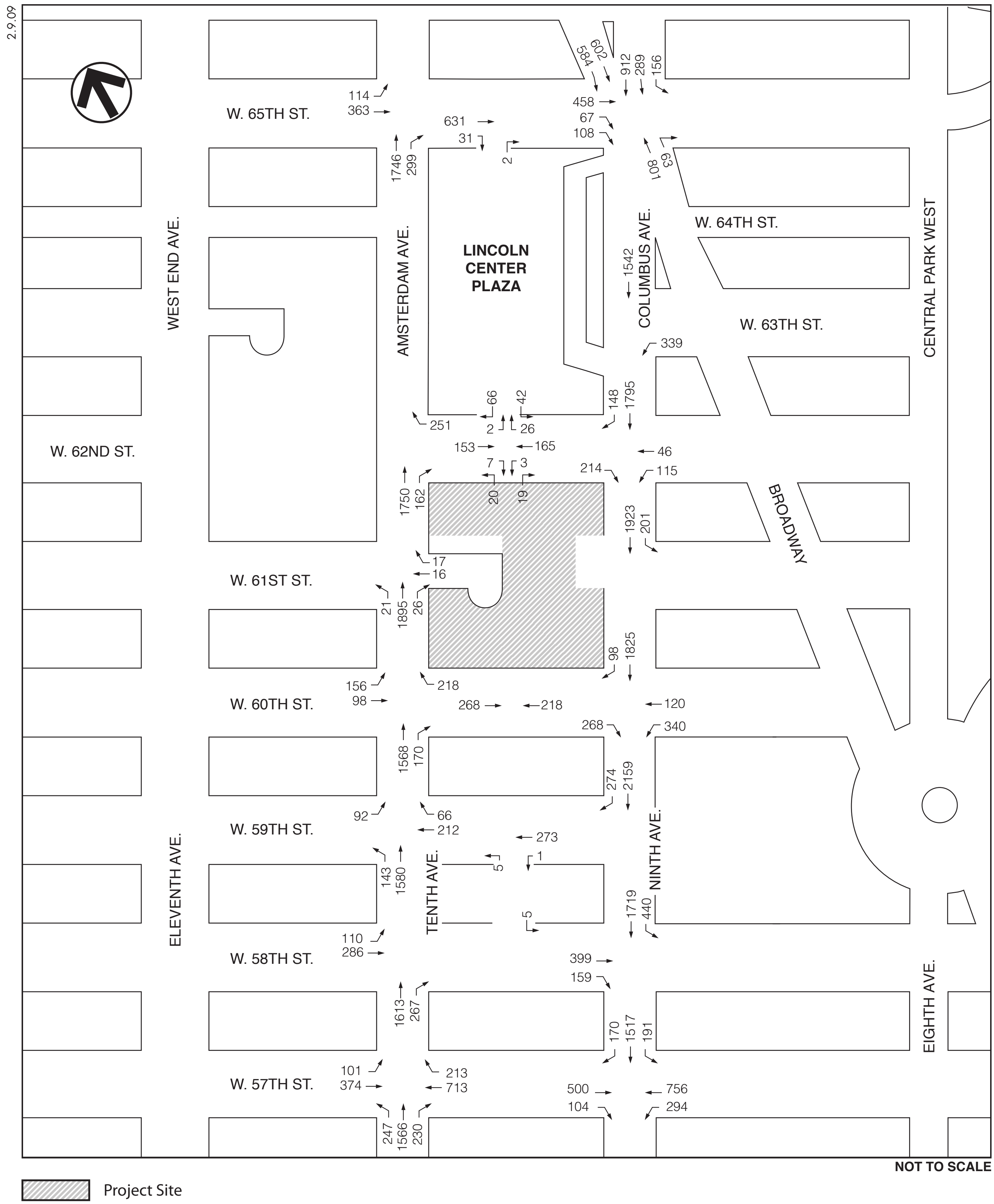
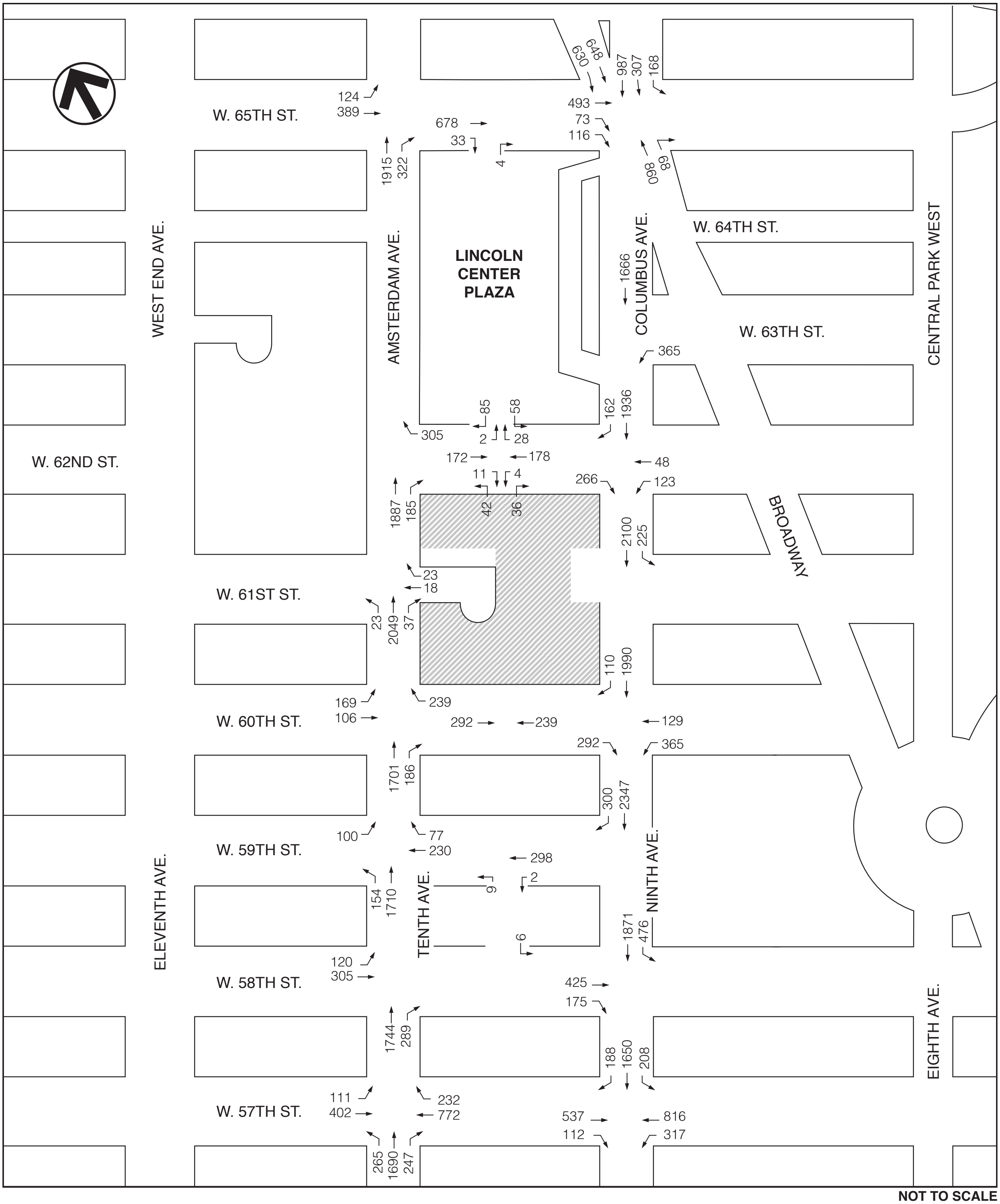


Figure 19-27
2031 Construction Traffic Volumes (PCEs)
3-4 PM Peak Hour

2.9.09



Project Site

Figure 19-28
2031 Construction Traffic Volumes (PCEs)
5-6 PM Peak Hour

Table 19-3
2011 No Build and Construction Level-of-Service Analysis

	6 - 7 AM Peak Hour								3 - 4 PM Peak Hour								5 - 6 PM Peak Hour							
	2011 No Build				2011 Construction				2011 No Build				2011 Construction				2011 No Build				2011 Construction			
App /INT	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS
Tenth Avenue and West 57th Street																								
EB	LT	0.59	25.3	C	LT	0.63	26.7	C	LT	0.85	40.1	D	LT	0.85	40.5	D	LT	0.92	48.7	D	LT	0.92	49.0	D
WB	TR	0.65	26.4	C	TR	0.68	27.4	C	TR	0.93	42.8	D	TR	0.94	44.0	D	TR	0.97	49.2	D	TR	0.98	50.7	D
NB	LT	0.47	11.9	B	LT	0.49	12.2	B	LTR	0.84	18.5	B	LTR	0.84	18.5	B	L	0.53	20.0-	B	L	0.53	20.0-	B
	R	0.40	13.9	B	R	0.40	13.9	B									TR	0.77	17.1	B	TR	0.77	17.1	B
INT			18.3	B			18.8	B			27.9	C			28.3	C			30.2	C			30.7	C
Tenth Avenue and West 58th Street																								
EB	LT	0.35	23.9	C	LT	0.36	24.1	C	LT	0.49	26.1	C	LT	0.49	26.1	C	LT	0.53	26.8	C	LT	0.53	26.8	C
NB	TR	0.42	8.2	A	TR	0.45	8.5	A	TR	0.70	11.2	B	TR	0.70	11.2	B	TR	0.75	12.2	B	TR	0.75	12.2	B
INT			11.4	B			11.5	B			13.8	B			13.8	B			14.7	B			14.7	B
Amsterdam Avenue and West 59th Street																								
EB	L	0.28	25.2	C	L	0.31	26.1	C	L	0.59	37.7	D	L	0.61	39.4	D	L	0.65	42.8	D	L	0.67	44.4	D
WB	T	0.38	24.6	C	T	0.38	24.7	C	T	0.47	26.5	C	T	0.50	27.3	C	T	0.51	27.4	C	T	0.53	28.1	C
	R	0.13	21.3	C	R	0.13	21.3	C	R	0.19	22.2	C	R	0.23	22.9	C	R	0.21	22.4	C	R	0.24	23.0	C
NB	LT	0.40	8.8	A	LT	0.43	9.0	A	L	0.35	13.9	B	L	0.35	13.9	B	L	0.38	14.4	B	L	0.38	14.4	B
									T	0.56	10.1	B	T	0.56	10.1	B	T	0.60	10.6	B	T	0.60	10.6	B
INT			12.0	B			12.1	B			13.7	B			14.0	B			14.4	B			14.7	B
Amsterdam Avenue and West 60th Street																								
EB	LT	0.60	31.1	C	LT	0.71	36.3	D	LT	0.66	32.9	C	LT	0.66	32.9	C	LT	0.71	35.4	D	LT	0.71	35.4	D
WB	R	0.49	28.7	C	R	0.49	28.5	C	R	0.61	32.1	C	R	0.59	31.0	C	R	0.65	34.1	C	R	0.63	32.8	C
NB	TR	0.39	8.7	A	TR	0.41	8.8	A	TR	0.61	10.7	B	TR	0.59	10.5	B	TR	0.66	11.3	B	TR	0.66	11.4	B
INT			14.8	B			16.0	B			15.7	B			315.3	B			16.7	B			16.5	B
Amsterdam Avenue and West 61st Street																								
WB	TR	0.02	20.2	C	TR	0.03	20.3	C	TR	0.07	20.8	C	TR	0.07	20.8	C	TR	0.08	20.9	C	TR	0.08	20.8	C
NB	LT	0.40	8.1	A	LTR	0.43	8.3	A	LTR	0.62	10.1	B	LTR	0.60	9.9	A	L	0.05	9.3	A	L	0.05	9.3	A
																	TR	0.66	10.6	B	TR	0.66	10.6	B
INT			8.2	A			8.5	A			10.3	B			10.0+	B			10.7	B			10.8	B
Amsterdam Avenue and West 62nd Street																								
WB	R	0.19	22.7	C	R	0.19	22.7	C	R	0.57	30.8	C	R	0.69	35.3	D	R	0.62	32.4	C	R	0.70	35.6	D
NB	TR	0.42	8.3	A	TR	0.47	8.7	A	TR	0.63	10.2	B	TR	0.61	9.9	A	TR	0.67	10.8	B	TR	0.68	10.9	B
INT			9.0	A			9.4	A			12.5	B			13.3	B			13.2	B			14.0	B
Amsterdam Avenue and West 65th Street																								
EB	LT	0.41	22.6	C	LT	0.41	22.7	C	LT	0.53	24.5	C	LT	0.53	24.5	C	LT	0.57	25.3	C	LT	0.57	25.3	C
NB	T	0.33	9.4	A	T	0.33	9.4	A	TR	0.74	14.1	B	TR	0.76	14.6	B	TR	0.79	15.3	B	TR	0.81	15.8	B
	R	0.47	16.8	B	R	0.49	17.5	B																
INT			13.9	B			14.1	B			16.3	B			16.6	B			17.4	B			17.8	B
Ninth Avenue and West 57th Street																								
EB	T	0.59	34.6	C	T	0.59	34.6	C	T	0.76	40.2	D	T	0.76	40.2	D	T	0.81	43.4	D	T	0.81	43.4	D
	R	0.50	41.1	D	R	0.50	41.1	D	R	0.63	48.5	D	R	0.63	48.5	D	R	0.68	52.5	D	R	0.68	52.5	D
WB	DefL	0.55	21.1	C	LT	0.73	24.4	C	LT	1.00	52.4	D	LT	1.00	52.4	D	DefL	0.87	42.1	D	DefL	0.87	42.1	D
	T	0.73	27.1	C													T	1.14	101.7	F	T	1.14	101.7	F
SB	LTR	0.75	27.9	C	LTR	0.75	27.9	C	LTR	1.08	74.1	E	LTR	1.10	83.7	F+	L	0.63	33.0	C	L	0.63	33.4	C
																	T	0.84	31.4	C	T	0.84	31.2	C
																	R	0.61	33.5	C	R	0.63	34.5	C
INT			28.6	C			28.4	C			62.2	E			67.6	E			49.5	D			49.5	D
Ninth Avenue and West 58th Street																								
EB	T	0.66	31.8	C	T	0.66	31.8	C	T	0.79	39.4	D	T	0.80	39.9	D	T	0.85	44.8	D	T	0.86	45.2	D
	R	0.28	24.2	C	R	0.28	24.2	C	R	0.52	30.5	C	R	0.56	31.9	C	R	0.56	32.0	C	R	0.59	33.3	C
SB	LT	0.54	10.0+	B	L	0.43	15.8	B	LT	0.82	14.8	B	LT	0.84	15.3	B	LT	0.92	19.8	B	LT	0.93	20.8	C
					T	0.61	11.0	B																
INT			14.6	B			15.8	B			19.1	B			19.6	B			24.0	C			24.9	C
Columbus Avenue and West 59th Street																								
SB	TR	0.58	10.4	B	TR	0.59	10.6	B	TR	0.85	15.4	B	TR	0.86	16.1	B	TR	0.74	12.5	B	TR	0.75	12.6	B
INT			10.4	B			10.6	B			15.4	B			16.1	B	R	0.78	31.2	C	R	0.80	33.5	C
																			14.6	B			15.0	B
Columbus Avenue and West 60th Street																								
EB	R	0.76	43.4	D	R	0.76	43.4	D	R	0.90	60.1	E	R	0.90	60.1	E	R	0.97	73.9	E	R	0.97	73.9	E
WB	L	0.46	28.3	C	L	0.46	28.3	C	L	0.61	33.0	C	L	0.61	33.0	C	L	0.66	35.1	D	L	0.66	35.1	D
	LT	0.47	27.9	C	LT	0.47	27.9	C	LT	0.63	32.6	C	LT	0.63	32.6	C	LT	0.68	34.7	C	LT	0.68	34.7	C
SB	TR	0.40	8.1	A	TR	0.41	8.2	A	TR	0.67	10.7	B	TR	0.68	10.9	B	TR	0.72	11.5	B	TR	0.73	11.7	B
INT			16.6	B			16.5	B			19.7	B			19.8	B			22.1	C			22.1	C

Table 19-3 (cont'd)
2011 No Build and Construction Level-of-Service Analysis

	6 - 7 AM Peak Hour								3 - 4 PM Peak Hour								5 - 6 PM Peak Hour							
	2011 No Build				2011 Construction				2011 No Build				2011 Construction				2011 No Build				2011 Construction			
App /INT	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS
Columbus Avenue and West 61st Street																								
EB	TR	0.02	20.2	C	TR	0.02	20.2	C	TR	0.00	20.0	B	TR	0.00	20.0	B	TR	0.00	20.0	B	TR	0.00	20.0	B
SB	LTR	0.43	8.3	A	LTR	0.44	8.4	A	LTR	0.72	11.5	B	LTR	0.74	11.8	B	LTR	0.77	12.5	B	LTR	0.79	12.8	B
INT			8.4	A			8.5	A			11.5	B			11.8	B			12.5	B			12.8	B
Columbus Avenue and West 62nd Street																								
EB	R	0.27	23.4	C	R	0.28	23.6	C	R	0.58	31.1	C	R	0.75	39.9	D	R	0.62	32.6	C	R	0.75	39.7	D
WB	LT	0.27	23.4	C	LT	0.28	23.5	C	LT	0.40	26.0	C	LT	0.40	26.0	C	LT	0.43	26.7	C	LT	0.43	26.7	C
SB	TR	0.42	8.2	A	TR	0.47	8.6	A	TR	0.69	11.0	B	TR	0.69	11.0	B	TR	0.74	11.9	B	TR	0.74	11.9	B
INT			10.7	B			10.9	B			13.7	B			15.2	B			14.7	B			15.7	B
Columbus Avenue and West 63rd Street																								
WB	L	0.20	22.0	C	L	0.20	22.0	C	L	0.58	28.4	C	L	0.58	28.4	C	L	0.63	29.7	C	L	0.63	29.7	C
SB	T	0.31	7.5	A	T	0.34	7.7	A	T	0.50	8.8	A	T	0.50	8.8	A	T	0.54	9.1	A	T	0.54	9.1	A
INT			9.7	A			9.7	A			12.6	B			12.6	B			13.1	B			13.1	B
Broadway, Columbus Avenue* and West 65th Street																								
EB	TR	0.52	32.1	C	TR	0.52	32.1	C	TR	0.71	37.0	D	TR	0.72	37.3	D	TR	0.76	39.1	D	TR	0.77	39.4	D
	R	0.46	34.5	C	R	0.46	34.5	C	R	0.52	38.3	D	R	0.53	38.7	D	R	0.56	39.9	D	R	0.56	40.1	D
NB	TR	0.51	30.2	C	TR	0.51	30.2	C	TR	0.88	43.5	D	TR	0.88	43.5	D	TR	0.95	51.4	D	TR	0.95	51.4	D
SB	T	0.62	31.8	C	T	0.64	32.2	C	T	0.99	57.1	E	T	0.99	57.1	E	T	1.07	78.5	E	T	1.07	78.5	E
SB*	LT	0.67	30.5	C	LT	0.71	31.5	C	LT	0.91	40.3	D	LT	0.91	40.3	D	LT	0.98	49.5	D	LT	0.98	49.5	D
INT			31.2	C			31.7	C			45.4	D			45.5	D			56.8	E			56.8	E

Notes: L: Left Turn; T: Through; R: Right Turn; DefL: Defacto Left Turn; INT: Intersection
V/C: Volume to Capacity; spv: Seconds per Vehicle; LOS: Level of Service; "+" = Exceeds CEQR Impact Threshold.

Peak 2021 Construction Analysis

The traffic analysis conducted for the peak 2021 construction encompasses a study area of 15 intersections and accounts for operational traffic from completed and occupied buildings. For this analysis, construction worker vehicles were assigned primarily to the Lincoln Center Park & Lock, across from the Fordham University Lincoln Center Campus on West 62nd Street, while construction trucks were assigned to driveways located along the driveway of the construction site. A summary of the analysis results, comparing the 2021 No Build and construction traffic conditions, is presented in Table 19-4.

Table 19-4
2021 No Build and Construction Level-of-Service Analysis

	6 - 7 AM Peak Hour								3 - 4 PM Peak Hour								5 - 6 PM Peak Hour							
	2021 No Build				2021 Construction				2021 No Build				2021 Construction				2021 No Build				2021 Construction			
App /INT	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS
Tenth Avenue and West 57th Street																								
EB																					DefL	1.40	266.2	F+
	LT	0.63	26.6	C	LT	0.67	27.9	C	LT	0.91	48.4	D	LT	0.92	49.9	D	LT	0.99	63.8	E	T	0.86	42.7	D
WB	TR	0.68	27.3	C	TR	0.70	28.0	C	TR	0.97	50.8	D	TR	0.98	52.9	D	TR	1.02	60.0	E	TR	1.04	65.8	E+
NB	LT	0.49	12.2	B	LT	0.50	12.3	B	LTR	0.88	20.4	C	LTR	0.88	20.5	C	L	0.56	20.7	C	L	0.56	20.7	C
	R	0.42	14.3	B	R	0.42	14.3	B									TR	0.81	18.2	B	TR	0.81	18.3	B
INT			18.9	B			19.3	B			32.3	C			33.2	C			35.7	D			41.1	D
Tenth Avenue and West 58th Street																								
EB	LT	0.37	24.2	C	LT	0.38	24.3	C	LT	0.52	26.5	C	LT	0.51	26.5	C	LT	0.55	27.3	C	LT	0.55	27.2	C
NB	TR	0.44	8.4	A	TR	0.45	8.5	A	TR	0.73	11.8	B	TR	0.73	11.9	B	TR	0.78	12.9	B	TR	0.79	13.1	B
INT			11.6	B			11.6	B			14.3	B			14.4	B			15.4	B			15.5	B
Amsterdam Avenue and West 59th Street																								
EB	L	0.30	25.8	C	L	0.32	26.4	C	L	0.61	39.7	D	L	0.62	40.0	D	L	0.69	46.1	D	L	0.70	47.0	D
WB	T	0.39	24.9	C	T	0.39	24.9	C	T	0.49	26.9	C	T	0.49	27.1	C	T	0.53	27.9	C	T	0.54	28.3	C
	R	0.14	21.5	C	R	0.14	21.5	C	R	0.21	22.4	C	R	0.23	22.8	C	R	0.22	22.7	C	R	0.27	23.6	C
NB	LT	0.42	9.0	A	LT	0.44	9.1	A	L	0.37	14.2	B	L	0.37	14.2	B	L	0.39	14.7	B	L	0.39	14.7	B
									T	0.59	10.4	B	T	0.59	10.5	B	T	0.63	10.9	B	T	0.64	11.1	B
INT			12.1	B			12.2	B			14.0	B			14.1	B			14.9	B			15.1	B

Table 19-4 cont'd
2021 No Build and Construction Level-of-Service Analysis

App /INT	6 - 7 AM Peak Hour								3 - 4 PM Peak Hour								5 - 6 PM Peak Hour							
	2021 No Build				2021 Construction				2021 No Build				2021 Construction				2021 No Build				2021 Construction			
	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS
Amsterdam Avenue and West 60th Street																								
EB	LT	0.62	32.1	C	LT	0.70	35.6	D	LT	0.69	34.3	C	LT	0.70	34.7	C	LT	0.74	37.2	D	LT	0.76	38.3	D
WB	R	0.51	29.3	C	R	0.51	29.3	C	R	0.64	33.5	C	R	0.65	33.9	C	R	0.68	35.7	D	R	0.70	36.9	D
NB	TR	0.41	8.8	A	TR	0.43	9.0	A	TR	0.64	11.1	B	TR	0.65	11.2	B	TR	0.69	11.8	B	TR	0.71	12.1	B
INT			15.1	B			15.9	B			16.3	B			16.4	B			17.4	B			17.8	B
Amsterdam Avenue and West 61st Street																								
WB	TR	0.02	20.2	C	TR	0.02	20.2	C	TR	0.08	20.9	C	TR	0.09	21.0	C	TR	0.08	20.9	C	TR	0.11	21.2	C
NB	LTR	0.42	8.2	A	LTR	0.44	8.4	A	LTR	0.65	10.5	B	LTR	0.66	10.6	B	L	0.05	9.3	A	L	0.05	9.3	A
																	TR	0.69	11.0	B	TR	0.71	11.3	B
INT			8.3	A			8.5	A			10.7	B			10.8	B			11.2	B			11.5	B
Amsterdam Avenue and West 62nd Street																								
WB	R	0.20	22.9	C	R	0.21	23.0	C	R	0.59	31.5	C	R	0.69	35.5	D	R	0.64	33.3	C	R	0.84	47.3	D+
NB	TR	0.44	8.4	A	T	0.48	8.8	A	TR	0.66	10.6	B	TR	0.67	10.7	B	TR	0.71	11.3	B	TR	0.72	11.6	B
INT			9.2	A			9.5	A			12.9	B			13.8	B			13.7	B			16.5	B
Amsterdam Avenue and West 65th Street																								
EB	LT	0.42	22.8	C	LT	0.43	22.9	C	LT	0.55	25.0	C	LT	0.55	25.0	C	LT	0.60	25.8	C	LT	0.59	25.8	C
NB	T	0.34	9.5	A	T	0.34	9.5	A	TR	0.77	14.9	B	TR	0.79	15.2	B	TR	0.83	16.5	B	TR	0.86	17.6	B
	R	0.49	17.4	B	R	0.51	17.8	B																
INT			14.1	B			14.3	B			17.0	B			17.2	B			18.5	B			19.3	B
Ninth Avenue and West 57th Street																								
EB	T	0.61	35.3	D	T	0.61	35.3	D	T	0.79	41.9	D	T	0.79	41.9	D	T	0.85	46.3	D	T	0.85	46.3	D
	R	0.52	42.1	D	R	0.52	42.1	D	R	0.67	51.4	D	R	0.67	51.4	D	R	0.71	54.8	D	R	0.71	54.8	D
WB	DefL	0.58	22.2	C	DefL	0.58	22.2	C	DefL	0.88	44.1	D	DefL	0.88	44.1	D	DefL	0.93	53.1	D	DefL	0.93	53.1	D
	T	0.76	28.9	C	T	0.78	30.2	C	T	1.13	101.5	F	T	1.14	102.6	F	T	1.19	122.9	F	T	1.20	125.9	F+
SB	LTR	0.79	28.9	C	LTR	0.79	29.0	C	LTR	1.13	93.4	F	LTR	1.15	100.9	F+	L	0.65	34.3	C	L	0.67	35.4	D
																	T	0.88	33.5	C	T	0.91	35.1	D
																	R	0.64	34.9	C	R	0.69	37.5	D
INT			29.7	C			30.0	C			82.5	F			86.9	F			56.4	E			57.6	E
Ninth Avenue and West 58th Street																								
EB	T	0.69	33.1	C	T	0.69	33.1	C	T	0.83	42.4	D	T	0.82	41.5	D	T	0.89	49.6	D	T	0.87	46.7	D
	R	0.30	24.5	C	R	0.30	24.5	C	R	0.55	31.3	C	R	0.56	32.0	C	R	0.58	33.0	C	R	0.62	34.8	C
SB	LT	0.57	10.3	B	LR	0.57	10.3	B	LT	0.86	16.2	B	LT	0.87	16.6	B	LT	0.96	24.7	C	LT	0.99	28.7	C
INT			15.0	B			15.0	B			20.7	C			20.9	B			28.6	C			31.5	C
Columbus Avenue and West 59th Street																								
SB	TR	0.61	10.7	B	TR	0.61	10.8	B	TR	0.89	17.1	B	TR	0.90	17.7	B	T	0.77	13.1	B	T	0.79	13.6	B
																B	R	0.81	34.3	C	R	0.84	37.9	D
INT			10.7	B			10.8	B			17.1	B			17.7				15.5	B			16.3	B
Columbus Avenue and West 60th Street																								
EB	R	0.79	46.5	D	R	0.79	46.5	D	R	0.94	67.5	E	R	0.95	69.5	E	R	1.01	83.8	F	R	1.03	89.9	F+
WB	L	0.48	28.9	C	L	0.48	28.9	C	L	0.63	34.0	C	L	0.63	33.9	C	L	0.69	36.6	D	L	0.67	36.0	D
	LT	0.50	28.6	C	LT	0.50	28.6	C	LT	0.66	33.8	C	LT	0.66	33.6	C	LT	0.71	36.3	D	LT	0.70	35.9	D
SB	TR	0.42	8.2	A	TR	0.43	8.3	A	TR	0.70	11.2	B	TR	0.71	11.4	B	TR	0.75	12.1	B	TR	0.78	12.7	B
INT			17.2	B			17.2	B			21.0	C			21.3	C			23.8	C			24.6	C
Columbus Avenue and West 61st Street																								
EB	TR	0.02	20.2	C					TR	0.00	20.0	B					TR	0.00	20.0	B				
SB	LTR	0.45	8.5	A	LT	0.46	8.5	A	LTR	0.75	12.1	B	LT	0.77	12.4	B	LTR	0.81	13.4	B	LT	0.84	14.3	B
INT			8.6	A			8.5	A			12.1	B			12.4	B			13.4	B			14.3	B
Columbus Avenue and West 62nd Street																								
EB	R	0.28	23.5	C	R	0.30	24.1	C	R	0.60	32.0	C	R	0.77	41.8	D	R	0.65	33.9	C	R	0.97	71.6	E+
WB	LT	0.27	23.5	C	LT	0.28	23.6	C	LT	0.41	26.3	C	LT	0.41	26.3	C	LT	0.44	27.0	C	LT	0.44	26.9	C
SB	TR	0.44	8.4	A	TR	0.47	8.7	A	TR	0.72	11.5	B	TR	0.73	11.6	B	TR	0.78	12.5	B	TR	0.78	12.7	B
INT			10.8	B			11.0	B			14.3	B			15.6	B			15.4	B			20.6	C
Columbus Avenue and West 63rd Street																								
WB	L	0.21	22.1	C	L	0.21	22.1	C	L	0.61	29.1	C	L	0.61	29.1	C	L	0.65	30.5	C	L	0.66	30.5	C
SB	T	0.32	7.6	A	T	0.34	7.7	A	T	0.52	9.0	A	T	0.52	9.0	A	T	0.56	9.4	A	T	0.57	9.4	A
INT			9.8	A			9.8	A			12.9	B			12.9	B			13.5	B			13.5	B
Broadway, Columbus Avenue* and West 65th Street																								
EB	TR	0.53	32.3	C	TR	0.53	32.3	C	TR	0.74	38.1	D	TR	0.74	38.2	D	TR	0.79	40.8	D	TR	0.80	41.0	D
	R	0.50	35.9	D	R	0.50	35.9	D	R	0.54	39.3	D	R	0.54	39.3	D	R	0.58	41.1	D	R	0.58	41.1	D
NB	TR	0.54	30.6	C	TR	0.54	30.6	C	TR	0.92	47.5	D	TR	0.92	47.4	D	TR	0.99	59.7	E	TR	0.99	58.8	E
SB	T	0.65	32.4	C	T	0.66	32.8	C	T	1.04	69.8	E	T	1.04	70.3	E	T	1.12	97.4	F	T	1.12	99.4	F
SB*	LT	0.70	31.2	C	LT	0.73	31.9	C	LT	0.95	45.2	D	LT	0.95	45.6	D	LT	1.02	60.0	E	LT	1.02	61.3	E
INT			31.8	C			32.2	C			51.8	D			52.1	D			67.9	E			68.7	E

Notes: L: Left Turn; T: Through; R: Right Turn; DefL: Defacto Left Turn; INT: Intersection
V/C: Volume to Capacity; spv: Seconds per Vehicle; LOS: Level of Service; "+" = Exceeds CEQR Impact Threshold.

During the 6:00–7:00 AM analysis hour, no significant adverse traffic impacts were identified at the study area intersections. During the 3:00–4:00 PM analysis hour, one significant adverse traffic impact was identified at one study area intersection, as follows:

- Ninth Avenue and West 57th Street—The southbound approach would deteriorate within LOS F, with average vehicle delay increasing from 93.4 to 100.9 seconds (v/c ratio increasing from 1.13 to 1.15).

During the 5:00–6:00 PM analysis hour, six significant adverse traffic impacts were identified at five study area intersections, as follows:

- Tenth Avenue and West 57th Street—The eastbound approach would deteriorate from LOS E with average vehicle delay of 63.8 seconds and a v/c ratio of 0.99, to LOS F on the *Defacto* left-turn movement with average vehicle delay of 266.2 seconds and a v/c ratio of 1.40, and LOS D on the through movement with average vehicle delay of 42.7 seconds and a v/c ratio of 0.86. The westbound approach would deteriorate within LOS E, with average vehicle delay increasing from 60.0 to 65.8 seconds (v/c ratio increasing from 1.02 to 1.04).
- Amsterdam Avenue and West 62nd Street—The westbound approach would deteriorate from LOS C to LOS D, with average vehicle delay increasing from 33.3 to 47.3 seconds (v/c ratio increasing from 0.64 to 0.84).
- Columbus Avenue and West 60th Street—The eastbound approach would deteriorate within LOS F, with average vehicle delay increasing from 83.8 to 89.9 seconds (v/c ratio increasing from 1.01 to 1.03).
- Columbus Avenue and West 62nd Street—The eastbound approach would deteriorate from LOS C to LOS E, with average vehicle delay increasing from 33.9 to 71.6 seconds (v/c ratio increasing from 0.65 to 0.97).
- Ninth Avenue and West 57th Street—The westbound through movement would deteriorate within LOS F, with average vehicle delay increasing from 122.9 to 125.9 seconds (v/c ratio increasing from 1.19 to 1.20).

Potential measures to mitigate these impacts, including project-specific mitigation strategies and other operational mitigation measures, are discussed below.

Peak 2031 Construction Analysis

The traffic analysis conducted for the peak 2031 construction encompasses a study area of 15 intersections and accounts for operational traffic from completed and occupied buildings. For this analysis, construction worker vehicles were assigned primarily to the Lincoln Center Park & Lock, across from the Fordham University Lincoln Center Campus on West 62nd Street, while construction trucks were assigned to entrance ramps at the perimeter of the construction site. A summary of the analysis results, comparing the 2031 No Build and construction traffic conditions, is presented in Table 19-5.

Table 19-5
2031 No Build and Construction Level-of-Service Analysis

App /INT	6 - 7 AM Peak Hour								3 - 4 PM Peak Hour								5 - 6 PM Peak Hour							
	2031 No Build				2031 Construction				2031 No Build				2031 Construction				2031 No Build				2031 Construction			
	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS
Tenth Avenue and West 57th Street																								
EB	LT	0.68	28.2	C	LT	0.71	29.7	C	LT	0.98	61.4	E	LT	0.99	63.8	E	DefL	1.42	273.5	F	DefL	1.48	296.2	F+
																	T	0.90	47.2	D	T	0.90	47.2	D
WB	TR	0.71	28.2	C	TR	0.74	29.1	C	TR	1.02	61.6	E	TR	1.03	64.6	E	TR	1.06	74.3	E	TR	1.08	81.4	F+
NB	LT	0.51	12.4	B	LT	0.52	12.5	B	LTR	0.92	23.0	C	LTR	0.92	23.4	C	L	0.58	21.3	C	L	0.58	21.3	C
	R	0.44	14.6	B	R	0.44	14.6	B									TR	0.84	19.5	B	TR	0.85	19.8	B
INT			19.5	B			20.1	C			38.5	D			39.8	D			44.5	D			47.5	D
Tenth Avenue and West 58th Street																								
EB	LT	0.39	24.5	C	LT	0.40	24.7	C	LT	0.53	26.9	C	LT	0.53	26.9	C	LT	0.57	27.8	C	LT	0.57	27.7	C
NB	TR	0.45	8.5	A	TR	0.48	8.7	A	TR	0.76	12.5	B	TR	0.77	12.5	B	TR	0.82	13.9	B	TR	0.83	14.2	B
INT			11.8	B			11.9	B			14.9	B			15.0	B			16.3	B			16.5	B
Amsterdam Avenue and West 59th Street																								
EB	L	0.31	26.2	C	L	0.34	26.9	C	L	0.63	40.7	D	L	0.63	41.4	D	L	0.70	47.1	D	L	0.72	49.3	D
WB	T	0.40	25.2	C	T	0.41	25.3	C	T	0.50	27.3	C	T	0.51	27.5	C	T	0.54	28.2	C	T	0.55	28.7	C
	R	0.15	21.6	C	R	0.15	21.6	C	R	0.23	22.8	C	R	0.25	23.3	C	R	0.24	23.1	C	R	0.30	24.2	C
NB	LT	0.44	9.1	A	LT	0.46	9.3	A	L	0.39	14.5	B	L	0.39	14.5	B	L	0.41	15.1	B	L	0.41	15.1	B
									T	0.62	10.7	B	T	0.62	10.8	B	T	0.66	11.3	B	T	0.67	11.5	B
INT			12.3	B			12.4	B			14.3	B			14.5	B			15.2	B			15.6	B
Amsterdam Avenue and West 60th Street																								
EB	LT	0.64	32.7	C	LT	0.71	36.7	D	LT	0.71	35.6	D	LT	0.72	36.2	D	LT	0.76	38.8	D	LT	0.78	40.2	D
WB	R	0.53	30.1	C	R	0.53	30.1	C	R	0.67	34.8	C	R	0.68	35.4	D	R	0.72	37.6	D	R	0.74	39.5	D
NB	TR	0.43	9.0	A	TR	0.45	9.2	A	TR	0.67	11.5	B	TR	0.68	11.7	B	TR	0.72	12.4	B	TR	0.74	12.7	B
INT			15.3	B			16.2	B			16.9	B			17.1	B			18.2	B			18.8	B
Amsterdam Avenue and West 61st Street																								
WB	TR	0.02	20.3	C	TR	0.03	20.3	C	TR	0.08	20.9	C	TR	0.09	21.1	C	TR	0.09	21.0	C	TR	0.12	21.4	C
NB	LTR	0.44	8.4	A	LTR	0.46	8.6	A	LTR	0.68	10.9	B	LTR	0.69	11.1	B	L	0.05	9.4	A	L	0.05	9.4	A
																	TR	0.72	11.5	B	TR	0.74	11.9	B
INT			8.5	A			8.7	A			11.1	B			11.3	B			11.7	B			12.1	B
Amsterdam Avenue and West 62nd Street																								
WB	R	0.21	23.0	C	R	0.22	23.2	C	R	0.61	32.3	C	R	0.72	37.4	D	R	0.66	34.3	C	R	0.88	51.5	D+
NB	TR	0.46	8.6	A	TR	0.50	9.0	A	TR	0.69	11.0	B	TR	0.70	11.2	B	TR	0.74	11.9	B	TR	0.76	12.3	B
INT			9.4	A			9.7	A			13.3	B			14.4	B			14.3	B			17.6	B
Amsterdam Avenue and West 65th Street																								
EB	LT	0.44	23.1	C	LT	0.44	23.2	C	LT	0.58	25.4	C	LT	0.58	25.4	C	LT	0.62	26.4	C	LT	0.62	26.4	C
NB	T	0.36	9.6	A	T	0.36	9.7	A	TR	0.81	15.9	B	TR	0.83	16.4	B	TR	0.87	18.1	B	TR	0.90	19.9	B
	R	0.51	17.9	B	R	0.53	18.3	B																
INT			14.3	B			14.5	B			17.8	B			18.2	B			19.8	B			21.2	C
Ninth Avenue and West 57th Street																								
EB	T	0.64	35.9	D	T	0.64	35.9	D	T	0.83	44.2	D	T	0.83	44.2	D	T	0.89	49.7	D	T	0.89	49.7	D
	R	0.54	43.2	D	R	0.54	43.2	D	R	0.70	53.6	D	R	0.70	53.6	D	R	0.75	58.6	E	R	0.75	58.6	E
WB	DefL	0.62	23.4	C	DefL	0.62	23.4	C	DefL	0.93	53.5	D	DefL	0.93	53.5	D	DefL	0.99	68.9	E	DefL	0.99	68.9	E
	T	0.79	30.9	C	T	0.82	32.9	C	T	1.19	121.9	F	T	1.19	123.1	F+	T	1.24	145.7	F	T	1.25	148.8	F+
SB	LTR	0.82	30.1	C	LTR	0.82	30.2	C	LTR	1.18	113.2	F	LTR	1.20	122.7	F+	L	0.68	35.7	D	L	0.70	37.0	D
																	T	0.92	36.2	D	T	0.94	38.9	D
																	R	0.67	36.4	D	R	0.72	39.8	D
INT			31.0	C			31.4	C			98.6	F			104.1	F			64.5	E			66.2	E
Ninth Avenue and West 58th Street																								
EB	T	0.72	34.5	C	T	0.72	34.5	C	T	0.86	45.9	D	T	0.85	44.8	D	T	0.93	55.6	E	T	0.91	52.1	D
	R	0.31	24.8	C	R	0.31	24.8	C	R	0.56	32.0	C	R	0.58	33.0	C	R	0.60	33.8	C	R	0.65	36.0	D
SB	LT	0.59	10.6	B	LT	0.56	10.2	B	LT	0.90	18.1	B	LT	0.91	18.9	B	LT	1.00	33.2	C	LT	1.03	39.9	D
INT			15.5	B			15.2	B			22.8	C			23.2	C			36.4	D			41.3	D
Columbus Avenue and West 59th Street																								
SB	TR	0.63	11.0	B	TR	0.64	11.2	B	TR	0.92	19.5	B	TR	0.94	20.9	C	T	0.81	13.9	B	T	0.83	14.5	B
																	R	0.84	37.9	D	R	0.88	43.0	D
INT			11.0	B			11.2	B			19.5	B			20.9	C			16.6	B			17.7	B
Columbus Avenue and West 60th Street																								
EB	R	0.82	49.4	D	R	0.82	49.4	D	R	0.97	74.7	E	R	0.99	78.7	E+	R	1.05	94.6	F	R	1.08	103.6	F+
WB	L	0.50	29.6	C	L	0.50	29.6	C	L	0.66	35.5	D	L	0.66	35.2	D	L	0.71	38.2	D	L	0.71	38.0	D
	LT	0.51	29.1	C	LT	0.51	29.1	C	LT	0.69	35.1	D	LT	0.69	35.0	D	LT	0.74	38.2	D	LT	0.74	37.7	D
SB	TR	0.44	8.4	A	TR	0.45	8.4	A	TR	0.73	11.7	B	TR	0.75	12.0	B	TR	0.78	12.8	B	TR	0.81	13.6	B
INT			17.8	B			17.7	B			22.3	C			22.9	C			25.7	C			27.0	C

Table 19-5 (cont'd)
2031 No Build and Construction Level-of-Service Analysis

App /INT	6 - 7 AM Peak Hour								3 - 4 PM Peak Hour								5 - 6 PM Peak Hour							
	2031 No Build				2031 Construction				2031 No Build				2031 Construction				2031 No Build				2031 Construction			
	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS	Ln Grp	V/C	Delay (spv)	LOS
Columbus Avenue and West 61st Street																								
EB	TR	0.03	20.3	C					TR	0.00	20.0	B					TR	0.00	20.0	B				
SB	LTR	0.47	8.6	A	LT	0.47	8.7	A	LTR	0.79	12.8	B	LT	0.81	13.2	B	LTR	0.85	14.4	B	LT	0.88	15.9	B
INT			8.8	A			8.7	A			12.8	B			13.2	B			14.4	B			15.9	B
Columbus Avenue and West 62nd Street																								
EB	R	0.28	23.7	C	R	0.31	24.1	C	R	0.62	32.7	C	R	0.80	43.9	D	R	0.67	34.9	C	R	0.99	75.2	E+
WB	LT	0.28	23.6	C	LT	0.29	23.7	C	LT	0.44	26.9	C	LT	0.44	26.9	C	LT	0.47	27.6	C	LT	0.46	27.5	C
SB	TR	0.46	8.5	A	TR	0.49	8.8	A	TR	0.75	12.1	B	TR	0.76	12.1	B	TR	0.81	13.3	B	TR	0.82	13.5	B
INT			10.9	B			11.2	B			14.8	B			16.4	B			16.1	B			21.8	C
Columbus Avenue and West 63rd Street																								
WB	L	0.22	22.2	C	L	0.22	22.2	C	L	0.63	29.9	C	L	0.63	29.9	C	L	0.68	31.4	C	L	0.68	31.4	C
SB	T	0.34	7.7	A	T	0.36	7.8	A	T	0.54	9.2	A	T	0.55	9.2	A	T	0.59	9.6	A	T	0.59	9.7	A
INT			9.9	A			9.9	A			13.2	B			13.2	B			13.8	B			13.9	B
Broadway, Columbus Avenue* and West 65th Street																								
EB	TR	0.55	32.7	C	TR	0.55	32.7	C	TR	0.77	39.4	D	TR	0.77	39.6	D	TR	0.83	42.8	D	TR	0.83	43.1	D
	R	0.52	36.7	D	R	0.52	36.7	D	R	0.57	40.4	D	R	0.57	40.4	D	R	0.62	42.8	D	R	0.62	42.8	D
NB	TR	0.56	31.1	C	TR	0.56	31.1	C	TR	0.96	52.8	D	TR	0.95	52.6	D	TR	1.03	69.9	E	TR	1.03	69.0	E
SB	T	0.68	33.1	C	T	0.69	33.5	C	T	1.09	85.5	F	T	1.09	86.7	F	T	1.17	117.4	F	T	1.17	120.1	F
SB*	LT	0.74	32.0	C	LT	0.76	32.8	C	LT	0.99	52.7	D	LT	0.99	53.2	D	LT	1.06	74.2	E	LT	1.07	75.8	E
INT			32.6	C			32.9	C			60.3	E			60.8	E			81.0	F			82.2	F

Notes: L: Left Turn; T: Through; R: Right Turn; DefL: Defacto Left Turn; INT: Intersection
V/C: Volume to Capacity; spv: Seconds per Vehicle; LOS: Level of Service; "+" = Exceeds CEQR Impact Threshold.

During the 6:00–7:00 AM analysis hour, no significant adverse traffic impacts were identified at the study area intersections. During the 3:00–4:00 PM analysis hour, three significant adverse traffic impacts were identified at two study area intersections, as follows:

- Ninth Avenue and West 57th Street—The southbound approach would deteriorate within LOS F, with average vehicle delay increasing from 113.2 to 122.7 seconds (v/c ratio increasing from 1.18 to 1.20). The westbound through movement would deteriorate within LOS F, with average vehicle delay increasing from 121.9 to 123.1 seconds (v/c ratio remaining at 1.19).
- Columbus Avenue and West 60th Street—The eastbound approach would deteriorate within LOS E, with average vehicle delay increasing from 74.7 to 78.7 seconds (v/c ratio increasing from 0.97 to 0.99).

During the 5:00–6:00 PM analysis hour, six significant adverse traffic impacts were identified at five study area intersections, as follows:

- Tenth Avenue and West 57th Street—The eastbound *Defacto* left-turn movement would deteriorate within LOS F with average vehicle delay increasing from 281.1 to 296.2 seconds (v/c ratio increasing from 1.44 to 1.48). The westbound approach would deteriorate from LOS E to LOS F, with average vehicle delay increasing from 74.3 to 81.4 seconds (v/c ratio increasing from 1.06 to 1.08).
- Amsterdam Avenue and West 62nd Street—The westbound approach would deteriorate from LOS C to LOS D, with average vehicle delay increasing from 34.3 to 51.5 seconds (v/c ratio increasing from 0.66 to 0.88).
- Ninth Avenue and West 57th Street—The westbound through movement would deteriorate within LOS F, with average vehicle delay increasing from 145.7 to 148.8 seconds (v/c ratio increasing from 1.24 to 1.25).

- Columbus Avenue and West 60th Street—The eastbound approach would deteriorate within LOS F, with average vehicle delay increasing from 94.6 to 103.6 seconds (v/c ratio increasing from 1.05 to 1.08).
- Columbus Avenue and West 62nd Street—The eastbound approach would deteriorate from LOS C to LOS E, with average vehicle delay increasing from 34.9 to 75.2 seconds (v/c ratio increasing from 0.67 to 0.99).

Potential measures to mitigate these impacts, including project-specific mitigation strategies, and other operational mitigation measures, are discussed below.

Construction Traffic Mitigation

One significant adverse traffic impact is expected during peak construction in 2011 during the 3:00–4:00 PM analysis hour. Potential measures to mitigate this impact and the mitigation analysis results are discussed below and summarized in Table 19-6.

Table 19-6
2011 Construction 3–4 PM Analysis Hour Mitigation

	3–4 PM Construction Peak Hour												
	No Build				Construction				Mitigation				
Approach/ Intersection	Lane Group	V/C Ratio	Delay (spv)	LOS	Lane Group	V/C Ratio	Delay (spv)	LOS	Lane Group	V/C Ratio	Delay (spv)	LOS	Mitigation Measures
Ninth Avenue and West 57th Street													
Eastbound	T	0.76	40.2	D	T	0.76	40.2	D	T	0.76	40.2	D	Early implementation of 2014 mitigation from the midday peak hour.
	R	0.63	48.5	D	R	0.63	48.5	D	R	0.63	48.5	D	
Westbound	LT	1.00	52.4	D	LT	1.00	52.4	D	LT	1.00	52.4	D	
Southbound	LTR	1.08	74.1	E	LTR	1.10	83.7	F+	LT	0.95	39.4	D	
									R	0.67	37.3	D	
Intersection			62.2	E			67.6	E			43.4	D	

Notes:
L = Left Turn; T = Through; R = Right Turn; LT: Left and Through; TR: Through and Right; LTR: Left, Through, and Right; DefL = Defacto Left Turn
V/C = Volume to Capacity; spv: Seconds per Vehicle; LOS = Level of Service; "+" = Exceeds CEQR Impact Threshold.

- Ninth Avenue and West 57th Street—An early implementation of the proposed 2014 operational mitigation measures for the midday peak hour, which include daylighting on the west curb lane on the southbound approach for 50 feet to create an exclusive right-turn lane, would fully mitigate the significant adverse impacts at the southbound approach from LOS F with 83.7 seconds of delay and a v/c ratio of 1.10 to LOS D on the left-through movement with 39.4 seconds of delay and a v/c ratio of 0.95 and LOS D on the right turn movement with 37.3 seconds of delay and a v/c ratio of 0.67.

For peak Phase 2 construction in 2021, one and six significant adverse traffic impacts would be expected to occur at five intersections during the 3–4 PM and 5–6 PM analysis hours, respectively. Potential measures to mitigate these impacts and the mitigation analysis results are discussed below and summarized in Table 19-7.

- Ninth Avenue and West 57th Street—During the 3–4 PM peak hour, extending the proposed 2014 operational mitigation measures for the midday peak hour, which include daylighting on the west curb lane on the southbound approach for 50 feet to create an exclusive right-turn lane, would fully mitigate the significant adverse impacts at the southbound approach from LOS F with 100.9 seconds of delay and a v/c ratio of 1.15 to LOS D on the left-through movement with 45.9 seconds of delay and a v/c ratio of 0.99 and LOS D on the right turn movement with 38.8 seconds of delay and a v/c ratio of 0.70.

During the 5–6 PM peak hour, an early implementation of the proposed 2032 operational mitigation measures, which include a 1-second shift of green time from the southbound phase to the eastbound/westbound phase, would fully mitigate the significant adverse impacts at the westbound through movement from LOS F with 125.97 seconds of delay and a v/c ratio of 1.20 to LOS F with 114.1 seconds of delay and a v/c ratio of 1.17.

Table 19-7
2021 Construction 3–4 PM and 5–6 PM Analysis Hour Mitigation

Approach/ Intersection	No Build				Construction				Mitigation				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	
3-4 PM Construction Peak Hour													
Ninth Avenue and West 57th Street													
Eastbound	T	0.79	41.9	D	T	0.79	41.9	D	T	0.79	41.9	D	Extension of 2014 midday peak hour mitigation
	R	0.67	51.4	D	R	0.67	51.4	D	R	0.67	51.4	D	
Westbound	DefL	0.88	44.1	D	DefL	0.88	44.1	D	DefL	0.88	44.1	D	
	T	1.13	101.5	F	T	1.14	102.6	F	T	1.14	102.6	F	
Southbound	LTR	1.13	93.4	F	LTR	1.15	100.9	F+	LT	0.99	45.9	D	
									R	0.70	38.8	D	
Intersection			82.5	F			86.9	F			56.8	E	
5-6 PM Construction Peak Hour													
Tenth Avenue and West 57th Street													
Eastbound	LT	0.99	63.8	E	DefL	1.40	266.2	F+	LT	0.97	58.0	E	Early implementation of 2032 mitigation.
					T	0.86	42.7	D					
Westbound	TR	1.02	60.0	E	TR	1.04	65.8	E+	TR	1.01	56.6	E	
Northbound	L	0.56	20.7	C	L	0.56	20.7	C	L	0.57	21.4	C	
	TR	0.81	18.2	B	TR	0.81	18.3	B	TR	0.83	19.8	B	
Intersection			35.7	D			41.1	D			20.0	C	
Amsterdam Avenue and West 62nd Street													
Westbound	R	0.64	33.3	C	R	0.84	47.3	D+	R	0.81	43.0	D	Shift 1 second of green time from northbound to westbound phase.
Northbound	TR	0.71	11.3	B	TR	0.72	11.6	B	TR	0.74	12.6	B	
Intersection			13.7	B			16.5	B			16.7	B	
Ninth Avenue and West 57th Street													
Eastbound	T	0.85	46.3	D	T	0.85	46.3	D	T	0.81	42.3	D	Early implementation of 2032 mitigation.
	R	0.71	54.8	D	R	0.71	54.8	D	R	0.67	50.2	D	
Westbound	DefL	0.93	53.1	D	DefL	0.93	53.1	D	DefL	0.91	47.5	D	
	T	1.19	122.9	F	T	1.20	125.9	F+	T	1.17	114.1	F	
Southbound	L	0.65	34.3	C	L	0.67	35.4	D	L	0.70	38.3	D	
	T	0.88	33.5	C	T	0.91	35.1	D	T	0.94	39.2	D	
	R	0.64	34.9	C	R	0.69	37.5	D	R	0.71	40.6	D	
Intersection			56.4	E			57.6	E			56.1	E	
Columbus Avenue and West 60th Street													
Eastbound	R	1.01	83.8	F	R	1.03	89.9	F+	R	1.00	79.1	E	Mitigated with 2014 mitigation.
Westbound	L	0.69	36.6	D	L	0.67	36.0	D	L	0.65	33.8	C	
	LT	0.71	36.3	D	LT	0.70	35.9	D	LT	0.68	33.8	C	
Southbound	TR	0.75	12.1	B	TR	0.78	12.7	B	TR	0.79	13.8	B	
Intersection			23.8	C			24.6	C			23.9	C	
Columbus Avenue and West 62nd Street													
Eastbound	R	0.65	33.9	C	R	0.97	71.6	E+	R	0.82	41.6	D	Early implementation of 2032 mitigation and an additional 3 seconds of signal retiming.
Westbound	LT	0.44	27.0	C	LT	0.44	26.9	C	LT	0.38	22.6	C	
Southbound	TR	0.78	12.5	B	TR	0.78	12.7	B	TR	0.85	18.0	B	
Intersection			15.4	B			20.6	C			21.1	C	

Notes:
L = Left Turn; T = Through; R = Right Turn; LT: Left and Through; TR: Through and Right; LTR: Left, Through, and Right; DefL = Defacto Left Turn
V/C = Volume to Capacity; spv: Seconds per Vehicle; LOS = Level of Service; "+" = Exceeds CEQR Impact Threshold.

- Tenth Avenue and West 57th Street—An early implementation of the proposed 2032 operational mitigation measures, which include a 1-second shift of green time from the northbound phase to the eastbound/westbound phase, would fully mitigate the significant adverse impacts at the eastbound *Defacto* left-turn movement (LOS F, 266.2 seconds of delay, and a v/c ratio of 1.40) and the westbound approach (LOS E, 65.8 seconds of delay, and a v/c ratio of 1.04). The impacted eastbound approach would improve to LOS E, with a delay of 58.0 seconds (v/c ratio of 0.97), and the westbound approach would improve within LOS E, with a delay of 56.6 seconds (v/c ratio of 1.01).
- Amsterdam Avenue and West 62nd Street—By temporarily shifting 1 second of green time from the northbound to the westbound phase, the significant adverse impacts at the westbound approach would be fully mitigated within LOS D from 47.3 seconds of delay and a v/c ratio of 0.84 to 43.0 seconds of delay and a v/c ratio of 0.81.
- Columbus Avenue and West 60th Street—The implementation of the proposed 2014 operational mitigation measures, which include a 1-second shift of green time from the southbound phase to the eastbound/westbound phase, would fully mitigate the significant adverse impacts at the eastbound approach from LOS F with 89.9 seconds of delay and a v/c ratio of 1.03 to LOS E with 79.1 seconds of delay and a v/c ratio of 1.00.
- Columbus Avenue and West 62nd Street—An early implementation of the proposed 2032 operational mitigation measures (1 second of signal retiming) and an additional 3-second shift of green time from the southbound to the eastbound/westbound phase would fully mitigate the significant adverse impacts at the eastbound approach from LOS E with 71.6 seconds of delay and a v/c ratio of 0.97 to LOS D with 41.6 seconds of delay and a v/c ratio of 0.82.

For peak Phase 2 construction in 2031, three and six significant adverse traffic impacts would be expected to occur at two and five intersections during the 3–4 PM and 5–6 PM analysis hours, respectively. Potential measures to mitigate these impacts and the mitigation analysis results are discussed below and summarized in Table 19-8.

- Ninth Avenue and West 57th Street—During the 3–4 PM peak hour, extending the proposed 2014 operational mitigation measures for the midday peak hour, which include daylighting on the west curb lane on the southbound approach for 50 feet to create an exclusive right-turn lane, would fully mitigate the significant adverse impacts at the southbound approach from LOS F with 122.7 seconds of delay and a v/c ratio of 1.20 to LOS E on the left-through movement with 69.6 seconds of delay and a v/c ratio of 1.06 and LOS D on the right turn movement with 46.0 seconds of delay and a v/c ratio of 0.77. An early implementation of the proposed 2032 operational mitigation measures for the PM peak hour, which include a 1-second shift of green time from the southbound phase to the eastbound/westbound phase, would fully mitigate the significant adverse impacts at the westbound through movement from LOS F with 123.1 seconds of delay and a v/c ratio of 1.19 to LOS F with 111.3 seconds of delay and a v/c ratio of 1.16.

  During the 5–6 PM peak hour, an early implementation of the proposed 2032 operational mitigation measures, which include a 1-second shift of green time from the southbound phase to the eastbound/westbound phase, would fully mitigate the significant adverse impacts at the westbound through movement from LOS F with 148.8 seconds of delay and a v/c ratio of 1.25 to LOS F with 136.1 seconds of delay and a v/c ratio of 1.22.
- Columbus Avenue and West 60th Street—During the 3–4 PM peak hour, implementation of the 2014 mitigation intended for the PM peak hour, which includes a 1-second shift of green time from the southbound to the eastbound/westbound phase, would fully mitigated the

significant adverse impacts at the eastbound approach from LOS E with 78.7 seconds of delay and a v/c ratio of 0.99 to LOS E with 69.2 seconds of delay and a v/c ratio of 0.96.

Table 19-8
2031 Construction 3–4 PM and 5–6 PM Analysis Hour Mitigation

Approach/ Intersection	No Build Lane Group	No Build V/C Ratio	No Build Delay (spv)	No Build LOS	Construction Lane Group	Construction V/C Ratio	Construction Delay (spv)	Construction LOS	Mitigation Lane Group	Mitigation V/C Ratio	Mitigation Delay (spv)	Mitigation LOS	Mitigation Measures
3–4 PM Construction Peak Hour													
Ninth Avenue and West 57th Street													
Eastbound	T	0.83	44.2	D	T	0.83	44.2	D	T	0.83	44.2	D	Extension of 2014 midday peak hour mitigation and early implementation of 2032 mitigation for the PM peak hour.
	R	0.70	53.6	D	R	0.70	53.6	D	R	0.70	53.6	D	
Westbound	DefL	0.93	53.5	D	DefL	0.93	53.5	D	DefL	0.93	53.5	D	
	T	1.19	121.9	F	T	1.19	123.1	F+	T	1.19	123.1	F	
Southbound	LTR	1.18	113.2	F	LTR	1.20	122.7	F+	LT	1.03	57.1	E	
									R	0.74	41.8	D	
Intersection			98.6	F			104.1	F			67.9	E	
Columbus Avenue and West 60th Street													
Eastbound	R	0.97	74.7	E	R	0.99	78.7	E+	R	0.96	69.2	E	Implementation of 2014 mitigation intended for the PM peak hour.
Westbound	L	0.66	35.5	D	L	0.66	35.2	D	L	0.63	33.2	D	
	LT	0.69	35.1	D	LT	0.69	35.0	D	LT	0.67	33.1	D	
Southbound	TR	0.73	11.7	B	TR	0.75	12.0	B	TR	0.76	13.0	B	
Intersection			22.3	C			22.9	C			22.3	C	
5–6 PM Construction Peak Hour													
Tenth Avenue and West 57th Street													
Eastbound	DefL	1.44	281.1	F	DefL	1.48	296.2	F+	DefL	1.36	243.7	F	Early implementation of 2032 mitigation and an additional 2 seconds of signal retiming.
	T	0.90	47.2	D	T	0.90	47.2	D	T	0.83	36.7	D	
Westbound	TR	1.06	74.3	E	TR	1.08	81.4	F+	TR	1.00	52.2	D	
Northbound	L	0.58	21.3	C	L	0.58	21.3	C	L	0.63	25.0	C	
	TR	0.84	19.5	B	TR	0.85	19.8	B	TR	0.91	26.1	C	
Intersection			44.8	D			47.5	D			40.6	D	
Amsterdam Avenue and West 62nd Street													
Westbound	R	0.66	34.3	C	R	0.88	51.5	D+	R	0.81	42.1	D	Shift 2 seconds of green time from northbound to westbound phase.
Northbound	TR	0.74	11.9	B	TR	0.76	12.3	B	TR	0.79	14.5	B	
Intersection			14.3	B			17.6	B			18.2	B	
Ninth Avenue and West 57th Street													
Eastbound	T	0.89	49.7	D	T	0.89	49.7	D	T	0.85	44.7	D	Early implementation of 2032 mitigation.
	R	0.75	58.6	E	R	0.75	58.6	E	R	0.71	53.4	D	
Westbound	DefL	0.99	68.9	E	DefL	0.99	68.9	E	DefL	0.97	60.7	E	
	T	1.24	145.7	F	T	1.25	148.8	F+	T	1.22	136.1	F	
Southbound	L	0.68	35.7	D	L	0.70	37.0	D	L	0.73	40.2	D	
	T	0.92	36.2	D	T	0.94	38.9	D	T	0.98	45.2	D	
	R	0.67	36.4	D	R	0.72	39.8	D	R	0.75	43.4	D	
Intersection			64.5	E			66.2	E			65.1	E	
Columbus Avenue and West 60th Street													
Eastbound	R	1.05	94.6	F	R	1.08	103.6	F+	R	1.04	90.9	F	Mitigated by 2014 mitigation.
Westbound	L	0.71	38.2	D	L	0.71	38.0	D	L	0.68	35.5	D	
	LT	0.74	38.2	D	LT	0.74	37.7	D	LT	0.71	35.4	D	
Southbound	TR	0.78	12.8	B	TR	0.81	13.6	B	TR	0.83	14.8	B	
Intersection			25.7	C			27.0	C			26.2	C	
Columbus Avenue and West 62nd Street													
Eastbound	R	0.67	34.9	C	R	0.99	75.2	E+	R	0.83	42.6	D	Early implementation of 2032 mitigation and an additional 3 seconds of signal retiming.
Westbound	LT	0.47	27.6	C	LT	0.46	27.5	C	LT	0.40	23.0	C	
Southbound	TR	0.81	13.3	B	TR	0.82	13.5	B	TR	0.89	19.7	B	
Intersection			16.1	B			21.8	C			22.7	C	

Notes:
L = Left Turn; T = Through; R = Right Turn; LT: Left and Through; TR: Through and Right; LTR: Left, Through, and Right; DefL = Defacto Left Turn; Int. = Intersection
V/C = Volume to Capacity; spv: Seconds per Vehicle; LOS = Level of Service; "+" = Exceeds CEQR Impact Threshold.

During the 5–6 PM peak hour, the implementation of the proposed 2014 operational mitigation measures, which include a 1-second shift of green time from the southbound phase to the eastbound/westbound phase, would fully mitigate the significant adverse impacts at the eastbound approach from LOS F with 103.6 seconds of delay and a v/c ratio of 1.08 to LOS F with 90.9 seconds of delay and a v/c ratio of 1.04.

- Tenth Avenue and West 57th Street—An early implementation of the proposed 2032 operational mitigation measures (1 second of signal retiming) and an additional 2-second shift of green time from the northbound to the eastbound/westbound phase would fully mitigate the significant adverse impacts at the eastbound *Defacto* left-turn movement (LOS F, 296.2 seconds of delay, and a v/c ratio of 1.48) and the westbound approach (LOS F, 81.4 seconds of delay, and a v/c ratio of 1.08). The impacted eastbound *Defacto* left-turn movement would improve within to LOS F, with a delay of 243.7 seconds (v/c ratio of 1.36) and the westbound approach would improve to LOS D, with a delay of 52.2 seconds (v/c ratio of 1.00).
- Amsterdam Avenue and West 62nd Street—By temporarily shifting 2 second of green time from the northbound to the westbound phase, the significant adverse impacts at the westbound approach would be fully mitigated within LOS D from 51.5 seconds of delay and a v/c ratio of 0.88 to 42.1 seconds of delay and a v/c ratio of 0.81.
- Columbus Avenue and West 62nd Street—An early implementation of the proposed 2032 operational mitigation measures (1 second of signal retiming) and an additional 3-second shift of green time from the southbound to the eastbound/westbound phase would fully mitigate the significant adverse impacts at the eastbound approach from LOS E with 75.2 seconds of delay and a v/c ratio of 0.99 to LOS D with 42.6 seconds of delay and a v/c ratio of 0.83.

CONSTRUCTION TRUCK MOVEMENTS

Over the periods of the construction, each of the construction sites would have dedicated gates, driveways, or ramps for delivery vehicle access. Flaggers are expected to be present at these active driveways to manage the access and movements of trucks. Some of the site deliveries may also occur along the perimeters of the construction site within delineated closed-off areas for concrete pour or steel delivery. As with any other construction projects, these activities would take place in accordance with NYCDOT-approved MPT plans and would be managed by on-site flag-persons.

PARKING

Based on the detailed parking information summarized in Chapter 15, “Traffic and Parking,” available parking spaces within numerous off-street parking facilities within the ¼-mile study area would be able to accommodate the projected construction worker parking demand, which was estimated at approximately 256, 172, and 171 spaces under peak 2011, 2021, and 2031 construction conditions, respectively.

For the construction traffic analysis, the construction worker vehicles were assigned to the two closest off-street parking facilities from the project site that would have available parking capacity to accommodate this demand. During the 6:00–7:00 AM construction worker arrival hour, the 721-space Lincoln Center Park and Lock underneath Lincoln Center and the 294-space 1 Columbus Place Garage located on the block bounded by Columbus and Amsterdam Avenues between West 58th and West 59th Streets would have in excess of 500 and 200 available spaces, respectively. Hence, 80 percent of the construction worker parking demand was allocated to the Lincoln Center Park and Lock, while the remaining 20 percent was assigned to the 1 Columbus Place Garage.

While construction worker parking demand could largely be accommodated off-street, there is expected to be some temporary loss of on-street parking spaces throughout construction to accommodate curb lane and roadway closures. Because construction would take place in stages over many years on various sites, the loss of on-street parking spaces would vary and occur at different locations. Nonetheless, because there would be a surplus of available off-street spaces in and surrounding the project site, as demonstrated in the analysis results summarized in Chapter 15, "Traffic and Parking," the effect of construction on neighborhood parking supply and utilization is not expected to be significant.

TRANSIT

With nearly 50 percent of the construction workers projected to travel via auto, the bulk of the remaining half would travel to and from the project site via transit. During peak 2011 construction, this distribution would represent approximately 320 workers traveling by subway or bus. With 80 percent of these workers arriving or departing during the peak commuting hours (6–7 AM arrival, 3–4 PM departure and 5–6 PM extended-shift departure), the total estimated number of peak hour transit trips would be fewer than 250. Similarly, during peak 2021 and 2031 construction, approximately 215 workers would travel via transit, resulting in 173 peak hour transit trips during the morning analysis peak hour. Distributed among the various subway and bus routes, station entrances, and bus stops near the project site, no single transit element is expected to experience an increase of more than 200 transit riders, the recommended CEQR threshold for a detailed quantified analysis. Hence, there would not be a potential for significant adverse transit impacts attributable to the projected construction worker transit trips.

While there would likely be a temporary relocation of the M11 bus stop at Columbus Avenue and West 60th Street, adequate access to transit service would be maintained through coordination with NYCDOT and NYCT.

PEDESTRIANS

For the same reasons provided for transit operations, above, a detailed pedestrian analysis would not be warranted to address the projected demand from the travel of construction workers to and from the project site. Considering that these pedestrian trips would occur primarily outside of peak hours and be distributed among numerous sidewalks and crosswalks in the area, there would not be a potential for significant adverse pedestrian impacts attributable to the projected construction worker pedestrian trips.

During construction, where sidewalk closures are required, adequate protection or temporary sidewalks would be provided in accordance with NYCDOT requirements.

AIR QUALITY

Construction activities have the potential to impact air quality as a consequence of emissions from on-site construction engines as well as emissions from on-road construction-related vehicles and their effects on traffic congestion. The analysis of potential impacts on air quality from the construction of the proposed action includes a quantitative analysis of both on-site and on-road sources of air emissions, and the overall combined impact of both sources where applicable. Appendix C.2 provides additional supportive data.

As discussed in Section B, "Methodology," the comparison to determine impacts is to Existing Conditions and not to No Action conditions where three buildings would be constructed as-of-right. Therefore, the conclusions are conservative because a private developer would not be bound by the commitments that Fordham University would make to prevent and reduce potential significant adverse air quality impacts.

In general, much of the heavy equipment used in construction has diesel-powered engines and produces relatively high levels of nitrogen oxides and particulate matter. Gasoline engines produce relatively high levels of carbon monoxide. Construction activities also generate fugitive dust emissions. In addition, increased traffic from construction related vehicles traveling to and from the project site could affect mobile source-related emissions at nearby intersections. As a result, the air pollutants analyzed for the construction activities include nitrogen dioxide (NO_2), particulate matter with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}), particulate matter with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$), and carbon monoxide (CO).

As stated above, construction activity in general and large-scale construction in particular, has the potential to adversely affect air quality as a result of diesel emissions. The main component of diesel exhaust that has been identified as having an adverse effect on human health is fine particulates. To ensure that the construction of the Fordham University Master Plan results in the lowest feasible diesel particulate matter (DPM) emissions, an emissions reduction program for all construction activities at the Lincoln Center Campus would be implemented and would consist of the following components:

1. *Diesel Equipment Reduction*. The construction of the Fordham University development sites would minimize the use of diesel engines and use electric engines operating on grid power instead, to the extent practicable. To that end, Fordham University has contacted Con Edison to seek the early connection of grid power to the sites by the start of construction. Construction contracts would specify the use of electric engines and ensure the distribution of power connections as needed and subject to availability. Equipment that would use grid power instead of diesel engines would include, but not be limited to, welders, water pumps, bench saws, table saws, and material/personnel hoists. Other items of equipment could be electric powered where available and practicable. The use of grid power for electrically driven equipment would also eliminate generators that would normally be needed for construction equipment with electric engines.
2. *Clean Fuel*. Ultra-low sulfur diesel fuel (ULSD) would be used exclusively for all diesel engines throughout the Fordham University development sites. This would enable the use of tailpipe reduction technologies (see below) and would directly reduce DPM and sulfur oxides (SO_x) emissions.
3. *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, such as concrete mixing and pumping trucks) would utilize the best available tailpipe 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. The construction contracts would specify that all diesel nonroad engines rated at 50 hp or greater would utilize DPFs, either original equipment manufacturer (OEM) or

retrofit technology that would result in emission reductions of DPM of at least 90 percent (when compared with normal private construction practices). Ninety percent reduction has been verified by a study of actual reductions of $_{PM2.5}$ emissions from comparable engines used at a New York City construction site. Controls may include active DPFs,[1] if necessary.

4. *Utilization of Tier 2 or Newer Equipment.* In addition to the tailpipe controls commitments, the construction program would mandate the use of Tier 2[2] or later construction equipment for nonroad diesel engines greater than 50 hp. The use of "newer" engines, especially Tier 2, is expected to reduce the likelihood of DPF plugging due to soot loading (i.e., clogging of DPF filters by accumulating particulate matter); the more recent the "Tier," the cleaner the engine for all criteria pollutants, including PM. Additionally, while all engines undergo some deterioration over time, "newer" as well as better maintained engines will emit less PM than their older Tier or unregulated counterparts. Therefore, restricting site access to equipment with lower engine-out PM emission values would enhance this emissions reduction program and implementation of DPF systems as well as reduce maintenance frequency due to soot loading (i.e., less downtime for construction equipment to replace clogged DPF filters).

In addition, in order to reduce the resulting concentration increments at residential and school locations, large emissions sources and activities, such as concrete trucks and pumps, would be located away from residential buildings and playgrounds, to the extent practicable. Fugitive dust control plans will 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 large construction sites. Trucks entering and leaving the site with excavated or other materials would be covered. 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 resuspension of dust. In addition to regular cleaning by the City, area roads would be cleaned as frequently as needed. The fugitive emissions reduction program would reduce $PM_{2.5}$ emissions by 50 percent for stockpiles and handling of excavated materials.

Additional measures would be taken to reduce pollutant emissions during construction of the proposed action in accordance with all applicable laws, regulations, and building codes. These include the restriction of on-site vehicle idle time to three minutes for all vehicles that are not using the engine to operate a loading, unloading, or processing device (e.g., concrete mixing

---

[1] 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).

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

trucks). Overall, this program is expected to reduce DPM emissions more than the measures required by New York City Local Law 77 alone.

AIR QUALITY ANALYSIS METHODOLOGIES

The following sections delineate additional details relevant only to the construction air quality analysis methodology. For a review of the applicable regulations, standards and criteria, and benchmarks for stationary and mobile source air quality analyses refer to Chapter 17, "Air Quality."

Stationary Sources

A stationary source air quality analysis was conducted to evaluate potential construction impacts at the project site. Construction at the site would include a number of activities, such as excavating, materials handling, concrete pouring, and erecting of the proposed buildings. Air emission sources include exhausts on fuel burning equipment, fugitive dust from excavation/transfer activities, and road dust. The analysis was performed following EPA and *CEQR Technical Manual* suggested procedures and analytical tools, as further discussed below, to determine source emission rates. The estimated emission rates were then used as input to an air quality dispersion model to determine the potential impacts.

Construction Activity Assessment

Overall, construction of the proposed Master Plan is expected to occur over a period of many years. To determine which construction periods constitute the worst-case periods for the pollutants of concern, construction-related emissions were calculated throughout the duration of construction on an annual and peak-day basis for $PM_{2.5}$. $PM_{2.5}$ was selected as the worst-case pollutant, because as compared to other pollutants, $PM_{2.5}$ has the highest ratio of emissions to impact criteria. Therefore, $PM_{2.5}$ was used for determining the worst-case periods for analysis of all pollutants. Generally, emission patterns of other pollutants would follow $PM_{2.5}$ emissions, since most pollutant emissions are proportional to diesel engines by horse power. CO emissions may have a somewhat different pattern, but generally would also be highest during periods when the most activity would occur. Based on the resulting multi-year profiles of annual average and peak day average emissions of $PM_{2.5}$, a worst-case year and a worst-case short-term period were identified for the modeling of annual and short-term (i.e., 24-hour and 8-hour) averaging periods. Dispersion of the relevant air pollutants from the site during the worst-case periods was quantified using computer models, and the highest resulting concentrations are presented in the sections discussing air quality impacts. Broader conclusions regarding potential concentrations during other construction periods, which were not modeled explicitly, are discussed as well, based on the multi-year emissions profiles and the worst-case period results.

Construction Data

The construction analyses used an emission estimation method and a modeling approach that has been previously used for evaluating air quality impacts of construction projects in New York City. Because the level of construction activities would vary from month to month, the approach includes a determination of worst-case emission periods based on an estimated monthly construction work schedule, the number of each equipment type, and rated horsepower of each unit. In addition, the concentrating of emission sources and the distances between sources and receptors, were considered in selecting a worst case scenario because of the shifting locations of construction activities throughout the campus and over time. As such, the worst-case short-term emissions (e.g., maximum daily emissions) were found to occur in 2009, and the maximum annual (based on a 12 month rolling average) emissions were found to occur during the time period when Sites 4 and 5 would be under construction. A typical operating schedule of 7:00 AM to 6:00 PM. (one 8-hour shift per day plus a 3-hour extended shift) was used for the analysis. The annual period assumes extended shifts occur every other day.

In addition to the annual peak emissions period discussed above, a secondary annual period was also examined for a 12-month period occurring in the years 2016 and 2017 for $PM_{2.5}$. This was done in consideration of how site-wide emissions at Site 2 were concentrated on a per unit area basis and the duration of ground level construction activities. $PM_{2.5}$ was the only pollutant analyzed for this annual period because of its potential to exceed the interim guidance threshold.

In addition to the short-term peak emissions period discussed above, a secondary short-term period was also examined in the year 2025. This was done in consideration of construction activities at Site 7 with its close proximity to The Alfred during Phase II of the project.

The specific construction information used to calculate emissions generated from the construction process includes, but is not limited to, the following:

- The number of units and fuel-type of construction equipment to be used;
- Rated horsepower for each piece of equipment;
- Hours of operation on-site;
- Excavation and processing rates;
- Average speed of dump trucks; and
- Average distance traveled on-site by dump trucks.

Engine Exhaust Emissions. The sizes, the types, and the number of construction equipment were based on the construction activities schedule. Emission factors for NO_X, PM_{10}, $PM_{2.5}$, and CO from the combustion of ultra-low sulfur diesel (ULSD) fuel for on-site construction equipment were developed using the latest United State Environmental Protection Agency (EPA) NONROAD Emission Model (Version 2005a). The model is based on source inventory data accumulated for specific categories of off-road equipment. The emission factors for each type of equipment were calculated from the output files for the NONROAD model (i.e., calculated from regional emissions estimates). However, these emission factors were not applied to trucks. Emission rates from combustion of fuel for on-site dump trucks, concrete trucks, and other heavy trucks were developed using the EPA MOBILE6.2 Emission Model. New York City restrictions placed on idling times were employed for the dump trucks and other heavy trucks. For analysis purposes, it was assumed that the concrete trucks would operate continuously. Detailed examples of the peak hour engine exhaust emission rate calculations for the analysis are included in Appendix C.2. Short-term and annual emission rates were adjusted from the peak hour emissions by applying usage factors for each equipment unit. Usage factors were determined using the construction equipment schedule.

The air quality analysis also took into account the application of available pollutant control technologies committed to by Fordham University. DEP recently undertook an evaluation of diesel-fueled equipment utilized for construction projects, and has made a determination that all equipment greater than 50 hp would likely be able to implement DPFs. Estimated PM emission rates for non-road equipment were therefore reduced to account for this add-on control technology for the Fordham project. The control efficiency assumed for the DPFs is 90 percent.

Fugitive Emission Sources. Road dust emissions from vehicle travel were calculated using equations from EPA's AP-42, Section 13.2.2 for unpaved roads. PM_{10} emissions were estimated for dump trucks traveling in and out of the excavation area. Average vehicle weights (i.e., unloaded going in and loaded going out) were used in the analysis and a reasonably conservative round trip distance was estimated for on-site travel. In addition, the contractor would be required to implement a dust control plan. For example, stabilized truck exit areas would be established for washing off the wheels of all trucks that exit the large construction sites. Trucks entering and leaving the site with excavated or other materials would be covered. 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 resuspension of dust. In addition to regular cleaning by the City, area roads would be cleaned as frequently as needed. These control measures would provide at least a 50 percent reduction in PM_{10} emission. Also, since on-site travel speeds would be restricted to 5 miles per hour, on-site travel for trucks would not be a significant contributor to $PM_{2.5}$ fugitive emissions.

Particulate matter emissions could also be generated by material handling activities (i.e., loading/drop operations for excavated soil and rock). Estimates of PM_{10} and $PM_{2.5}$ emissions from these activities were developed using EPA's AP-42 Sections 13.2.4. Excavation rates used for the analysis were based on information provided by the construction manager. Detailed examples of fugitive dust emission rate calculations used for the analysis are presented in Appendix C.2.

Dispersion Modeling

Potential impacts from on-site construction equipment were evaluated using the EPA/AMS AERMOD dispersion model (version 07026), which became the EPA and NYSDEC preferred model on December 9, 2006. The AERMOD model was designed as a replacement to the EPA Industrial Source Complex (ISC3) model and is applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions. The AERMOD model calculates pollutant concentrations based on hourly meteorological data.

Source Simulation. During construction, various types of construction equipment would be used at different locations throughout the site. Some of the equipment is mobile and would operate throughout the site while some would remain stationary on-site at distinct locations during short-term periods (i.e., daily and hourly). Stationary emission sources include (but are not limited to) air compressors, cranes, drill rigs, and reinforcing bar benders. These sources were considered to be point sources and were placed at fixed locations in the modeling analysis. The input data for point sources included stack heights that were equivalent to the height of engine exhaust points or tailpipes and an exhaust temperature of 250° Celsius (a temperature within the normal operating range of most diesel engines). Based on estimated fuel consumption rates per 100 hp and potential pressure drops with diesel particulate filters on the exhaust, a stack velocity of 17.2 feet per second (or 5.24 meters per second) per 100 hp was used for each exhaust point along with a diameter of six inches (or 0.1524 meters).

Equipment such as excavators, backhoes, concrete trowels, compactors and dump trucks would operate throughout the site. In the short-term periods, these sources were simulated as area sources for the purpose of the modeling analysis, and their emissions were distributed evenly across the construction site. In the modeled annual period all sources were simulated as area source emissions.

Receptor Locations. AERMOD was used to predict maximum pollutant concentrations at nearby locations of likely public exposure ("receptors"). Discrete receptors were placed along sidewalks and residential buildings and other general public uses such as parks and open space. Sidewalk receptors were placed at the middle of the sidewalk and spaced 25 feet apart with a height of 1.8 meters. Fence line receptors were also placed along the boundary between the work site and adjacent open space. Residential receptors were placed at the nearest windows facing the construction site. These residential receptors were located at ground level and elevated portions of the building façade. For The Alfred, the elevated receptors were placed on the façade at every three meters to simulate the floor levels.

Meteorological Data. The meteorological data set consisted of the latest five years of data that are available: surface data collected at LaGuardia Airport (2002-2006) and upper air data collected at Brookhaven, New York (2002-2006).

Background Concentrations. Where needed to determine potential air quality impacts from the construction of the project, background ambient air quality data for criteria pollutants were added to the predicted off-site concentrations. The background data was obtained from nearby NYSDEC monitoring stations that best represented the area surrounding the site for the monitoring years 2002 through 2006. These background concentrations are provided below in Table 19-9. Short-term concentrations (i.e., 24- and 8-hour averages) represent the second highest concentration of the five year data set and annual concentrations represent the maximum value of the five year data set. For $PM_{2.5}$, background concentrations are not considered, since impacts are determined on an incremental basis only.

Table 19-9
Background Pollutant Concentrations

Pollutant	Monitoring Station	Averaging Period	Background Concentration (μg/m³)	Ambient Standard (μg/m³)
NO_2	PS 59	Annual	71.5	100
CO	PS 59	1-hr	4,581	40,000
		8-hr	2,863	10,000
PM_{10}	PS 59	24-hr	60	150

Source: NYSDEC Annual New York State Air Quality Report, July 2007.

Mobile Sources

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

The mobile source analyses for the project employ models approved by EPA and that have been widely used for evaluating air quality impacts of projects in New York City, other parts of New

York State, and throughout the country. The modeling approach includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels resulting in a conservatively high estimate of anticipated CO concentrations that could ensue from mobile sources associated with the proposed action.

The following sections provide an overview of the analytical tools used to determine mobile source impacts.

Dispersion Model for Microscale Analyses

Maximum CO concentrations adjacent to streets near the project site, resulting from vehicle emissions, were predicted using the CAL3QHC model Version 2.0 (last updated on August 31, 2004). The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC predicts emissions and dispersion of CO from idling and moving vehicles. The queuing algorithm includes site–specific traffic parameters, such as signal timing and delay calculations (from the 2000 Highway Capacity Manual traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to accurately predict the number of idling vehicles. The CAL3QHC model has been updated with an extended module, CAL3QHCR, which allows for the incorporation of hourly meteorological data into the modeling, instead of worst-case assumptions regarding meteorological parameters. This refined version of the model, CAL3QHCR, is employed if maximum predicted future CO concentrations are greater than the applicable ambient air quality standards or when *de minimis* thresholds are exceeded using the first level of CAL3QHC modeling.

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

Analysis Year. An air quality analysis was performed for the year 2011, the worst case analysis year for traffic (i.e., project increments). The future analysis was performed for both the future without the proposed action and with the proposed action.

Vehicle Emissions Data

Engine Emissions. Vehicular CO engine emission factors were computed using the EPA mobile source emissions model, MOBILE6.2 (last updated in October 2002). This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. Idle emission factors were used when vehicles were queuing and free flow emission factors were based on vehicle travel speeds when traffic was moving. The inputs and use of MOBILE6.2 for this project is consistent with the most current guidance available from NYSDEC and DEP.

Vehicle classification data were based on field studies outlined in the traffic section (including project generated traffic). Appropriate credits were used to accurately reflect the inspection and maintenance program. The inspection and maintenance programs require inspections of automobiles and light trucks to determine if pollutant emissions from the vehicles exhaust systems are below emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State. All construction-worker generated vehicles were simulated as hot stabilized for arrivals and cold starts for departures. An ambient temperature of 50.0° Fahrenheit (F) was used for the analysis.

Traffic Data

Traffic data for the air quality analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the proposed action (see "Traffic and Parking," above) for the peak traffic year of 2011. Traffic data for the future with and without the proposed action were employed in the respective air quality modeling scenarios. Weekday AM (6:00 to 7:00 AM) and PM (3:00 to 4:00 PM) peak hour periods were used for microscale CO analysis. These time periods were selected because they produce the maximum anticipated project-generated traffic and therefore have the greatest potential for significant air quality impacts.

Background Concentrations

Background concentrations for mobile sources are those pollutant concentrations not accounted for through the modeling analysis, which directly accounts for vehicle-generated emissions on the streets within 1,000 feet and line-of-sight of the receptor location. Background concentrations must be added to mobile source modeling results to obtain total pollutant concentrations at a study location.

The 8-hour average background CO concentration used in this analysis was 2.5 parts per million (ppm) for the 2011 predictions. This value is representative for the mobile source receptor locations in the future year. For $PM_{2.5}$, background concentrations are not considered, since impacts are determined on an incremental basis only.

Mobile Source Analysis Sites

The intersection of Amsterdam Avenue and West 60th Street was used in the analysis for the assessment of CO impacts (see Table 19-10). This intersection was selected because it is where the largest levels of project–generated (incremental) traffic in the project study area are expected, and, therefore, where the greatest air quality impacts and maximum changes in concentrations would be anticipated.

Table 19-10
Mobile Source Analysis Intersection Locations

Analysis Site	Location
1	Amsterdam Avenue and West 60th Street

The intersection of Amsterdam Avenue and West 62nd Street was also analyzed for the purpose of assessing the combined, year 2009 impacts, of on-street mobile sources and construction activities at Sites 4 and 5 (Sites 4 and 5 are closest to Amsterdam Avenue and West 62nd Street). In this analysis, year 2009 mobile source emission factors were used to determine CO emission rates. Traffic volumes used for this analysis were from the year 2011 traffic data (2009 volumes were not quantified; however, the use of 2011 volumes is a conservative assumption).

Receptor Locations. Multiple receptors (i.e., precise locations at which concentrations are predicted by the model) were modeled along the approach and departure links of the selected intersection at spaced intervals. The receptor locations included sidewalks and roadside locations near intersections with continuous public access.

EXISTING CONDITIONS

A review of the existing monitored air quality conditions can be found in Chapter 17, "Air Quality".

THE FUTURE WITHOUT THE PROPOSED ACTION (2011)

Stationary Construction Source Impacts

In the future without the proposed action, air quality is anticipated to be similar to that described for existing conditions. Land uses are expected to remain generally the same in this neighborhood in midtown Manhattan. Since air quality regulations mandated by the Clean Air Act are anticipated to maintain or improve air quality in the region, it can be expected that air quality conditions in the future without the proposed action would be no worse than those that presently exist.

Mobile Source Impacts

CO concentrations without the proposed actions were determined for the 2011 analysis year using the methodology previously described. Table 19-11 shows the future maximum predicted 8-hour average CO concentration without the proposed actions (i.e., 2011 No Build values) at the analysis intersection in the project study area. The values shown are the highest predicted concentrations for the receptor locations at the intersection. As indicated in Table 19-11, the predicted 8-hour concentrations of CO, including background, are below the corresponding ambient air quality standard.

Table 19-11
No Build (2011) Maximum Predicted 8-Hour Carbon Monoxide Concentrations (parts per million)

Site	Location	Time Period	No Build 8-Hour Concentration (ppm)
1	Amsterdam Avenue and West 60th Street	Weekday AM	3.1
		Weekday PM	3.7

Notes:
8-hour CO standard is 9 ppm.
An adjusted ambient background concentration of 2.5 ppm is included in the no build values presented above.

PROBABLE IMPACTS OF THE PROPOSED ACTION (2011)

This section provides a summary of the projected air quality impacts from the construction activities of the proposed action. The most likely effects on local air quality during construction activities would result from:

- Engine emissions generated by on-site construction equipment, and trucks entering/leaving the site during construction;
- Fugitive dust emissions generated by soil excavation and other construction activities; and,
- Mobile source emissions generated by project-related construction trucks and worker vehicles traveling to and from the site on local roads.

An analysis of the potential for air quality impacts from on-site construction sources was performed using the methodology described above under "Stationary Sources." As discussed in the methodology, the peak periods (by stage of construction) from the $PM_{2.5}$ emissions profile were used to determine what time periods would be used for the short-term and annual impacts in the modeling analysis. These periods corresponded to one month late in 2009 for short-term analyses and 2009 for the annual analyses. An additional $PM_{2.5}$ analysis for the annual averaging period was also performed for the year 2016.

An analysis of the potential for air quality impacts from project induced traffic was also performed using the methodology described above under "Mobile Sources." The peak period used in this modeling analysis was the 2011 construction year.

The results of both stationary and mobile source modeling analyses are summarized below. As indicated, the modeling analyses demonstrated that no significant adverse impacts from construction sources are expected during the peak emission periods. Since the predicted concentrations were modeled for periods that represent the highest site-wide air emissions, the increments and total predicted concentrations during other stages of construction and at other locations are also not expected to have any significant adverse impacts.

Stationary Source Impacts

A dispersion modeling analysis was performed to estimate the maximum off-site pollutant concentrations associated with emissions produced by on-site construction activities at the project site. A reasonably worst case scenario was used to generate the site-wide emissions (see Methodologies). The modeling analysis was conducted using the AERMOD dispersion model and was performed in accordance with EPA and DEP guidance regarding the use of dispersion models for regulatory purposes. The predicted ambient concentrations of criteria pollutants have been used to demonstrate compliance with applicable air quality standards and DEP interim guidance values.

Table 19-12 presents the maximum predicted total concentration (including background) for several criteria pollutants due to the proposed construction activities at the Fordham Campus. The maximum concentrations from on-site construction sources were predicted at receptors near the project site. As indicated in Table 19-12 the maximum predicted total concentrations of NO_2, PM_{10} and CO would not result in any concentrations that exceed the NAAQS. This was true for all averaging periods, both short-term and annual, and for each pollutant modeled in the analysis using worst case emissions. Therefore, no significant adverse air quality impacts are predicted from the on-site construction sources due to these pollutants.

Table 19-12
Maximum Predicted Total Concentrations for Construction Activities

Pollutant	Averaging Period	Background Conc. (µg/m^3)	Predicted Increment (µg/m^3)	Total Max Predicted Conc. (µg/m^3)	Ambient Standard (µg/m^3)
NO_2	Annual	71.5	24.7	96.2	100
PM_{10}	24-hour	60	28.0	88.0	150
CO	1-hour	4,581	5,174	9,755	40,000
	8-hour	2,863	933	3,796	10,000

$PM_{2.5}$ Impacts

Introduction The air quality analysis was also performed to predict the concentrations of $PM_{2.5}$ from construction activities. Concentrations of $PM_{2.5}$ were modeled for the 24-hour averaging period (a measure of daily exposure) and the annual averaging period (a measure of long-term exposure). The 24-hour concentrations were modeled for two analysis periods; 2009 and 2025. The 2009 analysis was conducted because it was the peak emissions period. The 2025 analysis was performed because of the proximity of Site 7 to sensitive receptors (i.e., The Alfred).

The annual analyses were performed for the years 2009 and 2016. The year 2009 has the highest overall emissions. The year 2016 had less emissions than 2009 but a more concentrated level of emissions per unit area. Annual concentrations were modeled at both discrete locations and on a neighborhood-scale. The analysis periods for both short-term and annual studies included the greatest potential for impacts and therefore, the analysis is considered to be conservative. In all cases, the analysis periods included $PM_{2.5}$ emissions during site excavation (the excavation periods are the only time periods when elevated concentrations of $PM_{2.5}$ are expected to occur at off-site residential locations).

Short-term Analyses The maximum predicted 24-hour average (i.e., short term) $PM_{2.5}$ incremental concentration from the proposed construction activities was modeled for comparison with the DEP 24-hour average interim guidance criteria for a discrete receptor location. The 24-hour $PM_{2.5}$ construction impact assessment considered the potential frequency and extent of the predicted off-site $PM_{2.5}$ incremental impacts, especially at locations where 24-hour exposure could occur (a discussion of the DEP interim guidance criteria is presented in Chapter 17, “Air Quality”).

2009 A modeling analysis was conducted for the worst-case short-term period in 2009 when excavation activities take place at Sites 4 and 5 simultaneously. The maximum predicted 24 hour average $PM_{2.5}$ incremental concentration occurred at a fence-line receptor as expected. This value was equal to 3.75 $\mu g/m^3$ and is above the DEP interim guidance value of 2 $\mu g/m^3$ but below the DEP interim guidance value of 5 $\mu g/m^3$ (see a discussion of interim guidance values in Chapter 17 “Air Quality”). At sensitive receptor locations placed near the fence line (i.e., nearby sidewalks, the roof of the parking garage adjacent to The Alfred, nearby parks), the maximum predicted incremental concentrations range between 1.1 and 2.36 $\mu g/m^3$. At sensitive locations with a potential for 24-hour exposure such as the nearby residential receptors, the maximum predicted $PM_{2.5}$ incremental concentrations range between 0.7 and 1.82 $\mu g/m^3$. As indicated, all residential receptors (including residential receptors at The Alfred) would be below the current 24-hour interim guidance criteria of both 2 and 5 $\mu g/m^3$ for the maximum predicted value.

The maximum predicted concentration for sensitive locations was 2.36 $\mu g/m^3$. This occurred on The Alfred property and is based on a first floor receptor that corresponds to a non-residential section without the potential for 24 hour exposure, (the first and second floors in the building are service oriented except for the building superintendent’s apartment, which is located on the southeast part of the second floor). The maximum predicted $PM_{2.5}$ concentration of 2.36 $\mu g/m^3$ occurred at the northeast part of the first floor. The other predicted concentrations between 2.0 and 2.36 $\mu g/m^3$, only affect the northeast portion of the first and second floor of The Alfred.

The maximum frequency of predicted impacts (between 2.0 and 2.36 $\mu g/m^3$) on any single receptor would only be at most one occurrence for a single year (using five years of meteorological data, two out of five years showed no values greater than 2 ug/m^3). The maximum predicted concentrations are probably overstated because the model did not include the effects of the 16 foot high construction wall that would be between The Alfred and the source of the emissions. The modeling analysis may tend to overstate certain impacts because it is inherently conservative, modeling a worst case scenario with heavy equipment located nearest to The Alfred. In fact, over the course of the excavation, the equipment would not remain in the same proximity to The Alfred or could be distributed at different locations across the various sites that are under-going simultaneous development (reducing the likelihood of the single occurrence over 2 µg/m^3). Also, the excavation period for Site 4 would likely be eight and a half months or less, but the single occurrence referenced above is based on a full year of meteorological data (from a five-year database). If adjusted for the actual period of excavation, the single occurrence above 2 µg/m^3 would be even less likely. Overall, these factors would likely result in lower $PM_{2.5}$ concentrations, which would reduce the likelihood of the occurrences greater than the 2 µg/m^3 interim guidance threshold.

2025 During the modeled short term period in the year 2025 (Site 7), the maximum predicted 24-hour average $PM_{2.5}$ incremental concentration occurred at a fence-line receptor. This value was equal to 2.2 µg/m^3 and is above the DEP interim guidance value of 2 µg/m^3 but below the guidance value of 5 µg/m^3 (see a discussion of interim guidance values in Chapter 17, “Air Quality”). However, the highest value predicted for any Alfred House receptor (including residential floors of The Alfred) was 1.5 µg/m^3. This value is below the current 24-hour interim guidance criteria of both 2 and 5 µg/m^3 for $PM_{2.5}$.

In addition, the maximum predicted 24-hour concentrations are probably overstated because the model did not include the effects of the 16-foot-high construction wall that would be between The Alfred and the source of the emissions. The modeling analysis may tend to overstate certain impacts because it is inherently conservative, modeling a worst case scenario with heavy equipment located nearest to The Alfred. In fact, over the course of the excavation, the equipment would not remain in the same proximity to the Alfred. Overall, these factors would likely result in even lower $PM_{2.5}$ concentrations.

Other Periods The concentrations of $PM_{2.5}$ discussed above for periods in 2009 and 2025 are the result of specific meteorological conditions, and the predicted maximum concentrations would only occur during those metrological conditions and not at other times. However, as these maximum incremental impacts were computed based on periods with the highest emissions, it is expected that for other construction time periods with lesser emissions, the potential 24-hour incremental exposures would be less. For this reason, the $PM_{2.5}$ concentrations would be much less likely to exceed the interim guidance value of 2 µg/m^3 or in some cases, may not exceed the value at all. For example, the estimated peak daily emissions for the worst-case month in 2009 (employed in this analysis) are approximately 3 times the estimated emissions for the same month in 2010.

Annual Analysis Period In addition to the 24 hour average short term concentrations discussed above, an analysis was also performed to predict annually averaged $PM_{2.5}$ concentrations. These concentrations were modeled for comparison to the DEP annual average interim guidance values for discrete and neighborhood-scale receptors (see Chapter 17, “Air Quality”). The analysis periods included both 2009 (Sites 4 and 5) and 2016 (Site 2).

2009

The maximum predicted annual average $PM_{2.5}$ incremental concentration (for a discrete receptor location) occurred at a fence-line receptor and was equal to 0.46 µg/m^3. At sensitive receptor locations placed near the fence-line (i.e., sidewalks, open greens, nearby parks), the maximum predicted incremental concentrations range between 0.069 and 0.32 µg/m^3. Although some non-residential areas are above the DEP interim guidance value for discrete locations, it should be noted that construction periods would be temporary (with excavation periods less than one year). Additionally, the analysis is conservative, assuming that Sites 4 and 5 are excavated simultaneously.

At sensitive receptor locations with a potential for annual exposure such as nearby residential buildings, the maximum predicted $PM_{2.5}$ incremental concentrations were 0.20 µg/m^3 at The Alfred and 0.025 µg/m^3 for the residential buildings west of Amsterdam Avenue. Maximum predicted concentrations at these residential locations are less than the interim guidance threshold of 0.3 µg/m^3.

The maximum predicted annual $PM_{2.5}$ incremental concentration from the proposed construction activities was modeled for comparison with the DEP annual average neighborhood-scale interim guidance criterion of 0.1 µg/m^3. The annual average neighborhood-scale concentration increment from the construction activities was predicted to be 0.007 µg/m^3, which is less than the 0.1 µg/m^3 criterion.

2016 The maximum predicted annual average $PM_{2.5}$ incremental concentration (for a discrete receptor location) occurred at a fence-line receptor and was equal to 0.77 µg/m^3. At sensitive receptor locations placed near the fence-line (i.e., sidewalks, open greens, nearby parks), the maximum predicted incremental concentrations range between 0.29 and 0.36 µg/m^3. The concentration was 0.29 µg/m^3 at St Paul's Church south of West 60th Street. Although some non-residential areas are above the DEP interim guidance value for discrete locations, it should be noted that construction periods would be temporary (with excavation periods less than one year).

At sensitive receptor locations with a potential for annual exposure such as nearby residential buildings, the maximum predicted $PM_{2.5}$ incremental concentration was 0.23 µg/m^3 for the northwest portion of the residential housing east of Columbus Avenue (The Regent). This value is below the DEP interim guidance value of 0.3 ug/m^3.

The maximum predicted annual $PM_{2.5}$ incremental concentration from the proposed construction activities was modeled for comparison with the DEP annual average neighborhood-scale interim guidance criterion of 0.1 µg/m^3. The annual average neighborhood-scale concentration increment from the construction activities was predicted to be 0.01 µg/m^{3,} which is less than the 0.1 µg/m^3 criterion.

Conclusions

As stated in Chapter 17, "Air Quality", actions under CEQR that would increase $PM_{2.5}$ concentrations more than the DEP interim guidance criteria would be considered to have potential significant adverse impacts, depending upon the probability of occurrence, the projected duration of such impacts, the extent of the area and the potential number of people affected. While the dispersion model determined that the maximum predicted incremental concentrations of $PM_{2.5}$ (using a worst-case emissions scenario) exceed the applicable DEP interim guidance criteria at just a few non-residential discrete receptor locations, it should be noted that the likelihood of exposure is very low. First, the impacts do not occur at residential receptors where a full 24-hour or annual exposure might be expected. Second, the occurrences of elevated 24-hour average concentrations for $PM_{2.5}$ at non-residential receptors are very limited in duration and are only slightly above the interim guidance thresholds. Also, the worst case emission levels exist only during the excavation period of construction. The heavy equipment and construction activities that contribute to elevated $PM_{2.5}$ concentrations would be actively operated onsite for only a portion of the overall construction timeframe. Therefore, after taking into the account the temporary nature of construction and the limited timeframe of each site excavation (less than a year), the variability of $PM_{2.5}$ emissions over time (which are often considerably less than those used in the modeling analysis), the limited frequency of 24 hour impacts, and the limited area-wide extent of the 24 hour and annual discrete location impacts (the neighborhood scale analysis had $PM_{2.5}$ concentrations well below the DEP interim guidance criteria), it can be concluded that no significant adverse air quality impacts for $PM_{2.5}$ are expected from the on-site construction sources.

MOBILE SOURCE IMPACTS

A mobile source air quality analysis was conducted for the project during construction activities at the site for the peak construction traffic year, 2011. Localized pollutant impacts from the vehicles queuing at the selected intersection were analyzed for CO and were determined for the 8-hour averaging period.

CO concentrations with the proposed actions (build) were determined for the 2011 analysis year using the methodology previously described. Table 19-13 shows the future maximum predicted 8-hour average CO concentration with the proposed actions at the analysis intersection in the project study area.

Table 19-13
Build (2011) Maximum Predicted 8-Hour Carbon Monoxide Concentrations (parts per million)

Site	Location	Time Period	Project Build 8-Hour Concentration (ppm)	Not-To-Exceed *De minimis* Criteria (ppm)
1	Amsterdam Avenue and West 60th Street	Weekday AM	3.1	6.1
		Weekday PM	3.7	6.3

Notes:
8-hour CO standard is 9 ppm.
Adjusted ambient background concentration of 2.5 ppm is included in project build values presented above.

The values shown are the highest predicted concentrations for the time period analyzed. Also shown in the table is a Not-to-Exceed value based on the *de minimis* criteria used to determine the significance of the incremental increase in CO concentrations that would result from the proposed action. The *de minimis* criteria are derived using procedures outlined in the *CEQR Technical Manual* (2001) that set a minimum allowable change in 8-hour average CO concentrations due to a proposed action (i.e., the No Action concentration plus half the difference between No Action concentration and the 9.0 ppm standard).

The results in Table 19-12 indicate that in the future with the proposed actions, there would be no significant adverse mobile source air quality impacts (i.e., *de minimis* criteria were not exceeded). In addition, with or without the proposed actions in 2011, maximum predicted CO concentrations in the study area of the proposed actions would be less than the corresponding ambient air quality standards.

COMBINED STATIONARY AND MOBILE SOURCE IMPACTS

A mobile source analysis of CO impacts for the intersection of Amsterdam Avenue and West 62nd Street indicated that a maximum predicted concentration of 1.3 ppm could occur at receptors placed along the sidewalks adjacent to this intersection in the year 2009 (same time period as the quantified construction impacts described above). Modeled impacts from the stationary source construction activities included a maximum predicted fence-line CO concentration of 0.82 ppm. Background concentrations for the analysis are 2.5 ppm for CO. Total cumulative concentrations of CO for both mobile and stationary sources (including background) would then equal 4.62 ppm and would not exceed the applicable air quality standard of 9 ppm. Therefore, no significant adverse air quality impacts are expected to occur due to the combined impacts of mobile and construction sources.

NOISE

INTRODUCTION

Impacts on community noise levels during construction of Fordham University's proposed Master Plan can result from noise from construction equipment operation and from construction vehicles and delivery vehicles traveling to and from the 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 would vary widely, depending 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 impact equipment such as jackhammers, excavators with ram hoes, drill rigs, rock drills, impact wrenches, tower cranes and paving breakers, as well as the movements of trucks, and possible blasting.

As discussed in Section B, "Methodology," the comparison to determine impacts is to Existing Conditions and not to No Action conditions where three buildings would be constructed as-of-right. Therefore, the conclusions are conservative because a private developer would not be bound by the commitments that Fordham University would make to prevent and reduce potential significant adverse noise impacts.

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.

Given the scope and duration of construction activities for the proposed Master Plan, a quantified construction noise analysis was performed. The purpose of this analysis was to determine if it was likely that significant adverse noise impacts would occur during construction, and if so, to examine the feasibility of implementing mitigation measures to reduce or eliminate such impacts.

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 would occur for approximately two years or longer. In addition, the *CEQR Technical Manual* states that impact criteria for vehicular sources, using existing noise levels as the baseline, should be used for assessing construction impacts. See Chapter 18, "Noise," for an explanation of noise measurement and sound levels. The criteria are as follows:

- If the existing noise levels are less than 60 decibels, A-weighted equivalent sound level for one hour (dBA $L_{eq(1)}$) and the analysis period is not a nighttime period, the threshold for a significant impact would be an increase of at least 5 dBA $L_{eq(1)}$. For the 5 dBA threshold to be valid, the resulting proposed action condition noise level with the proposed action would have to be equal to or less than 65 dBA. If the existing noise level is equal to or greater than 62 dBA $L_{eq(1)}$, 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 dBA $L_{eq(1)}$. (If the existing noise level is 61 dBA $L_{eq(1)}$, the maximum incremental increase would be 4 dBA, since an increase higher than this would result in a noise level higher than the 65 dBA $L_{eq(1)}$ threshold.)

The impact criteria contained in the *CEQR Technical Manual* were used for assessing impacts from mobile and on-site construction activities.

NOISE ANALYSIS METHODOLOGY

Construction activities for the proposed Master Plan 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 surrounding roadways. The effect of each of these noise sources was evaluated. The results presented below show the effects of construction activities (i.e., noise due to both on-site construction equipment and construction-related vehicles operation) and the total cumulative impacts due to operational effects (caused by project-generated vehicular trips) and construction effects (as construction proceeds on uncompleted components of the project).

Noise from the operation of construction equipment on-site at a specific receptor location near a construction site is 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.)
- Vehicular speed;
- The distance between the roadway and the receptor;
- Topography and ground effects; and
- Shielding.

Construction Noise Modeling

Noise effects from construction activities were evaluated using the Cadna A model, a computerized model developed by DataKustik for noise prediction and assessment. The model can be used for the analysis of a wide variety of noise sources, including stationary sources (e.g., construction equipment, industrial equipment, power generation equipment, etc.), transportation sources (e.g., roads, highways, railroad lines, busways, airports, etc.), and other specialized sources (e.g., sporting facilities, etc.). The model takes into account the reference sound pressure levels of the noise sources at 50 feet, attenuation with distance, ground contours, reflections from barriers and structures, attenuation due to shielding, etc. The Cadna A model is based on the acoustic propagation standards promulgated in International Standard ISO 9613-2. This standard is currently under review for adoption by the American National Standards Institute as an American Standard. The Cadna A model is a state-of-the-art analysis for noise analysis.

Geographic input data used with the Cadna A model included CAD drawings that defined site work areas, adjacent building footprints and heights, locations of streets, and locations of sensitive receptors. For each analysis period, the geographic location and operational characteristics, including equipment usage rates (percentage of time equipment with full-horse power is used) for each piece of construction equipment operating at the project site, as well as noise control measures, were input to the model. In addition, reflections and shielding by barriers erected on the construction site, and shielding from both adjacent buildings and project buildings as they are constructed, were accounted for in the model. In addition, construction-related vehicles were assigned to the adjacent roadways. The model produced A-weighted $L_{eq(1)}$ noise levels at each receptor location, for each analysis period, which showed the noise level at each receptor location, as well as the contribution from each noise source.

Determination of Existing and Non-Construction Noise Levels

Existing and non-construction (i.e., operational) noise levels were calculated using the methodology discussed in Chapter 18. As discussed in that chapter, operational noise was calculated using proportional modeling or the TNM model (the Federal Highway Administration's [FHWA] *Traffic Noise Model* version 2.5) to calculate noise from traffic on adjacent and nearby streets and roadways.

Analysis Years

A screening analysis was performed to determine the years during the Phase 1 construction (i.e., between 2009 and 2014) and during the Phase 2 construction (i.e., between 2016 and 2032) when the maximum potential for significant noise impacts would occur. A construction schedule was prepared by a construction management firm employed by Fordham University, showing the number of workers, types and number of pieces of equipment, and number of construction vehicles anticipated to be operating during each month of the construction period. Based upon this screening analysis, on-site construction activities were estimated to produce maximum noise levels during the years 2009, 2010, 2011, 2012, and 2013 (for the Phase 1 construction), and during the years 2016, 2017, 2018, 2020, 2021, 2022, 2030, 2031, and 2032 (for the Phase 2 construction). To be conservative, the noise analysis assumed that both peak on-site construction activities and peak construction-related traffic conditions occurred simultaneously.

Noise Reduction Measures

The construction noise analysis for this project assumed a proactive approach during construction activities. This approach employs a wide variety of measures that exceeded standard construction practices, but the implementation of which was deemed feasible and practicable to minimize construction noise and reduce potential noise impacts. These measures will be described in the noise mitigation plan required as part of the New York City Noise Control Code. This program includes: source controls and path controls.

In terms of source controls (i.e., reducing noise levels at the source or during most sensitive time periods), the following measures for construction, which go beyond typical construction techniques, would be implemented:

- Equipment that meets the sound level standards specified in Subchapter 5 of the New York City Noise Control Code would be utilized from the start of construction activities, along with a wide range of equipment, including construction trucks, which produce lower noise levels than typical construction. Table 19-14 shows the noise levels for typical construction equipment and the mandated noise levels for the equipment that would be used for construction of the Master Plan.
- Where feasible and practicable, construction procedures that reduce noise levels and equipment (such as concrete trucks, delivery trucks, and trailers) that is quieter than that required by the New York City Noise Control Code would be used.
- As early in the construction period as practicable, 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).
- Where practicable and feasible, 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.
- Limit equipment on-site (only necessary equipment on-site).
- Contractors and subcontractors would be required to properly maintain their equipment and have quality mufflers installed.

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, which go beyond typical construction techniques, will be implemented to the extent feasible:

- Noisy equipment, such as cranes, concrete pumps, concrete trucks, and delivery trucks, would be located away from and shielded from sensitive receptor locations. For example, during the early construction phases of work, delivery and dump trucks, as well as many construction equipment operations, would be located and take place below grade to take advantage of shielding benefits. Once building foundations are completed, delivery trucks would operate behind noise barriers, where possible.

Table 19-14
Construction Equipment Noise Emission Levels (dBA)

Equipment List	DEP & FTA Typical Noise Level at 50 feet[1]	Mandated Noise Level at 50 feet[2]	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
Jack Hammer	85	82	72
Mortar Mixer	80	63	
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.

- Noise barriers would be utilized to provide shielding (e.g., the construction sites would have a minimum 8-foot barrier, with a 16-foot barrier adjacent to residential and other sensitive locations, and, where possible, truck deliveries would take place behind these barriers once building foundations are completed).
- Path noise control measures (i.e., portable noise barriers, panels, enclosures, and acoustical tents, where feasible) were used for certain dominant noise equipment, i.e., asphalt pavers, tower cranes, drill rigs, excavators with ram hoe, hoists, impact wrenches, jack hammers, power trowels, powder actuated devices, rivet busters, rock drills, concrete saws, and sledge

hammers. The details to construct portable noise barriers, enclosures, tents, etc. are based upon the instructions of DEP Citywide Construction Noise Mitigation[1]

- All trucking operations associated with construction activities for the construction Site 2 would take place on Columbus Avenue rather than on West 60th Street, and all trucking operations associated with construction activities for the construction Site 3 take place on Amsterdam Avenue rather than on West 60th Street.
- Acoustical curtains were assumed for internal construction activities at the construction Sites 2, 3, and 3a, to break the line-of-sight and provide acoustical shielding between noise sources and sensitive receptors.

Receptor Sites

Thirty-eight (38) receptor locations close to the project site were selected as discrete noise receptor sites for the construction noise analysis. These receptors are either located directly adjacent to the project sites or streets where construction trucks would be passing by. Each receptor site is the location of a residence or other noise sensitive use. At high-rise buildings, noise receptors were selected at multiple elevations. At open space locations, receptors were selected at street level. Figure 19-29 shows the location of the 38 noise receptor sites, and Table 19-15 lists the noise receptor sites and the associated land use at the receptor sites. The receptor sites selected for detailed analysis are representative of other noise receptors in the immediate project area, and are the locations where maximum project impacts due to construction noise would be expected.

Table 19-15
Construction Noise Receptor Locations

Receptor	Location	Associated Land Use
A,A1,A2, A3, A4	Alvin Ailey Place between Columbus and Amsterdam Avenues (The Alfred)	Residential
B,B1,B2,B3	20 Amsterdam Avenue between 60th and 61st Streets (PS 191)	School
BB	Amsterdam Avenue between 60th and 61st Streets	Residential
C,L,M,N,AA	Amsterdam Avenue between 61st and 64th Streets (Amsterdam Houses)	Residential
CC	Columbus Avenue between Lincoln Place and 64th Street (Dante Park)	Open Space
O	62nd Street between Amsterdam and Columbus Avenues (Damrosch Park)	Open Space
E	Columbus Avenue between 61st and 62nd Streets	Residential
F	West 60th Street between Columbus and Amsterdam Avenues	Residential
G, G1	Amsterdam Avenue between 59th and 60th Streets (John Jay College)	Institutional
H, I, I1	Amsterdam Avenue between 59th and 60th Streets	Residential
J	Amsterdam Avenue between 58th and 59th Streets	Institutional
K	Amsterdam Avenue between 57th and 58th Streets	Residential
D, P	62nd Street between Amsterdam and Columbus Avenues (Lincoln Center)	Institutional
Q	Columbus Avenue between 62nd and 63rd Streets	Residential
R	Columbus Avenue between 60th and 61st Streets	Residential
S	60th Street between Columbus and Amsterdam Avenues (St. Paul the Apostle R.C. Church)	Church
T,U	Columbus Avenue between 58th and 60th Street	Residential
V	59th Street between Columbus and Amsterdam Avenues	Residential
W	57th Street between Columbus Avenue and Broadway	Hotels
X	Broadway between Lincoln Place and 64th Street	Residential
Y	60th Street between Columbus Avenue and Broadway	Residential
Z	62nd Street between Columbus Avenue and Broadway	Residential

[1] Citywide Construction Noise Mitigation, Chapter 28, Department of Environmental Protection of New York City, 2007.

11.11.08

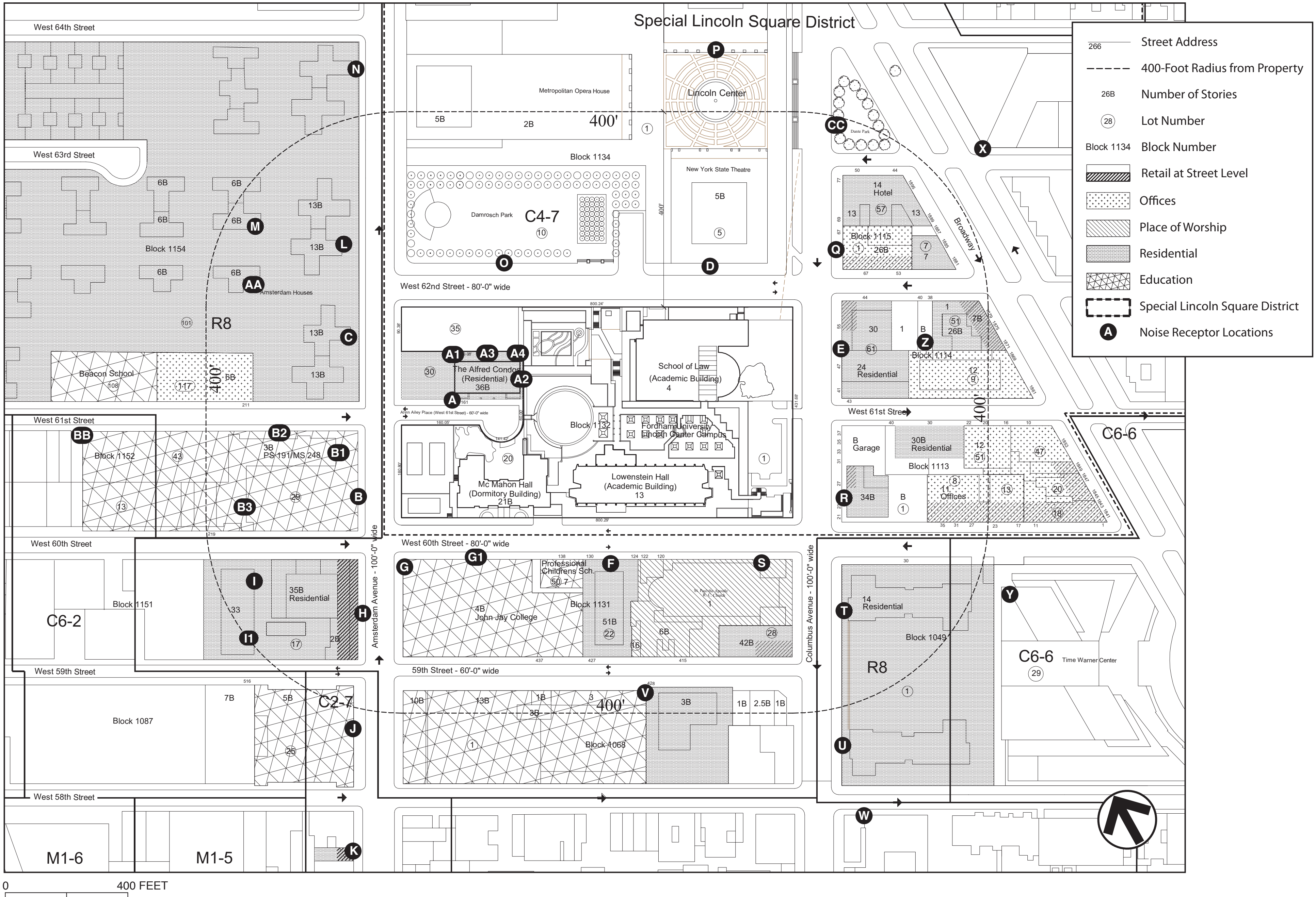


Figure 19-29
Noise Receptor Locations

FORDHAM LINCOLN CENTER

In addition to the 38 site-specific noise receptor sites, noise contours depicting the incremental noise due to construction activities (both on-site construction equipment operation and construction-related traffic) were developed for the area surrounding the project site and are presented in Appendix C.3.

CONSTRUCTION NOISE ANALYSIS RESULTS

Using the methodology described above, and considering the noise abatement measures for source and path controls specified above, noise analyses were performed to determine maximum one-hour equivalent ($L_{eq(1)}$) noise levels that would be expected to occur during each year of construction. Table 19-16$_{(a)\ (b)}$ and Table 19-17$_{(a)\ (b)\ (c)\ (d)}$ show the following for the construction Phase 1 and the construction Phase 2, respectively (see Appendix C.3 for the complete list of results for every floor analyzed):

- Existing noise levels;
- Maximum predicted total noise levels (i.e., cumulative noise levels), which are the sum of noise due to construction activities[1] and noise due to traffic on the adjacent street; and
- Maximum predicted increases in noise levels based upon comparing the total noise levels with existing noise levels.

Locations where noise levels exceed the CEQR impact criteria (i.e., increase by more than 3 dBA comparing the total noise level with existing noise level) are shown in bold. The noise analysis results show that maximum predicted noise levels would exceed the 3 dBA CEQR impact criteria during two or more consecutive years at receptor sites A, A1, A2, A3, A4, E, and R. The exceedance of the 3 dBA CEQR impact criteria would be due principally to noise generated by on-site construction activities.

Where exceedances of the 3 dBA CEQR impact criterion are predicted to occur on a building's upper locations, exceedances would also be expected to occur at other locations on the building that have a direct line-of-sight to one or more construction sites.

[1] The maximum predicted noise level due to construction activities alone includes the noise generated by on-site construction activities, assuming maximum construction activity during the analysis time period, and noise generated by construction vehicles traveling to and from the project site during the hour which generated the maximum number of construction vehicles.

Table 19-16(a)
Construction Noise Analysis Results for Phase 1 values in dBA

Noise Receptor	Receptor Height (in stories)	Existing dBA	2009		2010		2011		2012		2013	
			Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change
A	1	67.2	69.2	2.0	68.1	0.9	67.9	0.7	72.3	**5.1**	69.6	2.4
	5	66.4	73.8	**7.4**	69.8	**3.4**	67.6	1.2	75.6	**9.2**	74.4	**8.0**
	10	66.4	72.8	**6.4**	71.4	**5.0**	68.5	2.1	74.3	**7.9**	76.5	**10.1**
	35	66.4	69.2	2.8	68.9	2.5	69.3	2.9	69.9	**3.5**	70.7	**4.3**
A1	1	66.6	69.8	**3.2**	68.0	1.4	67.9	1.3	67.6	1.0	67.1	0.5
	5	65.9	78.6	**12.7**	68.7	2.8	68.5	2.6	66.7	0.8	66.4	0.5
	20	65.9	73.9	**8.0**	73.2	**7.3**	67.3	1.4	66.5	0.6	66.5	0.6
	35	66.0	70.9	**4.9**	70.4	**4.4**	67.3	1.3	66.5	0.5	66.5	0.5
A2	1	61.9	62.7	0.8	63.8	1.9	63.0	1.1	62.1	0.2	62.1	0.2
	5	61.7	71.7	**10.0**	65.8	**4.1**	64.0	2.3	62.1	0.4	62.1	0.4
	20	62.9	68.7	**5.8**	72.7	**9.8**	65.5	2.6	63.2	0.3	63.2	0.3
	35	63.4	66.5	**3.1**	68.7	**5.3**	65.2	1.8	63.7	0.3	63.6	0.2
A3	1	64.0	68.5	**4.5**	66.3	2.3	65.6	1.6	64.3	0.3	64.3	0.3
	5	63.7	77.5	**13.8**	68.1	**4.4**	66.5	2.8	63.9	0.2	63.9	0.2
	20	63.9	73.1	**9.2**	72.1	**8.2**	65.7	1.8	64.1	0.2	64.1	0.2
	35	64.2	70.2	**6.0**	69.9	**5.7**	65.7	1.5	64.5	0.3	64.4	0.2
A4	1	63.8	68.1	**4.3**	66.7	2.9	65.6	1.8	64.0	0.2	64.0	0.2
	3	63.3	77.6	**14.3**	68.1	**4.8**	66.5	**3.2**	63.5	0.2	63.6	0.3
	20	64.2	72.9	**8.7**	75.0	**10.8**	68.2	**4.0**	64.4	0.2	64.4	0.2
	35	64.4	70.2	**5.8**	70.8	**6.4**	66.7	2.3	64.6	0.2	64.6	0.2
B	At grade	71.5	72.1	0.6	72.4	0.9	72.5	1.0	72.4	0.9	72.9	1.4
B1	1	70.1	70.9	0.8	71.0	0.9	70.9	0.8	70.9	0.8	71.4	1.3
	3	63.4	63.7	0.3	64.7	1.3	65.0	1.6	64.6	1.2	65.9	2.5
C	1	71.6	73.3	1.7	72.2	0.6	72.2	0.6	72.3	0.7	72.5	0.9
	5	70.8	78.3	**7.5**	72.4	1.6	72.2	1.4	72.4	1.6	72.6	1.8
	10	70.7	77.6	**6.9**	73.0	2.3	71.6	0.9	73.0	2.3	72.8	2.1
D	At grade	67.1	68.3	1.2	67.8	0.7	68.0	0.9	67.3	0.2	67.3	0.2
E	1	72.0	72.2	0.2	72.3	0.3	72.3	0.3	72.4	0.4	72.5	0.5
	20	70.9	71.9	1.0	71.5	0.6	71.3	0.4	71.4	0.5	71.4	0.5
F	1	65.5	66.0	0.5	66.4	0.9	66.5	1.0	66.5	1.0	66.7	1.2
	50	65.1	66.6	1.5	67.5	2.4	66.9	1.8	66.4	1.3	66.6	1.5
G	1	71.3	71.9	0.6	75.1	**3.8**	72.6	1.3	72.3	1.0	72.7	1.4
	3	71.0	71.8	0.8	76.5	**5.5**	73.2	2.2	72.4	1.4	73.0	2.0
G1	1	66.0	66.5	0.5	68.7	2.7	67.5	1.5	67.1	1.1	67.6	1.6
	3	65.3	65.8	0.5	70.1	**4.8**	67.6	2.3	66.6	1.3	67.6	2.3

Table 19-16(a) (cont'd)
Construction Noise Analysis Results for Phase 1 values in dBA

Noise Receptor	Receptor Height (in stories)	Existing dBA	2009		2010		2011		2012		2013	
			Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change
H	1	71.6	71.9	0.3	72.0	0.4	72.0	0.4	72.0	0.4	72.1	0.5
	35	70.4	71.0	0.6	71.6	1.2	71.8	1.4	71.4	1.0	71.4	1.0
I	1	63.2	63.8	0.6	64.4	1.2	64.5	1.3	64.5	1.3	64.9	1.7
	15	64.0	66.5	2.5	68.1	**4.1**	66.5	2.5	66.8	2.8	67.0	**3.0**
	34	64.8	66.7	1.9	68.2	**3.4**	67.3	2.5	67.4	2.6	67.2	2.4
I1	1	64.4	64.5	0.1	64.5	0.1	64.6	0.2	64.6	0.2	64.6	0.2
	34	65.6	66.7	1.1	65.9	0.3	65.8	0.2	66.1	0.5	66.0	0.4
J	1	71.8	71.9	0.1	71.9	0.1	72.0	0.2	72.0	0.2	72.1	0.3
	5	70.8	71.0	0.2	71.0	0.2	71.1	0.3	71.2	0.4	71.2	0.4
K	1	72.0	72.2	0.2	72.2	0.2	72.2	0.2	72.3	0.3	72.3	0.3
	5	71.7	71.8	0.1	71.8	0.1	71.9	0.2	71.9	0.2	72.0	0.3
L	1	70.0	71.0	1.0	70.4	0.4	70.5	0.5	70.4	0.4	70.5	0.5
	10	68.9	72.8	**3.9**	70.6	1.7	70.6	1.7	70.1	1.2	70.0	1.1
M	1	62.0	62.2	0.2	62.2	0.2	62.2	0.2	62.3	0.3	62.2	0.2
	5	62.7	62.9	0.2	63.0	0.3	62.9	0.2	63.2	0.5	62.9	0.2

Note: Locations where predicted noise levels exceed the CEQR impact criteria are shown in bold.

Table 19-16(b)
Construction Noise Analysis Results for Phase 1 values in dBA

Noise Receptor	Receptor Height (in stories)	Existing dBA	2009		2010		2011		2012		2013	
			Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change
N	1	71.5	71.7	0.2	71.7	0.2	71.8	0.3	71.8	0.3	71.9	0.4
	10	70.8	71.3	0.5	71.2	0.4	71.2	0.4	71.1	0.3	71.1	0.3
O	At grade	65.3	68.8	**3.5**	67.4	2.1	68.4	**3.1**	65.6	0.3	65.6	0.3
P	At grade	64.9	65.1	0.2	65.2	0.3	65.2	0.3	65.1	0.2	65.1	0.2
Q	1	71.6	71.8	0.2	71.8	0.2	71.8	0.2	71.8	0.2	71.9	0.3
	25	70.4	71.4	1.0	70.9	0.5	71.1	0.7	70.7	0.3	70.7	0.3
R	1	72.4	72.6	0.2	72.7	0.3	72.7	0.3	72.8	0.4	72.9	0.5
	25	71.3	72.0	0.7	71.7	0.4	71.6	0.3	71.6	0.3	71.7	0.4
S	1	68.5	68.8	0.3	69.0	0.5	69.1	0.6	69.1	0.6	69.2	0.7
	3	68.0	68.3	0.3	68.6	0.6	68.6	0.6	68.6	0.6	68.7	0.7
T	1	72.8	72.9	0.1	73.0	0.2	73.0	0.2	73.0	0.2	73.1	0.3
	15	71.9	72.0	0.1	72.0	0.1	72.1	0.2	72.1	0.2	72.1	0.2
U	1	72.7	72.8	0.1	72.9	0.2	72.9	0.2	73.0	0.3	73.0	0.3
	15	71.7	71.8	0.1	71.9	0.2	71.9	0.2	72.0	0.3	72.0	0.3
V	5	63.1	63.1	0.0	63.4	0.3	63.3	0.2	63.2	0.1	63.2	0.1
	50	64.8	64.8	0.0	65.0	0.2	65.0	0.2	65.1	0.3	65.0	0.2
W	1	72.0	72.1	0.1	72.1	0.1	72.2	0.2	72.2	0.2	72.3	0.3
	20	71.5	71.6	0.1	71.7	0.2	71.7	0.2	71.8	0.3	71.8	0.3
X	1	73.4	73.4	0.0	73.5	0.1	73.5	0.1	73.6	0.2	73.6	0.2
	40	71.6	71.9	0.3	71.8	0.2	71.9	0.3	71.8	0.2	71.9	0.3
Y	1	65.3	65.4	0.1	65.5	0.2	65.5	0.2	65.6	0.3	65.6	0.3
	70	66.0	66.5	0.5	66.5	0.5	66.3	0.3	66.3	0.3	66.4	0.4
Z	1	63.6	63.6	0.0	63.6	0.0	63.6	0.0	63.6	0.0	63.6	0.0
	30	63.5	63.6	0.1	63.6	0.1	63.6	0.1	63.7	0.2	63.6	0.1
AA	1	62.3	64.0	1.7	63.1	0.8	63.2	0.9	62.6	0.3	62.5	0.2
	5	62.9	66.5	**3.6**	64.4	1.5	64.8	1.9	63.4	0.5	63.1	0.2
BB	1	63.4	63.0	-0.4	62.8	-0.6	62.8	-0.6	62.6	-0.8	62.5	-0.9
CC	At grade	73.8	73.9	0.1	74.0	0.2	74.0	0.2	74.1	0.3	74.1	0.3

Note: Locations where predicted noise levels exceed the CEQR impact criteria are shown in bold.

Table 19-17(a)
Construction Noise Analysis Results for Phase 2 values in dBA

Noise Receptor	Receptor Height (in stories)	Existing dBA	2016 Total Leq(1)	2016 Change	2017 Total Leq(1)	2017 Change	2018 Total Leq(1)	2018 Change	2020 Total Leq(1)	2020 Change	2021 Total Leq(1)	2021 Change
A	1	67.2	67.9	0.7	67.7	0.5	67.7	0.5	67.7	0.5	67.8	0.6
	35	66.4	67.5	1.1	67.3	0.9	67.0	0.6	67.0	0.6	67.0	0.6
A1	1	66.6	67.1	0.5	67.1	0.5	67.1	0.5	67.1	0.5	67.2	0.6
	35	66.0	66.3	0.3	66.4	0.4	66.4	0.4	66.8	0.8	66.8	0.8
A2	1	61.9	63.5	1.6	62.3	0.4	62.0	0.1	62.2	0.3	62.5	0.6
	10	62.2	66.1	**3.9**	63.1	0.9	62.4	0.2	62.6	0.4	63.4	1.2
	35	63.4	65.3	1.9	64.9	1.5	63.7	0.3	65.3	1.9	64.7	1.3
A3	1	64.0	64.3	0.3	64.3	0.3	64.3	0.3	64.3	0.3	64.3	0.3
	35	64.2	64.4	0.2	64.5	0.3	64.5	0.3	64.9	0.7	64.6	0.4
A4	1	63.8	64.0	0.2	64.0	0.2	64.0	0.2	64.1	0.3	64.1	0.3
	35	64.4	65.2	0.8	65.1	0.7	64.6	0.2	65.8	1.4	65.5	1.1
B	At Grade	71.5	72.4	0.9	72.4	0.9	72.4	0.9	72.5	1.0	72.5	1.0
B1	1	70.1	70.7	0.6	70.8	0.7	70.8	0.7	70.8	0.7	70.8	0.7
	3	63.4	64.2	0.8	64.2	0.8	64.2	0.8	64.2	0.8	64.2	0.8
C	1	71.6	72.1	0.5	72.1	0.5	72.1	0.5	72.2	0.6	72.2	0.6
	10	70.7	71.2	0.5	71.2	0.5	71.2	0.5	71.3	0.6	71.3	0.6
D	At grade	67.1	67.4	0.3	67.6	0.5	67.5	0.4	69.8	2.7	68.1	1.0
E	1	72.0	73.0	1.0	72.8	0.8	72.8	0.8	73.0	1.0	73.4	1.4
	10	71.0	74.0	**3.0**	72.9	1.9	72.9	1.9	76.1	**5.1**	75.4	**4.4**
	15	71.0	73.7	2.7	73.0	2.0	73.1	2.1	75.2	**4.2**	75.6	**4.6**
	20	70.9	73.5	2.6	72.9	2.0	72.9	2.0	74.4	**3.5**	75.2	**4.3**
F	1	65.5	67.2	1.7	66.8	1.3	66.7	1.2	66.6	1.1	66.7	1.2
	15	64.9	68.2	**3.3**	66.9	2.0	66.3	1.4	66.0	1.1	66.0	1.1
	50	65.1	67.7	2.6	68.1	**3.0**	66.8	1.7	67.2	2.1	67.0	1.9
G	1	71.3	72.4	1.1	72.4	1.1	72.4	1.1	72.5	1.2	72.5	1.2
	3	71.0	72.1	1.1	72.2	1.2	72.1	1.1	72.2	1.2	72.2	1.2
G1	1	66.0	67.3	1.3	67.3	1.3	67.2	1.2	67.2	1.2	67.2	1.2
	3	65.3	66.8	1.5	66.7	1.4	66.6	1.3	66.5	1.2	66.5	1.2
H	1	71.6	72.0	0.4	72.1	0.5	72.1	0.5	72.1	0.5	72.1	0.5
	35	70.4	70.9	0.5	70.9	0.5	70.9	0.5	70.9	0.5	71.0	0.6
I	1	63.2	64.6	1.4	64.6	1.4	64.6	1.4	64.6	1.4	64.6	1.4
	34	64.8	65.9	1.1	66.1	1.3	65.9	1.1	65.9	1.1	65.9	1.1
I1	1	64.4	64.6	0.2	64.7	0.3	64.7	0.3	64.7	0.3	64.7	0.3
	34	65.6	65.9	0.3	66.0	0.4	65.9	0.3	66.0	0.4	66.0	0.4

Table 19-17(a) (cont'd)
Construction Noise Analysis Results for Phase 2 values in dBA

Noise Receptor	Receptor Height (in stories)	Existing dBA	2016		2017		2018		2020		2021	
			Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change
J	1	71.8	72.1	0.3	72.1	0.3	72.2	0.4	72.2	0.4	72.2	0.4
	5	70.8	71.2	0.4	71.2	0.4	71.2	0.4	71.2	0.4	71.3	0.5
K	1	72.0	72.4	0.4	72.4	0.4	72.4	0.4	72.5	0.5	72.5	0.5
	5	71.7	72.0	0.3	72.0	0.3	72.1	0.4	72.1	0.4	72.1	0.4
L	1	70.0	70.4	0.4	70.4	0.4	70.4	0.4	70.4	0.4	70.5	0.5
	10	68.9	69.3	0.4	69.4	0.5	69.4	0.5	69.5	0.6	69.5	0.6
M	1	62.0	62.2	0.2	62.2	0.2	62.2	0.2	62.2	0.2	62.2	0.2
	5	62.7	62.9	0.2	62.9	0.2	62.9	0.2	62.9	0.2	62.9	0.2

Note: Locations where predicted noise levels exceed the CEQR impact criteria are shown in bold.

Table 19-17(b)
Construction Noise Analysis Results for Phase 2 values in dBA

Noise Receptor	Receptor Height (in stories)	Existing dBA	2016		2017		2018		2020		2021	
			Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change
N	1	71.5	71.9	0.4	71.9	0.4	71.9	0.4	72.0	0.5	72.0	0.5
	10	70.8	71.1	0.3	71.1	0.3	71.1	0.3	71.2	0.4	71.2	0.4
O	At grade	65.3	65.7	0.4	65.7	0.4	65.7	0.4	65.9	0.6	66.0	0.7
P	At grade	64.9	65.2	0.3	65.3	0.4	65.2	0.3	65.3	0.4	65.3	0.4
Q	1	71.6	72.2	0.6	72.1	0.5	72.0	0.4	72.6	1.0	72.4	0.8
	10	70.7	71.9	1.2	71.5	0.8	71.4	0.7	74.3	**3.6**	72.9	2.2
	25	70.4	71.7	1.3	71.4	1.0	71.2	0.8	72.9	2.5	72.9	2.5
R	1	72.4	74.8	2.4	73.4	1.0	73.4	1.0	73.2	0.8	73.2	0.8
	5	71.5	76.6	**5.1**	73.9	2.4	74.6	**3.1**	73.3	1.8	72.8	1.3
	10	71.2	76.1	**4.9**	74.3	**3.1**	75.0	**3.8**	73.2	2.0	72.8	1.6
	25	71.3	74.5	**3.2**	74.7	**3.4**	73.9	2.6	72.8	1.5	73.1	1.8
	30	71.0	73.9	2.9	75.1	**4.1**	73.4	2.4	72.5	1.5	72.9	1.9
S	1	68.5	70.7	2.2	69.6	1.1	69.6	1.1	69.3	0.8	69.4	0.9
	3	68.0	73.4	**5.4**	70.0	2.0	70.1	2.1	68.8	0.8	68.9	0.9
T	1	72.8	73.5	0.7	73.3	0.5	73.3	0.5	73.3	0.5	73.3	0.5
	15	71.9	73.2	1.3	72.8	0.9	72.9	1.0	72.6	0.7	72.5	0.6
U	1	72.7	73.2	0.5	73.2	0.5	73.2	0.5	73.2	0.5	73.2	0.5
	15	71.7	72.3	0.6	72.3	0.6	72.3	0.6	72.3	0.6	72.3	0.6

Table 19-17(b) (cont'd)
Construction Noise Analysis Results for Phase 2 values in dBA

Noise Receptor	Receptor Height (in stories)	Existing dBA	2016		2017		2018		2020		2021	
			Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change
V	5	63.1	63.1	0.0	63.6	0.5	63.2	0.1	63.1	0.0	63.2	0.1
	50	64.8	66.2	1.4	66.0	1.2	65.4	0.6	65.2	0.4	65.5	0.7
W	1	72.0	72.4	0.4	72.4	0.4	72.4	0.4	72.4	0.4	72.4	0.4
	20	71.5	72.1	0.6	72.1	0.6	72.0	0.5	72.0	0.5	72.0	0.5
X	1	73.4	73.7	0.3	73.7	0.3	73.7	0.3	73.7	0.3	73.7	0.3
	40	71.6	71.9	0.3	72.0	0.4	71.9	0.3	72.0	0.4	72.0	0.4
Y	1	65.3	65.8	0.5	65.8	0.5	65.8	0.5	65.8	0.5	65.8	0.5
	70	66.0	66.5	0.5	66.9	0.9	66.5	0.5	66.7	0.7	66.9	0.9
Z	1	63.6	63.7	0.1	63.7	0.1	63.7	0.1	64.0	0.4	64.1	0.5
	30	63.5	63.8	0.3	65.4	1.9	64.0	0.5	65.4	1.9	65.2	1.7
AA	1	62.3	62.5	0.2	62.5	0.2	62.5	0.2	62.5	0.2	62.5	0.2
	5	62.9	63.1	0.2	63.1	0.2	63.1	0.2	63.2	0.3	63.2	0.3
BB	1	63.4	62.1	-1.3	62.1	-1.3	62.1	-1.3	62.1	-1.3	62.2	-1.2
CC	At grade	73.8	74.2	0.4	74.2	0.4	74.2	0.4	74.3	0.5	74.3	0.5

Note: Locations where predicted noise levels exceed the CEQR impact criteria are shown in bold.

Table 19-17(c)
Construction Noise Analysis Results for Phase 2 values in dBA

Noise Receptor	Receptor Height (in stories)	Existing dBA	2022		2030		2031		2032	
			Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change
A	1	67.2	67.8	0.6	67.9	0.7	67.9	0.7	67.9	0.7
	35	66.4	67.0	0.6	67.1	0.7	67.1	0.7	67.1	0.7
A1	1	66.6	67.2	0.6	67.3	0.7	67.3	0.7	67.3	0.7
	35	66.0	66.5	0.5	67.0	1.0	67.1	1.1	66.6	0.6
A2	1	61.9	62.1	0.2	62.1	0.2	62.1	0.2	62.1	0.2
	35	63.4	64.0	0.6	65.2	1.8	65.3	1.9	63.8	0.4
A3	1	64.0	64.3	0.3	64.5	0.5	64.4	0.4	64.4	0.4
	35	64.2	64.6	0.4	65.3	1.1	65.6	1.4	64.7	0.5
A4	1	63.8	64.1	0.3	64.3	0.5	64.2	0.4	64.2	0.4
	35	64.4	65.0	0.6	65.8	1.4	66.4	2.0	64.9	0.5
B	At Grade	71.5	72.5	1.0	72.6	1.1	72.6	1.1	72.7	1.2

Table 19-17(c) (cont'd)
Construction Noise Analysis Results for Phase 2 values in dBA

Noise Receptor	Receptor Height (in stories)	Existing dBA	2022		2030		2031		2032	
			Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change
B1	1	70.1	70.9	0.8	71.0	0.9	71.0	0.9	71.1	1.0
	3	63.4	64.2	0.8	64.4	1.0	64.3	0.9	64.3	0.9
C	1	71.6	72.2	0.6	72.4	0.8	72.4	0.8	72.4	0.8
	10	70.7	71.3	0.6	71.4	0.7	71.4	0.7	71.4	0.7
D	At grade	67.1	67.9	0.8	69.2	2.1	69.5	2.4	68.4	1.3
E	1	72.0	72.7	0.7	72.8	0.8	72.8	0.8	72.7	0.7
	20	70.9	71.9	1.0	71.8	0.9	71.9	1.0	71.7	0.8
F	1	65.5	66.7	1.2	66.8	1.3	66.9	1.4	66.9	1.4
	50	65.1	66.4	1.3	67.2	2.1	67.1	2.0	66.3	1.2
G	1	71.3	72.5	1.2	72.7	1.4	72.7	1.4	72.7	1.4
	3	71.0	72.2	1.2	72.3	1.3	72.3	1.3	72.3	1.3
G1	1	66.0	67.2	1.2	67.4	1.4	67.4	1.4	67.4	1.4
	3	65.3	66.5	1.2	66.7	1.4	66.7	1.4	66.7	1.4
H	1	71.6	72.1	0.5	72.3	0.7	72.3	0.7	72.3	0.7
	35	70.4	71.0	0.6	71.1	0.7	71.2	0.8	71.1	0.7
I	1	63.2	64.6	1.4	64.7	1.5	64.7	1.5	64.7	1.5
	34	64.8	65.9	1.1	66.0	1.2	66.0	1.2	66.0	1.2
I1	1	64.4	64.7	0.3	64.8	0.4	64.8	0.4	64.9	0.5
	34	65.6	66.0	0.4	66.1	0.5	66.1	0.5	66.1	0.5
J	1	71.8	72.2	0.4	72.4	0.6	72.4	0.6	72.4	0.6
	5	70.8	71.3	0.5	71.4	0.6	71.4	0.6	71.4	0.6
K	1	72.0	72.5	0.5	72.7	0.7	72.7	0.7	72.7	0.7
	5	71.7	72.1	0.4	72.3	0.6	72.3	0.6	72.3	0.6
L	1	70.0	70.5	0.5	70.6	0.6	70.6	0.6	70.6	0.6
	10	68.9	69.4	0.5	69.7	0.8	69.7	0.8	69.6	0.7
M	1	62.0	62.2	0.2	62.2	0.2	62.2	0.2	62.2	0.2
	5	62.7	62.9	0.2	63.0	0.3	63.0	0.3	63.0	0.3

Table 19-17(d)
Construction Noise Analysis Results for Phase 2 values in dBA

Noise Receptor	Receptor Height (in stories)	Existing dBA	2022		2030		2031		2032	
			Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change	Total Leq(1)	Change
N	1	71.5	72.0	0.5	72.1	0.6	72.1	0.6	72.2	0.7
	10	70.8	71.2	0.4	71.4	0.6	71.5	0.7	71.4	0.6
O	At grade	65.3	65.8	0.5	66.2	0.9	66.3	1.0	66.1	0.8
P	At grade	64.9	65.2	0.3	65.4	0.5	65.6	0.7	65.4	0.5
Q	1	71.6	72.1	0.5	72.3	0.7	72.4	0.8	72.2	0.6
	25	70.4	71.2	0.8	71.8	1.4	72.4	2.0	71.3	0.9
R	1	72.4	73.1	0.7	73.2	0.8	73.2	0.8	73.2	0.8
	25	71.3	72.1	0.8	72.1	0.8	72.1	0.8	72.1	0.8
S	1	68.5	69.4	0.9	69.5	1.0	69.5	1.0	69.5	1.0
	3	68.0	68.9	0.9	68.9	0.9	68.9	0.9	69.0	1.0
T	1	72.8	73.3	0.5	73.4	0.6	73.5	0.7	73.5	0.7
	15	71.9	72.3	0.4	72.4	0.5	72.4	0.5	72.4	0.5
U	1	72.7	73.2	0.5	73.3	0.6	73.4	0.7	73.4	0.7
	15	71.7	72.2	0.5	72.3	0.6	72.3	0.6	72.3	0.6
V	5	63.1	63.2	0.1	63.2	0.1	63.3	0.2	63.3	0.2
	50	64.8	65.2	0.4	65.5	0.7	65.4	0.6	65.1	0.3
W	1	72.0	72.5	0.5	72.6	0.6	72.6	0.6	72.6	0.6
	20	71.5	72.0	0.5	72.1	0.6	72.1	0.6	72.1	0.6
X	1	73.4	73.8	0.4	73.9	0.5	73.9	0.5	73.9	0.5
	40	71.6	72.0	0.4	72.2	0.6	72.3	0.7	72.2	0.6
Y	1	65.3	65.8	0.5	65.9	0.6	65.9	0.6	65.9	0.6
	70	66.0	66.5	0.5	66.5	0.5	66.6	0.6	66.5	0.5
Z	1	63.6	63.7	0.1	63.8	0.2	63.8	0.2	63.8	0.2
	30	63.5	63.8	0.3	63.9	0.4	64.0	0.5	63.8	0.3
AA	1	62.3	62.5	0.2	62.6	0.3	62.7	0.4	62.6	0.3
	5	62.9	63.1	0.2	63.3	0.4	63.5	0.6	63.3	0.4
BB	1	63.4	62.2	-1.2	62.3	-1.1	62.3	-1.1	62.3	-1.1
CC	At grade	73.8	74.3	0.5	74.4	0.6	74.4	0.6	74.4	0.6

Note: Locations where predicted noise levels exceed the CEQR impact criteria are shown in bold.

For impact determination purposes, the significance of adverse noise impacts is determined based on whether maximum predicted incremental noise levels at sensitive receptor locations would be greater than the impact criteria suggested in the *CEQR Technical Manual* for two consecutive years or more. Based upon examining the noisiest period during each analysis year maximum predicted incremental noise levels would be greater than the impact criteria for two or more consecutive years at sites A, A1, A2, A3, A4, E, and R, and these locations were identified in the DEIS as having significant adverse impacts. At other receptor sites, while increases exceeding the CEQR impact criteria for one year or less may be noisy and intrusive, they are not considered to be significant adverse noise impacts. (At receptor site O, located at 62nd Street between Amsterdam and Columbus Avenues [Damrosch Park], a significant increase in noise levels would occur in 2009 and 2011. However, these increases would not be continuous for two or more years and would not constitute a significant noise impact.) An assessment was made of the duration of exceedances of the CEQR impact criteria.

Subsequent to the DEIS, additional analyses were performed. The analysis in the FEIS made further refinements to the analysis presented in the DEIS. At locations where significant impacts were predicted to occur in the DEIS, analyses were performed for the months before and after the time when the significant noise level increases were predicted to occur to determine whether the impacts identified in the DEIS would occur continually for at least two or more consecutive years (see Table B in Appendix C.3). Additional noise mitigation options were also investigated. If the additional analysis time periods identified that construction noise impacts would not be expected to occur continuously for at least two consecutive years, then a significant impact would not be expected to occur. If the additional analysis scenarios identified that construction noise impacts identified in the DEIS would occur continually for at least two or more consecutive years, then the potential impacts identified in the EIS would be considered a significant noise impact. Specifically, the additional analyses examined the maximum predicted incremental noise levels during other time periods within the two or more years when exceedances of the 3 dBA impact criteria were predicted to occur at sites A, A1, A2, A3, A4, E, and R to determine whether these exceedances would occur for two or more consecutive years. These additional analyses showed that the exceedances of the 3 dBA impact criteria for two or more years would not occur continuously at sites A, E, and R, and that the extent of impacts at sites A1, A2, A3, and A4 would be slightly less than previously disclosed in the DEIS. (The results for these additional time periods are shown in Table B in Appendix C.3) In addition, analyses were performed to determine whether it would be feasible to implement additional mitigation measures to reduce or eliminate the impacts predicted to occur at sites A1, A2, A3, and/or A4. Those analyses indicated that there were not feasible mitigation measures that would significantly reduce or eliminate the predicted impacts at these locations.

During Phase 1, construction activities would be expected to result in significant noise impacts at the following locations:

- Receptor A1 (the north façade of The Alfred) at locations that have a direct line-of-sight to construction sites, from the 10th floor to the top residential floor during the years 2009 through 2010. The maximum predicted increase in noise levels at the Receptor A1 significant noise impact locations was 11.0 dBA and would be expected to occur at the 10th floor in 2009;
- Receptor A2 (the east façade of The Alfred) at locations that have a direct line-of-sight to construction sites, from the third floor to the 30th floor during the years 2009 through 2010.

The maximum predicted increase in noise levels at Receptor A2 was 16.7 dBA and would be expected to occur at the 15th floor in 2010;

- Receptor A3 (the north façade of The Alfred) at locations that have a direct line-of-sight to construction sites, from the third floor to the top residential floor during the years 2009 through 2010. The maximum predicted increase in noise levels at Receptor A3 was 14.0 dBA and would be expected to occur at the fifth floor in 2009; and
- Receptor A4 (the north façade of The Alfred) at locations that have a direct line-of-sight to the construction sites, from the third floor to the top residential floor during the years 2009 through 2010 and from the third floor through the 25th floor during the years 2009 through 2011. The maximum predicted increase in noise levels at Receptor A4 was 14.5 dBA and would be expected to occur at the 20th floor in 2010.

During Phase 2, construction activities would not be expected to result in significant noise impacts at any sensitive receptor locations.

Construction activities at the other receptor sites in the study area would at times produce noise levels which would be noisy and intrusive, but due to their limited duration, they would not produce significant noise impacts.

The only residential location where significant noise impacts are predicted to occur is at the Alfred, which has double-glazed windows and central air conditioning (i.e., alternative ventilation). Consequently, even during warm weather conditions, interior noise levels would be approximately 30-35 dBA less than exterior noise levels. The double-glazed windows and alternative ventilation at this residential structure would provide a significant amount of sound attenuation, and would result in interior noise levels during much of the time that are below 45 dBA L_{10} (the CEQR acceptable interior noise level criteria). However, at the terraces on all four façades of The Alfred, the highest $L_{10(1)}$ noise levels would range from approximately 76 to 82 dBA during some peak periods of construction activity. Even though this residence has double-glazed windows and alternative ventilation (i.e., central air conditioning) which would reduce interior noise levels by approximately 30-35 dBA, during some limited daytime time periods construction activities would result in interior noise levels that would be above the 45 dBA L_{10} noise level recommended by CEQR for residences and result in significant adverse noise impacts.

In addition, while noise levels at the residential terraces at The Alfred currently exceed the CEQR acceptable range (55 dBA L_{10}) for an outdoor area requiring serenity and quiet (see Appendix C.3 for existing noise levels at Receptors A, A1, A2, A3, and A4), during the weekday daytime time periods identified above when construction activities are predicted to significantly increase noise levels, construction activities would exacerbate these exceedances and result in significant adverse noise impacts at the terraces at The Alfred.

Consequently, the proposed action would have unmitigated significant noise impacts at the locations specified above for limited periods of time.

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, generally construction activities 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 access quantitatively 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 was 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 vibration decibels (VdB) would have the potential to result in significant adverse impacts if they were to occur for a prolonged period of time.

Analysis Methodology

For purposes of assessing potential structural or architectural damage, the following formula was used:

$$PPV_{equip} = PPV_{ref} \text{ x } (25/D)^{1.5}$$

where: PPV_{equip} is the peak particle velocity in in/sec of the equipment at the receiver location;

PPV_{ref} is the reference vibration level in in/sec at 25 feet; and

D is the distance from the equipment to the received location in feet.

For purposes of assessing potential annoyance or interference with vibration sensitive activities, the following formula was used:

$$L_v(D) = L_v(ref) - 30\log(D/25)$$

where: $L_v(D)$ is the vibration level in VdB of the equipment at the receiver location;

$L_v(ref)$ is the reference vibration level in VdB at 25 feet; and

D is the distance from the equipment to the receiver location in feet.

Table 19-18 shows vibration source levels for typical construction equipment.

Construction Vibration Analysis Results

The buildings and structures of most concern with regard to the potential for structural or architectural damage due to vibration are Amsterdam Houses, The Alfred, P.S. 191, John Jay Collage, St. Paul the Apostle Roman Catholic Church, 44 West 62nd Street, 41 Columbus Avenue, and 21 Columbus Avenue, all of which are adjacent to the project construction sites, and some of which are considered fragile buildings. Vibration levels at these buildings and structures would be well below the 0.50 inches/second PPV limit. In addition, Fordham University would implement a monitoring program to ensure that this limit is not exceeded, and that no architectural or structural damage would occur. At all other locations, the distance between construction equipment and receiving buildings or structures is large enough to avoid vibratory levels that would result in architectural or structural damage.

Table 19-18
Vibration Source Levels for Construction Equipment

Equipment	PPV_{ref} (in/sec)	Approximate L_v (ref) (VdB)
Pile Driver (sonic)*	0.170	93
Clam Shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall in rock)	0.017	75
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drilling	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Note: * Sonic rather than impact pile drivers will be utilized.
Source: *Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06, May 2006.

In terms of potential vibration levels that would be perceptible and annoying, the three pieces of equipment that would have the most potential for producing levels which exceed the 65 VdB limit are pile drivers, the clam shovel drop, and vibratory roller. A clam shovel drop would produce perceptible vibration levels (i.e., vibration levels exceeding 65 VdB) at receptor locations within a distance of approximately 232 feet. However, the operation would only occur for limited periods of time at a particular location and therefore would not result in any significant adverse impacts. The drilling of piles and any blasting are expected to produce vibrations less perceptible than those from the operation of a clam shovel. In no case are significant adverse impacts from vibrations expected to occur.

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 phase, as necessary, the contractor would carry out a maintenance program. 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. Therefore, construction of the proposed Master Plan would not result in any significant adverse impacts to rodent control. ✷