Chapter 6: Shadows

A. INTRODUCTION

This chapter identifies whether the proposed project's structures would cast shadows on sunlight-sensitive publicly accessible resources or other resources of concern, such as natural resources, and assesses the significance of their impact.

According to the 2010 *City Environmental Quality Review (CEQR) Technical Manual*, a shadows assessment is required if a project would result in structures (or additions to existing structures) of 50 feet in height or greater, or if a project is located adjacent to a sunlight-sensitive resource. The proposed project would introduce four new buildings—two on the North Block and two on the South Block—that would each exceed 50 feet in height, and the proposed buildings would be located adjacent to sunlight-sensitive resources. Therefore, a shadows assessment was conducted to determine whether the shadows cast by the proposed project could result in significant adverse impacts on public open space, important natural areas, or sunlight-sensitive historic and cultural resources.

B. PRINCIPAL CONCLUSIONS

Following *CEQR Technical Manual* guidelines, the analysis began with a preliminary assessment which found that project buildings could—assuming the absence of intervening buildings—create new, incremental shadows during one or more seasons on the following sunlight-sensitive resources: Washington Square Park; the LaGuardia Corner Gardens; the willow oaks in the Oak Grove area of the South Block; the Time Landscape Greenstreet; Schwartz Plaza; Mercer Plaza; the east, south and north facades of the University Village towers; the north façade of the Church of Saint Anthony of Padua; the landscaped areas on the South Block along Bleecker Street; LaGuardia Landscape; and Mercer Street Playground. A detailed shadow analysis was conducted for these resources, and the detailed analysis found that the Proposed Actions would not result in significant adverse shadow impacts on the following:

- **Washington Square Park** would not receive any incremental shadows from the proposed project due to intervening buildings.
- By 2021 the **Time Landscape** would receive between a half-hour and two hours and twenty minutes of incremental shadow in the spring, summer and fall, early in the morning, but would continue to be in sun from late morning to late afternoon in these seasons and consequently the proposed project would not result in significant adverse shadow impacts to this resource.
- By 2021 portions of the **Bleecker Street Strip** would experience incremental shadow during all seasons. The longer portions of the strip, in the center of the South Block, would continue to receive adequate sunlight during the growing season. The smaller landscaped areas toward the eastern and western ends of the block would experience longer durations of incremental shadow. However, they would be re-landscaped as part of the proposed

development of the South Block, and more shade-tolerant species would be selected for the plantings in these areas. Therefore, the strip of landscaped areas would not experience significant adverse shadow impacts.

- **Schwartz Plaza** would not receive any incremental shadows from the proposed project due to intervening buildings.
- **Mercer Plaza**, on Mercer Street between West 3rd and 4th Streets, would by 2021 receive 20 minutes of incremental shadow from the proposed project on the December 21 analysis day. By 2031, Mercer Plaza would receive a half-hour of incremental shadow on December 21 (including the 20 minutes of shadow generated by 2021) and on March 21/September 21. This limited amount of new shadow would not cause significant adverse shadow impacts to this space.
- **University Village** is a designated New York City landmark, and the gridded and sheer concrete facades of the three identical 30-story towers were analyzed as sunlight-sensitive features of this cultural resource, because documents supporting its designation reference "that each tower has four to eight deeply-recessed horizontal window bays, as well as a 22-foot wide sheer wall, creating dramatic juxtapositions of light and shadow."[1] By 2021, the proposed Zipper Building would for several morning hours throughout the year cast new shadows on the east facade of 100 Bleecker Street/Silver Tower II (the easternmost of the three University Village buildings), on the south façade in December and March/September for shorter durations, and on the north façade in May/August and June for a brief duration. New shadows also would be cast on one or more facades of the other two University Village buildings, but for shorter durations and on smaller areas in most months. Despite these new shadows, large portions of the gridded and sheer concrete facades of the three buildings would remain in sunlight during the affected periods. In addition, the proposed project's Greene Street Walk would introduce a new publicly accessible vantage point from which to view the facades. Therefore, the University Village buildings would not experience significant adverse shadow impacts as a result of the proposed project.
- The **Church of Saint Anthony of Padua** would not receive any incremental shadows from the proposed project due to intervening buildings.
- By 2021 a portion of the **LaGuardia Landscape** on the west side of the North Block would experience about two hours of new shadow in the winter and March/September analysis days, but the limited extent and duration of this new shadow would not cause significant adverse impacts.
- By 2021 a portion of the **Mercer Street Playground** would receive between two and three hours of new shadow throughout the year from the proposed Zipper Building, but the area of new shadow would remain small most of the time, and this space, which is completely paved except for some fenced-off landscape at the northern and southern ends, would not experience significant adverse shadow impacts as a result of the project.
- By 2021 the state-endangered[2] **willow oaks** located in the South Block's Oak Grove would experience between one and three-and-a-half hours of incremental shadow from the

[1] Landmarks Preservation Commission's November 18, 2008 designation report, Designation List 407, LP-2300. [http://www.nyc.gov/html/lpc/downloads/pdf/reports/university_village.pdf]

[2] Willow oak (*Quercus phellos*) is ranked as "S1" by the New York Natural Heritage Program, indicating that it is critically imperiled in the state because of extreme rarity (i.e., five or fewer sites or very few remaining individuals) in New York State. However, the willow oak is a common street tree in New

proposed project on the March 21/September 21 analysis day, and would experience incremental shadows on the May 6/August 6 and June 21 analysis days as a result of the proposed project, but the durations would be less as compared to the March 21/September 21 analysis day. Although the trees located in the Oak Grove would continue to receive adequate sunlight during the peak of their growing season, during the early and late portions of their growing season the trees would receive less than the four-to-six-hour minimum threshold of daily sun that is recommended in the *CEQR Technical Manual*. The proposed project's incremental shadows could place stress on the six willow oak trees located in the Oak Grove (two of which are already in serious decline and should be removed irrespective of the project). In order to maintain the viability of the four willow oaks that are not already in serious decline, NYU would commit to a tree maintenance plan. With the implementation of a tree maintenance plan, the four willow oaks are not expected to decline as a result of project-generated shadows, and there would be no potential for a significant adverse impact on the willow oaks as a result of the Proposed Actions.

The detailed analysis found that the proposed project would result in significant shadow impacts[1] on the following sunlight-sensitive resource:

- **LaGuardia Corners Gardens**, a community garden located on the corner of LaGuardia Place and Bleecker Street on the LaGuardia Street Strip adjacent to the South Block, would by 2021 experience significant adverse shadow impacts in the spring, summer, and fall as a result of the proposed project. While the remaining sunlight could support shade-tolerant species, the proposed Bleecker Building adjacent to the garden would cast between four and five-and-a-half hours of new shadow on the garden during morning hours throughout the growing season, jeopardizing the viability of shade-intolerant species. Potential mitigation for this significant adverse impact is discussed in Chapter 21, "Mitigation."

According to CEQR methodology, open space that would be developed as part of a project cannot experience adverse impacts from the project, because without the project the space wouldn't exist. However, a discussion of shadows on the proposed open space is provided for informational purposes. The proposed South Block open spaces—including the Toddler Playground, the Greene Street Walk, and relocated dog run (a private, membership-only dog run)—would experience shadow from the proposed Zipper Building during the mornings throughout the year, and shadow from the existing University Village towers in the afternoons. In the late spring and summer the southern area—the playground and dog run—would be in sun for long periods. The Greene Street Walk adjacent to the Zipper Building would be in shade for most of the day in all seasons. On the North Block, the southern half of the proposed open spaces would be in shadow or partial shadow from the Washington Square Village 3 & 4

York City, and the willow oaks in the South Block's Oak Grove do not constitute one of the "five or fewer sites or very few remaining individuals" of this species in New York State. The range of the willow oak in New York State is limited to the New York City area and portions of Long Island, as this species is more commonly known to occur south of New York State. Although endangered in New York because New York State represents the extreme north end of its habitat, the willow oak is a common tree in the southeastern United States and is not a federally endangered species.

[1] According to the *CEQR Technical Manual*, a significant adverse shadow impact occurs when the incremental shadow added by a proposed project falls on a sunlight-sensitive resource and substantially reduces or completely eliminates direct sunlight, thereby significantly altering the public's use of the resource or threatening the viability of vegetation or other resources.

throughout the day in the fall, winter and spring, and to a lesser extent in the summer. The northern portion of the open space, and the eastern and western areas along LaGuardia Place and Bleecker Street, would be mostly in sun during the spring, summer and fall analysis days.

C. DEFINITIONS AND METHODOLOGY

DEFINITIONS

Incremental shadow is the additional shadow that the project's new structures would cast on a sunlight-sensitive resource.

Sunlight-sensitive resources are those resources that depend on sunlight or for which direct sunlight is necessary to maintain the resource's usability or architectural integrity. Such resources generally include:

- Public open space (e.g., parks, beaches, playgrounds, plazas, schoolyards, greenways, landscaped medians with seating).
- Planted areas within unused portions of roadbeds that are part of the Greenstreets program.
- Features of architectural resources that depend on sunlight for their enjoyment by the public. Only the sunlight-sensitive features need be considered, as opposed to the entire resource. Such sunlight-sensitive features might include: design elements that depend on the contrast between light and dark (e.g., recessed balconies, arcades, deep window reveals); elaborate, highly carved ornamentation; stained glass windows; historic landscapes and scenic landmarks; and features for which the effect of direct sunlight is described as playing a significant role in the structure's importance as a historic landmark.
- Natural resources where the introduction of shadows could alter the resource's condition or microclimate. Such resources could include surface water bodies, wetlands, or designated resources such as coastal fish and wildlife habitats.

Non-sunlight-sensitive resources include, for the purposes of CEQR:

- City streets and sidewalks (except Greenstreets).
- Private open space (e.g., front and back yards, stoops, vacant lots, and any private, non-publicly-accessible open space).
- Private apartment buildings and offices.
- Project-generated open space cannot experience a significant adverse shadow impact from the project, according to CEQR, because without the project the open space would not exist. However, when the condition of the project-generated open space is included as part of the qualitative open space analysis in Chapter 5, "Open Space," a discussion of how shadows would affect the new space may be warranted.

A significant adverse shadow impact occurs when the incremental shadow added by a proposed project falls on a sunlight-sensitive resource and substantially reduces or completely eliminates direct sunlight, thereby significantly altering the public's use of the resource or threatening the viability of vegetation or other resources. According to the *CEQR Technical Manual*, each case must be considered on its own merits based on the extent and duration of new shadow and an analysis of the resource's sensitivity to reduced sunlight.

METHODOLOGY

The analysis follows the suggested methodologies of the *CEQR Technical Manual*. According to *CEQR Technical Manual* guidelines, the first analytical step is a preliminary screening assessment to confirm that the project's shadow could reach sunlight-sensitive resources at any time of year. The preliminary screening assessment consists of three tiers of analysis. The first tier determines a simple radius around the proposed buildings representing the longest shadows that could be cast. If there are sunlight-sensitive resources within this radius, the analysis proceeds to the second tier. The second tier refines the area that could be affected by project shadows by accounting for the fact that shadows can never be cast between a certain range of angles south of the project site due to the path of the sun through the sky at the latitude of New York City. If the second tier of analysis does not eliminate the possibility of new shadows on sunlight-sensitive resources, a third tier of screening analysis further refines the area that could be reached by project shadows by looking at specific representative days of the year and modeling the extent of shadow over the course of each representative day.

If the third tier of analysis does not eliminate the possibility of new shadows on sunlight-sensitive resources, a detailed shadow analysis is required to determine the extent and duration of the incremental shadow resulting from the project. The detailed analysis provides the data needed to assess the shadow impacts. The effects of the new shadows on the sunlight-sensitive resources are described, and their degree of significance is considered. The results of the analysis and assessment are documented with graphics, a table of incremental shadow durations, and narrative text.

ANALYSIS FRAMEWORK

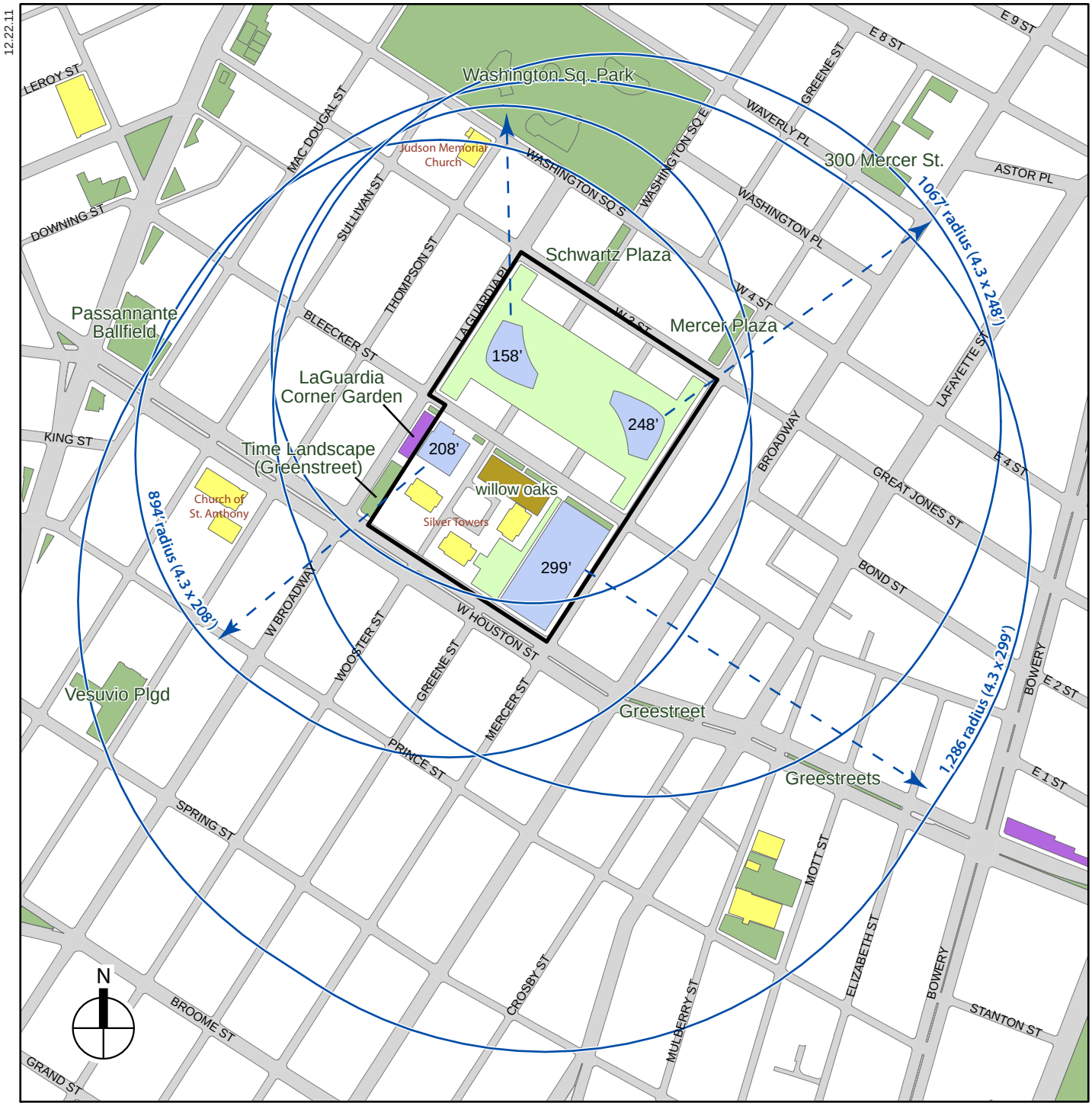
All potential development scenarios resulting from the Proposed Actions would occur within the same proposed building envelopes and site planning. Therefore, the "reasonable worst case development scenario" (RWCDS) used in this chapter assumes the maximum building envelopes permitted under the Proposed Actions. Additionally, rooftop mechanical space is included in the modeling of the overall height and bulk of each proposed building.

The shadows analysis was performed for the expected year of completion of the proposed project, which is 2031, as well as the interim 2021 analysis year, when the full development of the South Block would be completed, but development on the North Block would not yet have begun.

The analysis focuses entirely on the shadow impacts of the proposed buildings within the Proposed Development Area. There would be no new development within the Mercer Plaza Area. The projected development in the Commercial Overlay Area would occur within the ground floors of existing buildings, and therefore there would be no incremental shadows in the Commercial Overlay Area from development resulting from the Proposed Actions.

D. PRELIMINARY SCREENING ASSESSMENT

A base map was developed (see **Figure 6-1**) showing the location of the proposed project and the surrounding street layout. In coordination with the open space, historic and cultural resources, and natural resource assessments presented in other chapters of this DEIS, sunlight-sensitive resources were identified and are displayed on the map. Topographic information was also added to the map, in the form of spot elevations published in Geographic Information



Tier 1 Screening Assessment

Figure 6-1

NYU Core

Systems (GIS) format by the Department of Information Technology and Telecommunications (DoITT).

TIER 1 SCREENING ASSESSMENT

For the Tier 1 assessment, the longest shadow that the proposed structures could cast is calculated, and, using this length as the radius, a perimeter is drawn around the project site. Anything outside this perimeter representing the longest possible shadow could never be affected by project-generated shadow, while anything inside the perimeter needs additional assessment.

The longest shadow that a structure can cast occurs on December 21, the winter solstice, at the very start of the analysis day, and is equal to 4.3 times the height of the structure (2010 *CEQR Technical Manual*, page 8-4).

To ensure a conservative analysis, the maximum height of each of the four proposed building envelopes was used in the assessment. The proposed Zipper Building envelope would reach a maximum height of 299 feet (including rooftop mechanical equipment). Therefore, the longest shadow it could cast would be 1,286 feet (4.3 x 299 feet). The proposed Bleecker Building envelope would be a maximum height of 208 feet (including rooftop mechanical equipment), and the longest shadow it could cast would be 894 feet. On the North Block, the proposed LaGuardia and Mercer Building envelopes would be a maximum of 158 feet and 248 feet (including mechanicals), respectively, and the longest shadows they could cast would be 680 feet and 1,067 feet, respectively.

Figure 6-1 shows the resulting longest shadow study area for each of the four proposed building envelopes. A number of potentially sunlight-sensitive resources are located within the study area, and a Tier 2 screening assessment is therefore necessary.

TIER 2 SCREENING ASSESSMENT

Because of the path that the sun travels across the sky in the northern hemisphere, no shadow can be cast in a triangular area south of any given project site. In New York City this area lies between -108 and +108 degrees from true north. **Figure 6-2** illustrates this triangular area south of the project site within which project shadows cannot be cast. The complementing area to the north within the longest shadow study area represents the remaining area that could potentially experience new project-generated shadow.

A number of sunlight-sensitive resources are located in the remaining shadow study area; these resources are shown in **Figure 6-2**, and described below.

PUBLICLY ACCESSIBLE OPEN SPACES

One block north of the Proposed Development Area, **Schwartz Plaza** and **Mercer Plaza** are small public open spaces with seating and planters or landscaping. At the northeastern edge of the study area, the residential plaza at **300 Mercer Street** has seating and planters. A portion of **Washington Square Park** is located within the study area two blocks to the north. A very small strip of the **Passannante Ballfield** lies within the western edge of the study area, four blocks away from the Proposed Development Area. **Vesuvio Playground** is located a few blocks southwest of the Proposed Development Area. There are also landscaped areas on the South Block along Bleecker Street that could be affected by project shadows.

12.22.11



Feet
0 200 400 600 800

- Proposed Development Area Boundary
- Proposed Buildings (heights shown represent maximum envelope plus rooftop mechanical space)
- Publicly-Accessible Open Space or Greenstreet
- Historic Resources with Sunlight-Sensitive Features
- Important Natural Features
- Community Gardens
- Project-Generated Publicly-Accessible Open Space
- Longest Shadow Study Area Boundary

NYU Core

Tier 2 Screening Assessment
Figure 6-2

GREENSTREETS AND COMMUNITY GARDENS

There are existing sunlight sensitive resources immediately adjacent to the Proposed Development Area that could be affected by project shadows. The **Time Landscape**, located on the LaGuardia Street Strip adjacent to the South Block (at West Houston Street and LaGuardia Place), is a landscaped area maintained by the Department of Parks and Recreation (DPR) under its Greenstreets program. Also on the LaGuardia Street Strip adjacent to the South Block, the **LaGuardia Corner Gardens** at LaGuardia Place and Bleecker Street is a GreenThumb-registered community garden with flowers, vegetables and benches.

IMPORTANT NATURAL FEATURES

Also within the Proposed Development Area, on the South Block, the Oak Grove contains six **willow oak trees**, a state-endangered species. As detailed in Chapter 9, "Natural Resources," the willow oak (*Quercus phellos*) is ranked as "S1" by the New York Natural Heritage Program, indicating that it is critically imperiled in the state because of extreme rarity (i.e., five or fewer sites or very few remaining individuals) in New York State. However, the willow oak is a common street tree in New York City, and the willow oaks in the South Block's Oak Grove do not constitute one of the "five or fewer sites or very few remaining individuals" of this species in New York State. The range of the willow oak in New York State is limited to the New York City area and portions of Long Island, as this species is more commonly known to occur south of New York State. Although endangered in New York because New York State represents the extreme north end of its habitat, the willow oak is a common tree in the southeastern United States and is not a federally endangered species. The willow oaks observed in the Oak Grove area of the South Block within the Proposed Development Area occur in a linear arrangement, thus indicating that these trees were planted. Otherwise, due to the urbanized nature and absence of moist soils, this species would not be likely to occur within the Proposed Development Area.

SUNLIGHT-DEPENDENT FEATURES OF HISTORIC RESOURCES

Two blocks northwest of the Proposed Development Area is the **Judson Memorial Church, Tower, and Hall Complex** (State/National Register of Historic Places [S/NR], New York City Landmark [NYCL]). The church has arched stained-glass windows on its east façade. Its north façade, which also has stained-glass windows, faces away from the project site and could not receive project-generated shadows.

The **Church of Saint Anthony of Padua**, located two blocks southwest of the Proposed Development Area at 154 Sullivan Street, has two rows of large stained-glass windows on its north façade, which faces generally towards the project site.

Within the Proposed Development Area, the three **University Village** buildings (a.k.a. Silver Towers and 505 LaGuardia Place, S/NR-eligible and NYCL) stand in the middle of the South Block between the proposed Zipper Building to their east and the proposed Bleecker Building to their northwest. The 30-story towers are defined by grids of deeply-recessed horizontal window bays and wide sheer concrete walls. The juxtaposition of the gridded window bays and the concrete walls create "strong contrasts of light and shadow," as described in the New York City Landmarks Preservation Commission (LPC)'s University Village designation report. Therefore, the facades of the University Village towers are considered sunlight-sensitive resources.

TIER 3 SCREENING ASSESSMENT

The direction and length of shadows vary throughout the course of the day and also differ depending on the season. The Tier 3 assessment models shadows on specific representative analysis days in each season, to determine if and when resources could be affected by project-generated shadows. Each day, the sun rises in the east, casting long shadows toward the west. Later in the morning, the sun rises higher in the sky, casting shorter shadows toward the northwest. At noon, the sun is at its highest point in the sky and casts the shortest shadows of the day directly north. (During Daylight Savings Time, this occurs at 1:00 PM rather than at noon.) In the afternoon, the sun continues to move west and begins to descend, casting longer shadows toward the northeast and east. At the end of the day, shadows stretch to the east as the sun sets in the west.

In its yearly cycle, the height of the sun in the sky and the time and compass direction at which it rises and sets vary by season. In the winter, the sun travels in a low arc across the southern sky, rising late in the southeast and setting early in the southwest. Because it is so low in the sky, it casts longer shadows. In the spring and fall, the sun arcs through the sky at a somewhat higher angle, rises earlier in the east, and sets later in the west. In these seasons, shadows are of moderate length. In the summer, the sun arcs through the sky at its highest angle, rising almost directly overhead at noon. For this reason, summer shadows are shortest. In the summer, the sun rises earliest and sets latest; it also travels farther, rising from the northeast to high in the southern sky at noon and then arcing down to the northwest at dusk. Thus, the summer sun casts shadows in more directions than those seen in other seasons and the late sunset and early sunrise creates shadows earlier in the morning and later in the evening than in other seasons.

In order to determine if and when project-generated shadow could fall on a sunlight-sensitive resource, three-dimensional computer modeling software is used in the Tier 3 assessment to calculate and display the proposed project's shadow patterns over the course of individual representative days of the year. A three-dimensional model was developed, including representations of all the elements in the base map developed for the previous tiers of analysis, a model of the proposed project, and the topography of the study area. At this stage of the assessment, the surrounding buildings are not included in the model so that it may be determined whether shadows from the proposed project would be long enough on the representative analysis days of the year to reach a sunlight-sensitive resource irrespective of intervening buildings. The surrounding built context is included in the detailed analysis reported in Section E, below.

REPRESENTATIVE DAYS FOR ANALYSIS

Shadows on the summer solstice (June 21), winter solstice (December 21) and spring and fall equinoxes (March 21 and September 21, which are approximately the same in terms of shadow patterns) are modeled, to represent the range of shadows over the course of the year. An additional representative day during the growing season is also modeled, generally the day halfway between the summer solstice and the equinoxes, i.e., May 6 or August 6, which are approximately the same.

In addition to the above-described representative days for analysis recommended by the *CEQR Technical Manual*, additional analysis days (April 6, April 21, and May 21) were modeled to more precisely identify incremental shadow during the peak growing season for the willow oaks located in the South Block's Oak Grove.

TIMEFRAME WINDOW OF ANALYSIS

The shadow assessment considers shadows occurring between 1.5 hours after sunrise and 1.5 hours before sunset. At times earlier or later than this timeframe, the sun is down near the horizon, diminishing the amount of solar energy and producing shadows that are very long, move fast, and generally blend with shadows from existing structures until the sun reaches the horizon and sets. Consequently, shadows occurring outside the timeframe window of analysis are not considered significant under CEQR, and their assessment is not required.

TIER 3 SCREENING ASSESSMENT RESULTS

Figures 6-3 to 6-6 illustrate the range of shadows that would—in the absence of intervening buildings—occur from each of the four proposed buildings on the four representative analysis days. The shadows are shown occurring approximately every two to three hours from the start of the analysis day (1.5 hours after sunrise) to the end of the analysis day (1.5 hours before sunset). Any resource that is located in the daily west-to-east "sweep" of shadow on an analysis day could, absent intervening buildings, be affected by project shadow, and requires detailed analysis.

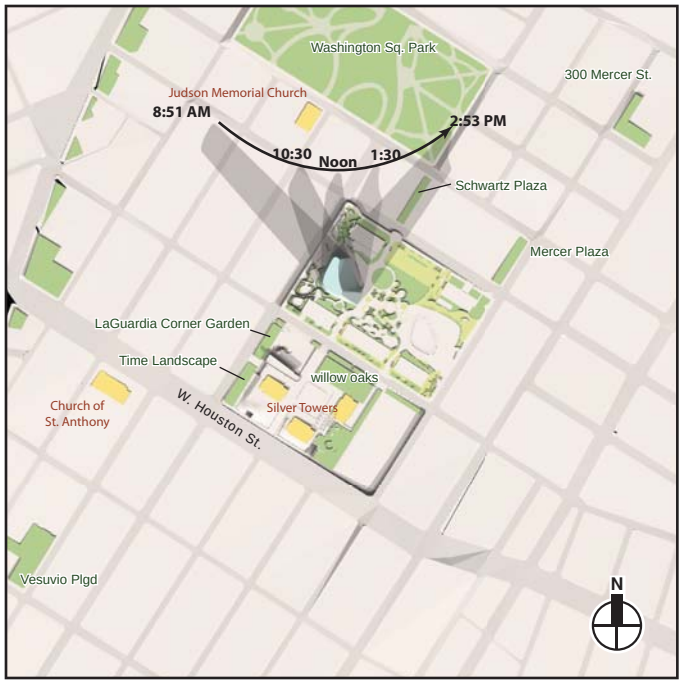
Figure 6-3 shows that on December 21, by 2021 project-generated shadow would be long enough, absent intervening buildings, to reach Schwartz Plaza, Mercer Plaza, the southeast corner of Washington Square Park, and several sun-sensitive resources on and adjacent to the South Block: the landscaped areas along Bleecker Street; the willow oaks in the Oak Grove; the eastern facades of the three University Village towers and the southern façade of 100 Bleecker Street/Silver Tower II; the LaGuardia Corner Gardens; and the northern end of the Time Landscape. In 2021, the interim year, both LaGuardia Landscape and Mercer Street Playground lie within range of project shadows.

Figure 6-4 shows that on the March 21/September 21 analysis day, by 2021 project-generated shadow from the South Block could reach the Time Landscape and LaGuardia Corner Gardens; portions of the landscaped areas on the south side of Bleecker Street; the eastern facades of the three University Village towers and the southern façade of 100 Bleecker Street/ Silver Tower II; and the area containing willow oaks. The southern part of Mercer Street Playground and a small area at the southern edge of the LaGuardia Landscape could also be reached by project-generated shadow by 2021. By 2031, project-generated shadow from the North Block would be long enough, absent intervening buildings, to reach the southern part of Mercer Plaza and possibly the southern edge of Schwartz Plaza.

On both the May 6/August 6 analysis day and the June 21 analysis day, all the sun-sensitive resources on the South Block could be affected by Phase 1 (2021) project-generated shadow (see **Figures 6-5 and 6-6**): the landscaped areas along Bleecker Street; the willow oaks; the eastern and northern facades of the 100 Bleecker Street/ Silver Tower II and 110 Bleecker Street/ Silver Tower I; the LaGuardia Corner Gardens; and the Time Landscape. In addition, the north façade of the Church of Saint Anthony of Padua could be reached by shadow from the proposed Bleecker Building at the start of both the May 6/August 6 and June 21 analysis days. In the 2021 interim year, a small area in the south of the Mercer Street Playground could be reached by project shadow on both these analysis days.

In summary, the Tier 3 assessment found that project-generated shadow would be long enough, absent intervening buildings, to reach the following resources during all four analysis days: the Time Landscape; the LaGuardia Corner Gardens; the eastern facades of the 100 Bleecker Street/

7.1.11



LaGuardia Building



Mercer Building



Bleecker Building



Zipper Building

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

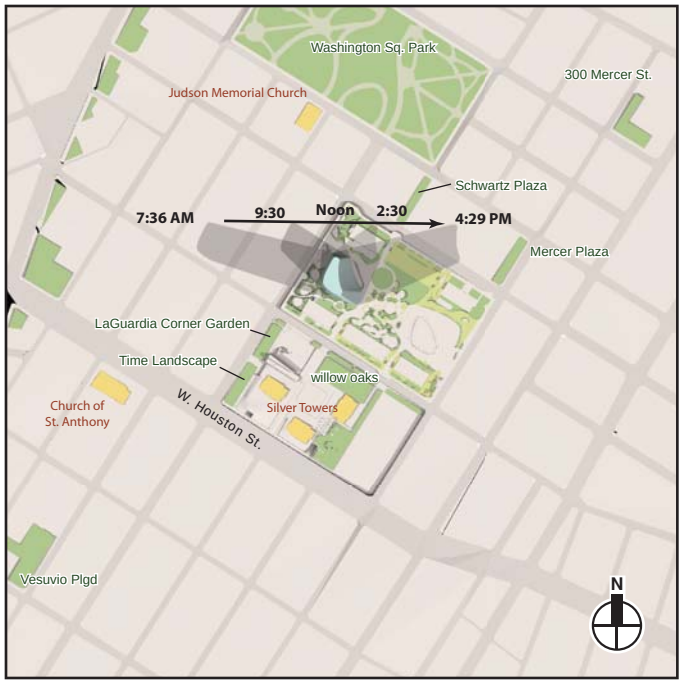
Historic Resources with Sunlight-Sensitive Features

NYU Core

Tier 3 Screening Assessment - December 21

Figure 6-3

7.1.11



LaGuardia Building



Mercer Building



Bleecker Building



Zipper Building

Note: Daylight Saving Time not used.

Proposed Buildings

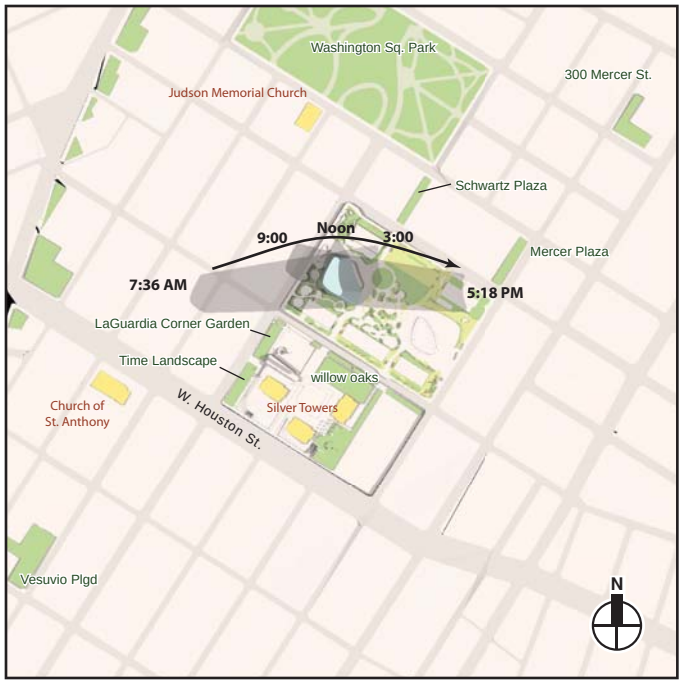
Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Historic Resources with Sunlight-Sensitive Features

Tier 3 Screening Assessment - March 21 / Sept. 21

Figure 6-4

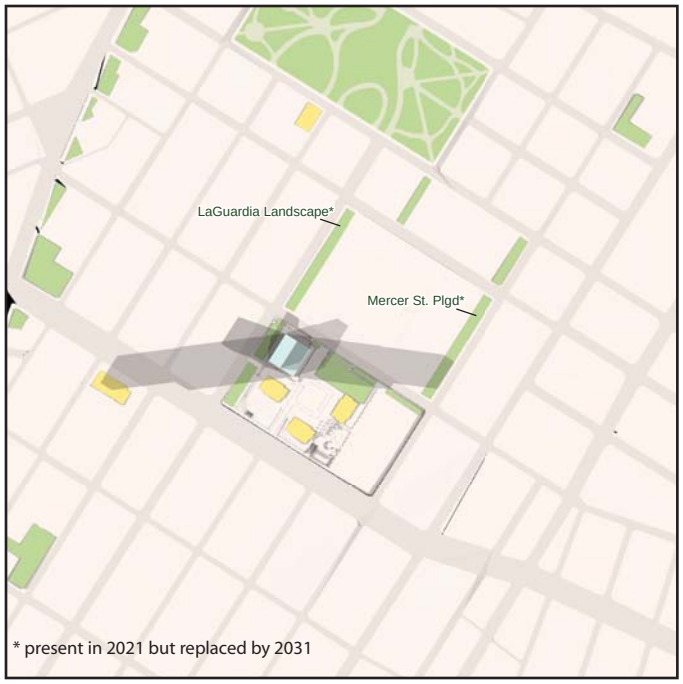
7.1.11



LaGuardia Building



Mercer Building



Bleecker Building



Zipper Building

Note: Daylight Saving Time not used.

Proposed Buildings

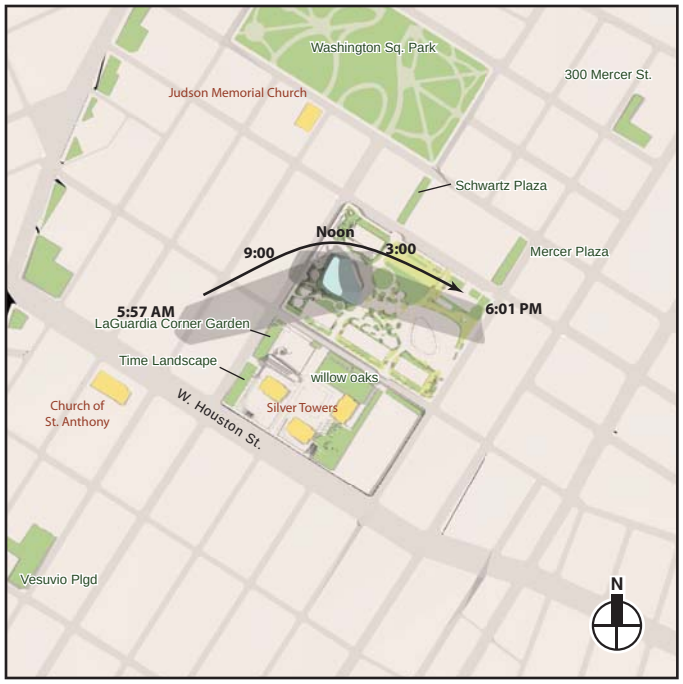
Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Historic Resources with Sunlight-Sensitive Features

Tier 3 Screening Assessment - May 6 / August 6

Figure 6-5

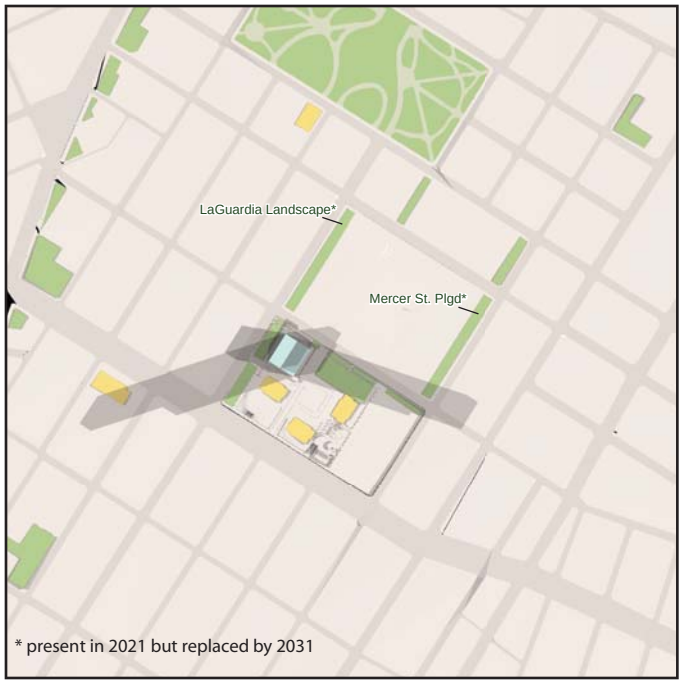
7.1.11



LaGuardia Building



Mercer Building



Bleecker Building



Zipper Building

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Historic Resources with Sunlight-Sensitive Features

NYU Core

Tier 3 Screening Assessment - June 21

Figure 6-6

Silver Tower II and 110 Bleecker Street/ Silver Tower I; the willow oaks in the Oak Grove; and the landscaped areas on the South Block along Bleecker Street. Project shadow could also potentially reach the north façades of all three University Village buildings on the May 6/August 6 and June 21 analysis days, and the north façade of the Church of Saint Anthony of Padua early in the morning on the May 6/August 6 and June 21 analysis days. Project-generated shadow would also reach the south facades of the three University Village buildings on December 21 and of 100 Bleecker Street / Silver Tower II on March 21/September 21. Portions of Schwartz Plaza and Mercer Plaza could potentially be reached by project shadow on the March 21/September 21 and December 21 analysis days. A small area in the southeast corner of Washington Square Park could potentially be reached on the December 21 analysis day. In the 2021 analysis year, Mercer Street Playground could be affected by project-generated shadow on all four analysis days, and the LaGuardia Landscape could be reached on the March/September and December analysis days. Therefore, for these cases, further assessment is required to consider whether incremental shadow would affect these resources given existing intervening buildings, and if so, to determine the extent and duration of any incremental shadow.

The Tier 3 assessment concluded that no project-generated shadow could reach the residential plaza at 300 Mercer Street, the Judson Church windows, Passannante Ballfield, or Vesuvio Playground on any analysis day, and therefore no further assessment is required for these resources.

E. DETAILED SHADOW ANALYSIS

The purpose of the detailed analysis is to determine the extent and duration of incremental shadows on sunlight-sensitive resources and to assess their effects. A baseline or future No Action condition is established, containing existing buildings and sunlight-sensitive resources and any future developments planned in the area, to illustrate the existing shadows from buildings on and near the Proposed Development Area. The future condition with the Proposed Actions and its shadows can then be compared to the baseline condition with shadows from the No Action condition, to determine the incremental shadows that would result with the proposed project.

Three-dimensional representations of the existing buildings in the study area were developed using data obtained from Fugro EarthData, Inc., DoITT, Sanborn maps, and photos taken during site visits, and were merged with the three-dimensional model of the proposed project used in the Tier 3 assessment. Other developments in the area expected to be completed by the build years were also added to the model.

Following the analysis framework described in Chapter 1, “Project Description,” the shadows assessment was performed for Phase 1, the interim year of 2021, comparing the completed proposed development on the South Block with the future No action condition in which no development would have occurred in the Proposed Development Area. Then, for the Phase 2 or 2031 analysis year, shadows with the full build out of the proposed project were compared to shadows in the 2031 No Action condition, in which the Morton-Williams supermarket site would be redeveloped as-of-right.

Shadow assessments were performed for the analysis periods (1.5 hours after sunrise to 1.5 hours before sunset) for each of the representative days indicated in the Tier 3 assessment.

PHASE 1 (2021)

Table 6-1 shows the entry and exit times and total duration of incremental shadows on sun-sensitive resources for the Phase 1 analysis year. **Figures 6-7** to **6-22** depict the extent of incremental increase in shadows at various moments in time, highlighted in red on the sunlight-sensitive resources. The extent, duration and potential effects of project-generated shadow on resources are discussed below by analysis day.

Table 6-1
Incremental Shadow Durations – Phase 1 (2021)

	December 21 8:51 AM-2:53 PM	March 21 / Sept. 21 7:36 AM-4:29 PM	May 6 / August 6 6:27 AM-5:18 PM	June 21 5:57 AM-6:01 PM
PUBLICLY ACCESSIBLE OPEN SPACES				
South Block/Bleecker St. landscaped areas	9:20 AM–2:53 PM Total: 5 hr 33 min	9:00 AM–4:29 PM Total: 7 hr 29 min	10:00 AM–5:18 PM Total: 7 hr 18 min	10:30 AM–6:01 PM Total: 7 hr 31 min
LaGuardia Landscape	8:51 AM–9:40 AM 10:30 AM–11:20 AM 1:30 PM–1:50 PM Total: 1 hr 59 min	11:20 AM–1:10 PM Total: 1 hr 50 min	—	—
Mercer Playground	1:00 PM–2:53 PM Total: 1 hr 53 min	12:30 PM–3:50 PM Total: 3 hr 20 min	12:20 PM–3:10 PM Total: 2 hr 50 min	1:10 PM –3:20 PM 5:40 PM–6:01 PM Total: 2 hr 31 min
Mercer Plaza	2:20 PM–2:40 PM Total: 20 min	—	—	—
GREENSTREETS				
Time Landscape	—	7:36 AM–8:10 AM Total: 34 min	6:27 AM–8:20 AM Total: 1 hr 53 min	6:20 AM–8:40 AM Total: 2 hr 20 min
COMMUNITY GARDENS				
LaGuardia Corner Gardens	8:51 AM–10:30 AM 1:20 PM–1:30 PM Total: 1 hr 49 min	7:36 AM–11:50 AM Total: 4 hr 14 min	6:50 AM–12:20 PM Total: 5 hr 30 min	6:50 AM–12:00 PM Total: 5 hr 10 min
IMPORTANT NATURAL FEATURES				
Oak Grove willow oaks	9:00 AM–1:30 PM Total: 4 hr 30 min	7:36 AM–12:10 PM Total: 4 hr 34 min	8:10 AM–11:20 AM 4:10 PM–5:18 PM Total: 4 hr 18 min	9:30 AM–11:00 AM 4:00 PM–6:01 PM Total: 3 hr 1 min
HISTORIC RESOURCES				
University Village – 100 Bleecker St./ Silver Tower II	8:51 AM–1:00 PM Total: 4 hr 9 min	7:36 AM–12:00 PM Total: 4 hr 24 min	6:27 AM–11:20 AM Total:4 hr 53 min	5:57 AM–11:00 AM Total:5 hr 3 min
University Village – 110 Bleecker St./ Silver Tower I	8:51 AM–9:50 AM Total: 59 min	7:36 AM–10:20 AM Total: 2 hr 44 min	6:27 AM–9:30 AM Total: 3 hr 3 min	5:57 AM–8:50 AM Total: 2 hr 53 min
University Village – 505 LaGuardia Pl.	8:51 AM–9:30 AM Total: 39 min	7:36 AM–8:50 AM Total: 1 hr 14 min	6:27 AM–7:20 AM Total: 53 min	5:57 AM–8:10 AM Total: 2 hr 13 min

Notes:
Table indicates entry and exit times and total duration of incremental shadow for each sunlight-sensitive resource.
Daylight saving time is not used.

DECEMBER 21

December 21, representing the winter months, does not fall within New York's growing season, according to CEQR methodology. Shadow falling on vegetation in winter is not generally considered to cause a significant adverse impact. However, winter shadow can adversely impact users of open space who may rely on sunlight for warmth.

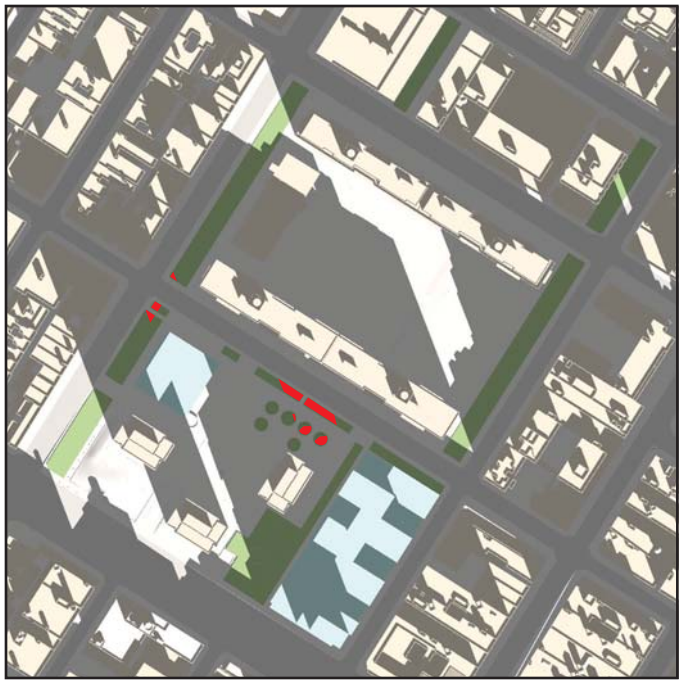
7.1.11



9:00 AM



9:30 AM



10:30 AM



11:30 AM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 1 (2021) - December 21

Figure 6-7

7.1.11



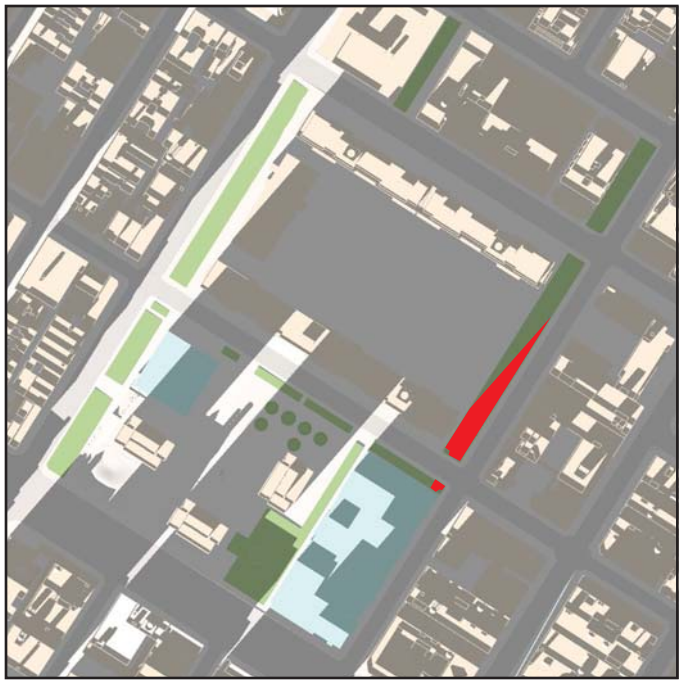
12:30 PM



1:30 PM



2:30 PM



2:50 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

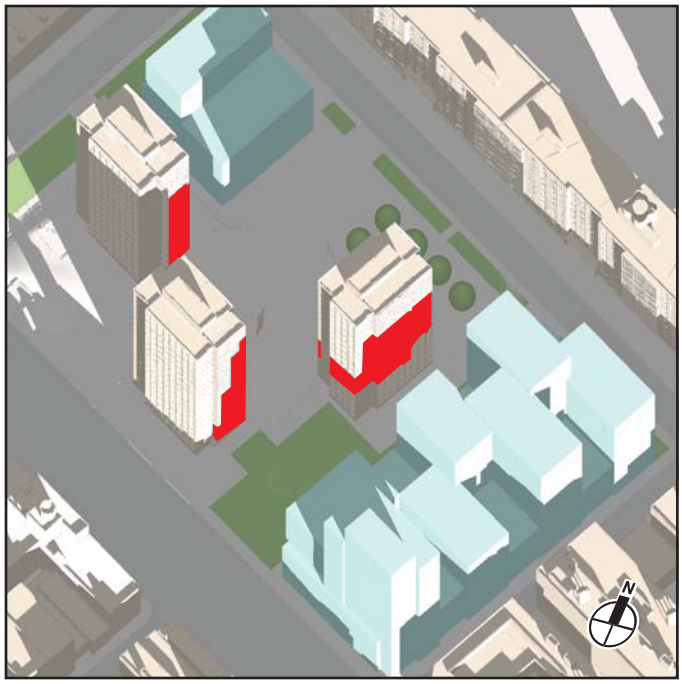
Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 1 (2021) - December 21

Figure 6-8

7.1.11



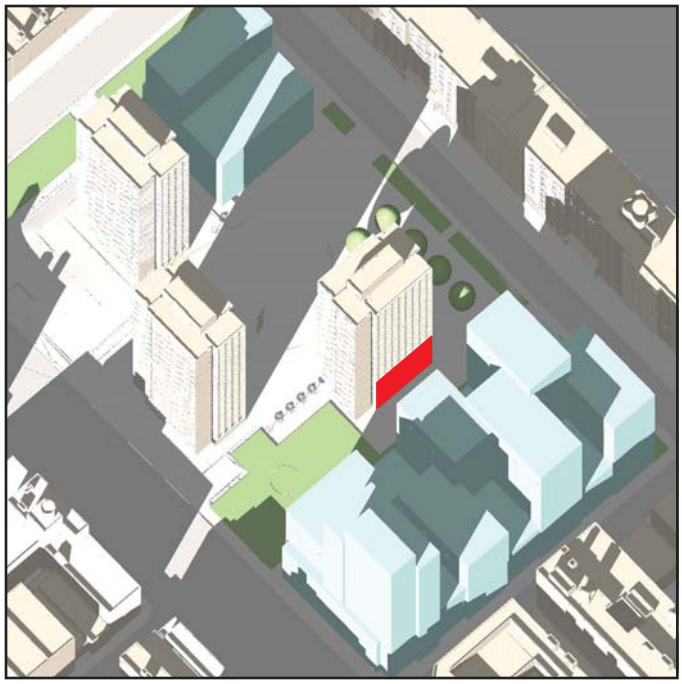
9:00 AM



10:15 AM



11:30 AM



12:45 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

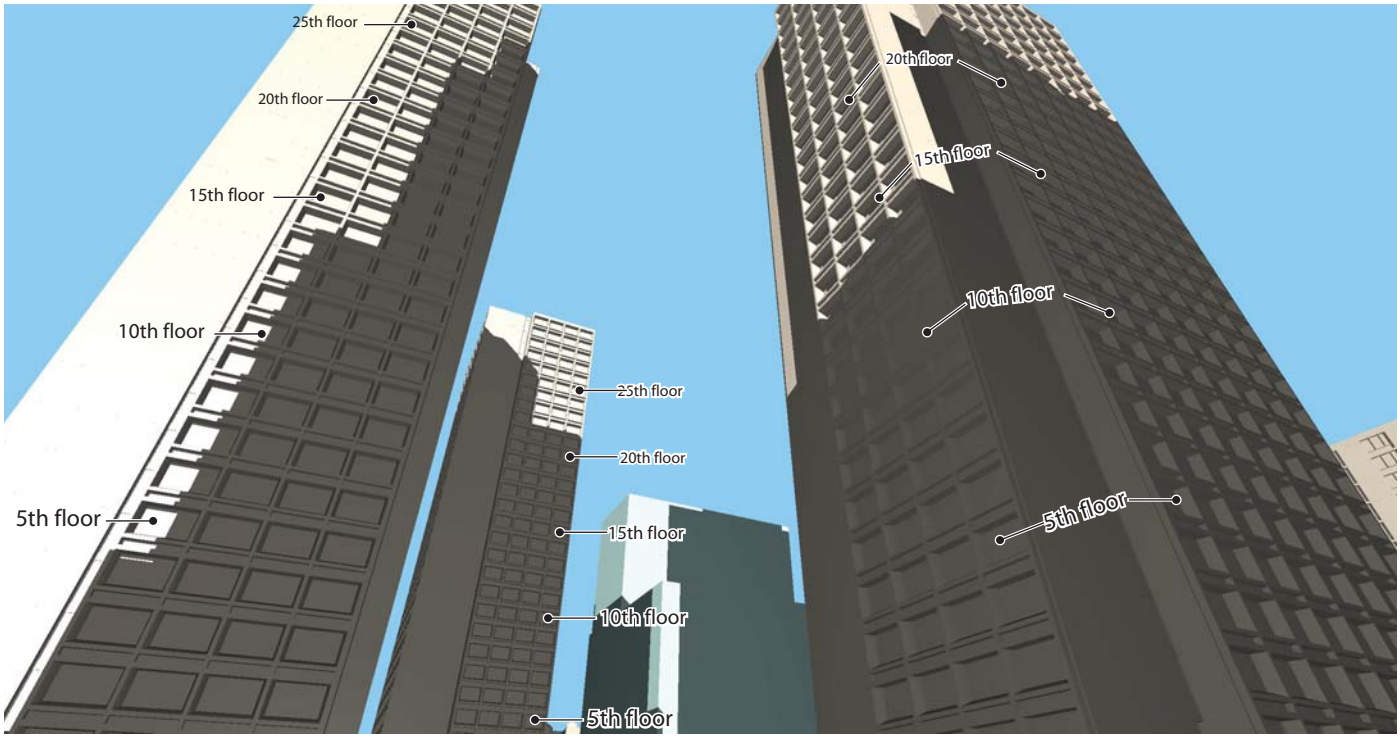
Incremental Shadow on University Village Facades

NYU Core

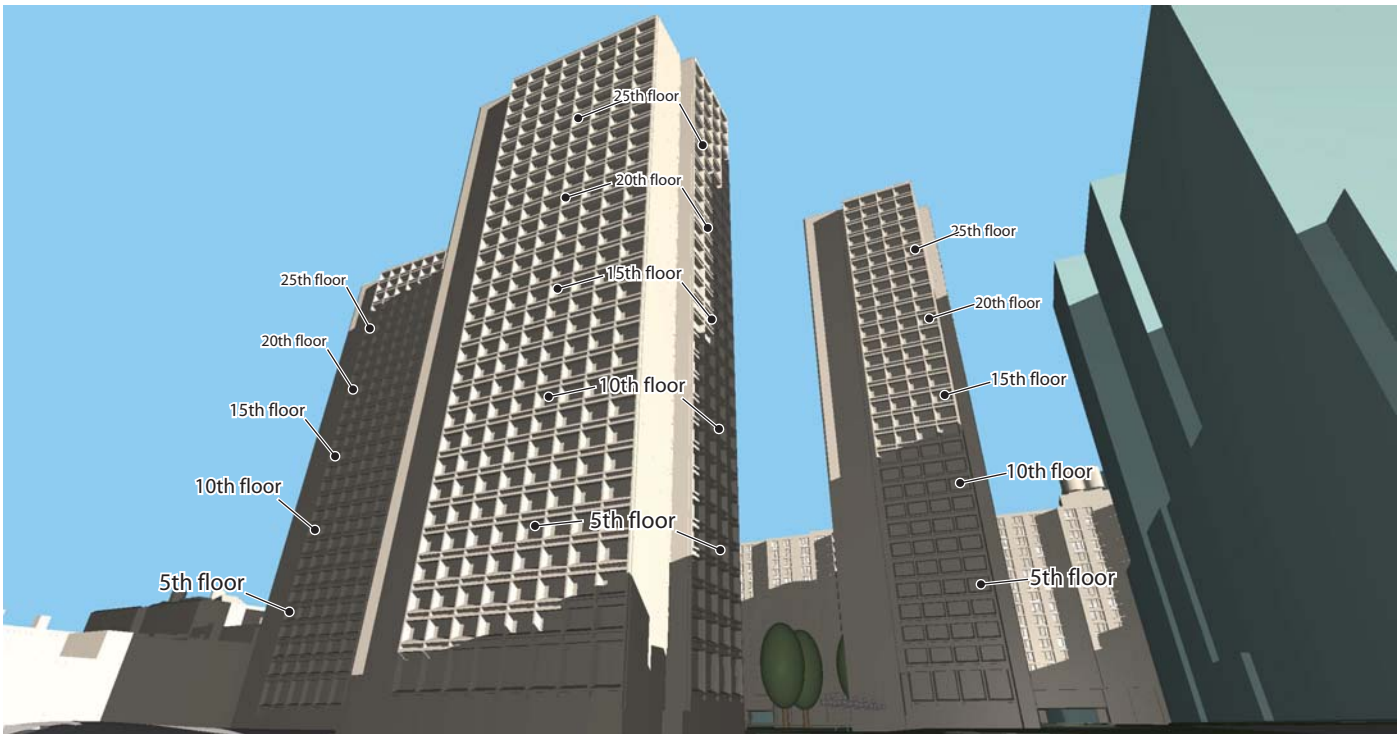
Phase 1 (2021) - December 21

Figure 6-9

11.28.11



Ⓐ Pedestrian view from proposed Greene Street Walk on South Block looking northwest



Ⓑ Pedestrian view from southwest corner of West Houston Street and Greene Street looking north

See Figure 6-27 for map key showing pedestrian locations A and B.

9.30.11



8:00 AM



9:00 AM



10:00 AM



11:00 AM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 1 (2021) - March 21 / Sept. 21

Figure 6-11

9.30.11



12:00 PM



1:00 PM



2:30 PM



4:00 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

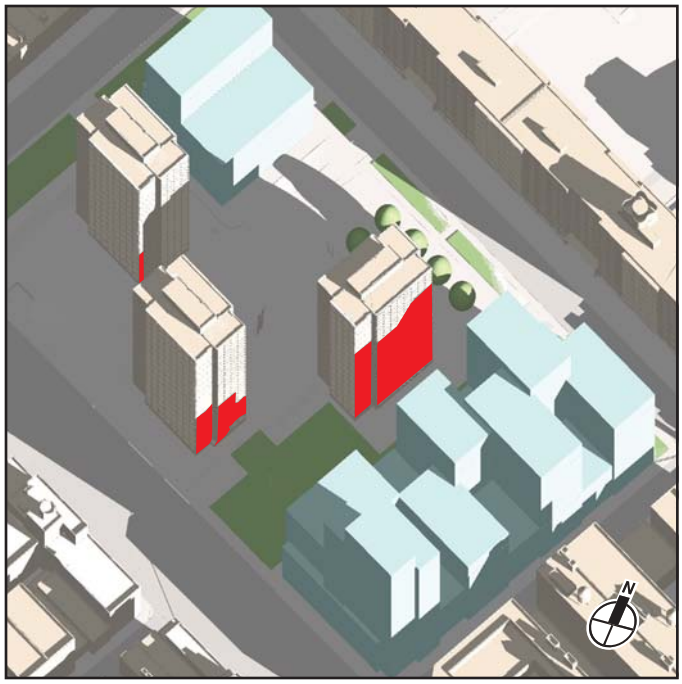
Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 1 (2021) - March 21 / Sept. 21

Figure 6-12

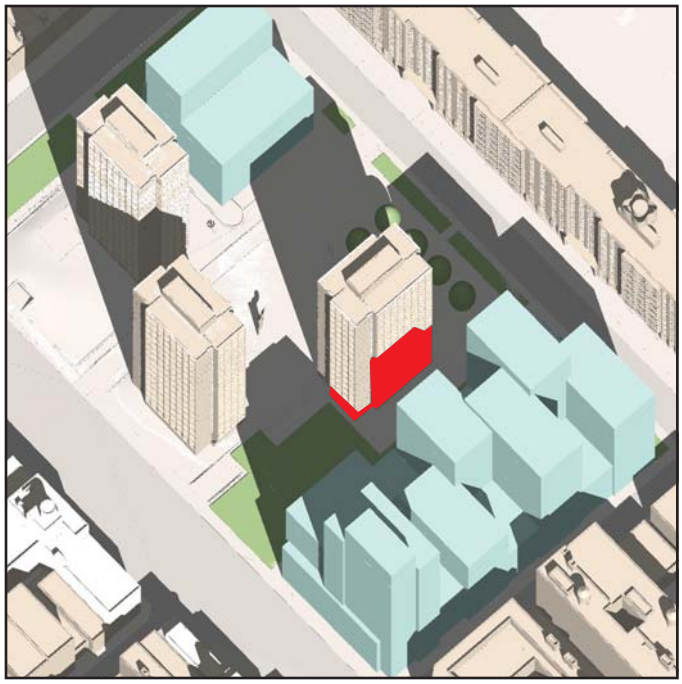
9.30.11



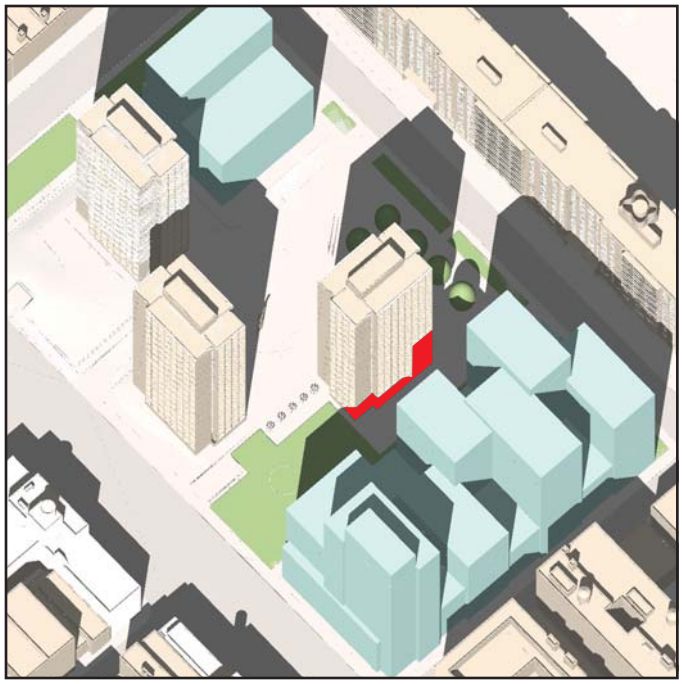
8:00 AM



9:15 AM



10:30 AM



11:45 AM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

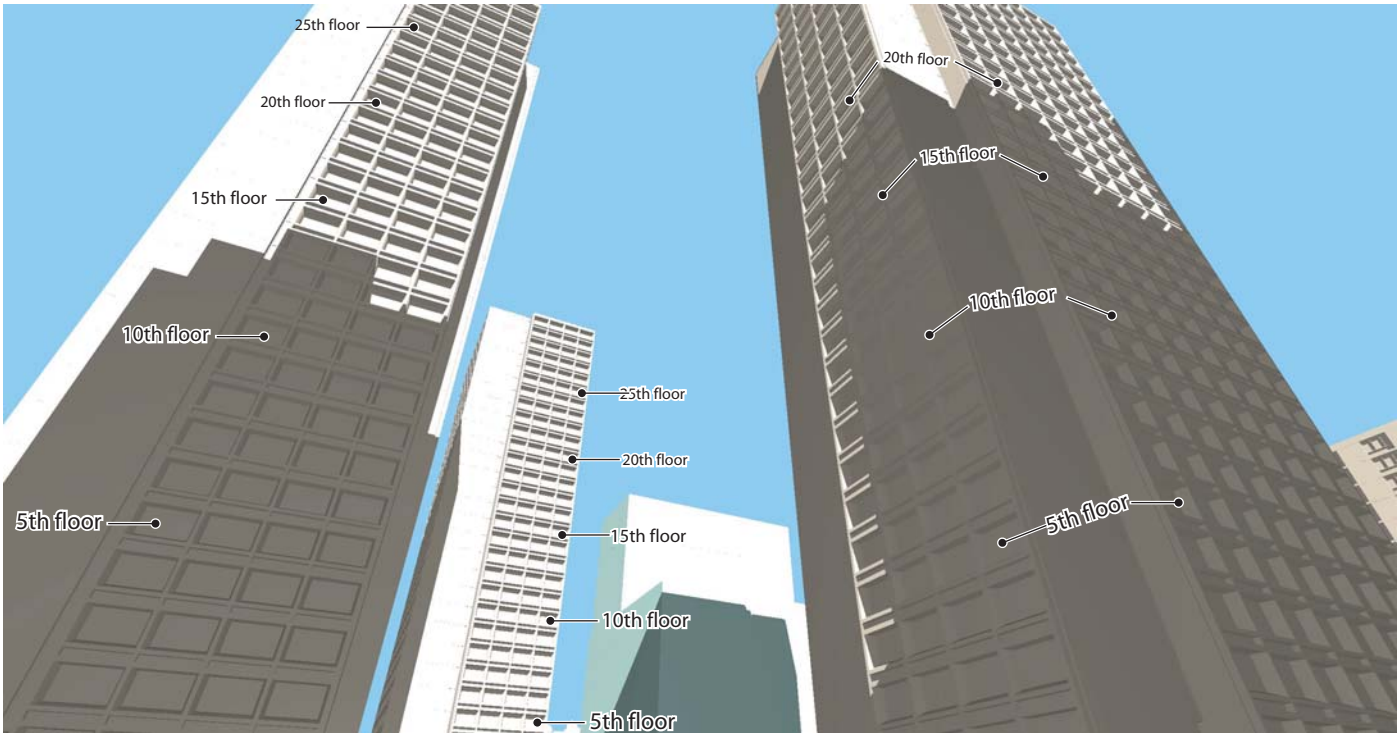
Incremental Shadow on University Village Facades

NYU Core

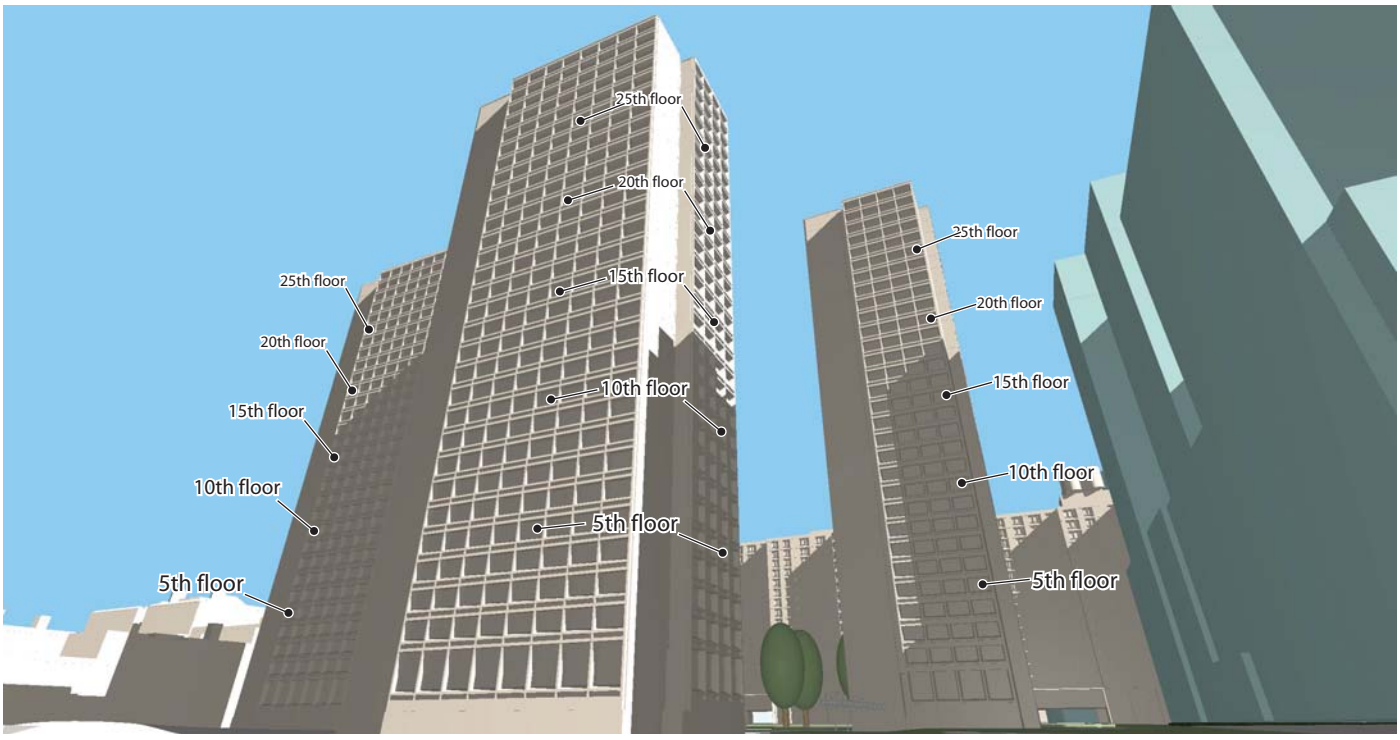
Phase 1 (2021) - March 21 / Sept. 21

Figure 6-13

11.28.11



Ⓐ Pedestrian view from proposed Greene Street Walk on South Block looking northwest



Ⓑ Pedestrian view from southwest corner of West Houston Street and Greene Street looking north

See Figure 6-27 for map key showing pedestrian locations A and B.

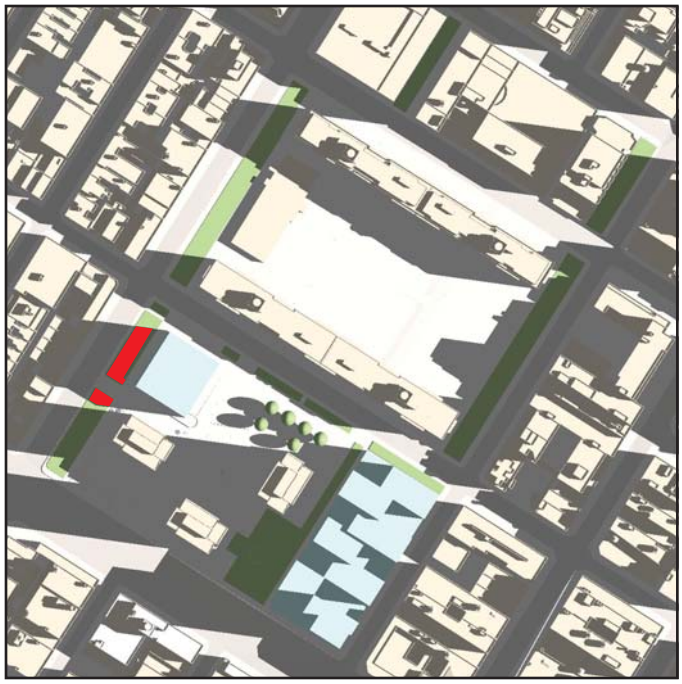
March 21/Sept. 21 - 9:30 AM with Proposed Actions

Figure 6-14

9.30.11



7:00 AM



8:00 AM



9:00 AM



10:00 AM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 1 (2021) - May 6 / August 6

Figure 6-15

9.30.11



11:00 AM



12:00 PM



1:00 PM



2:00 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

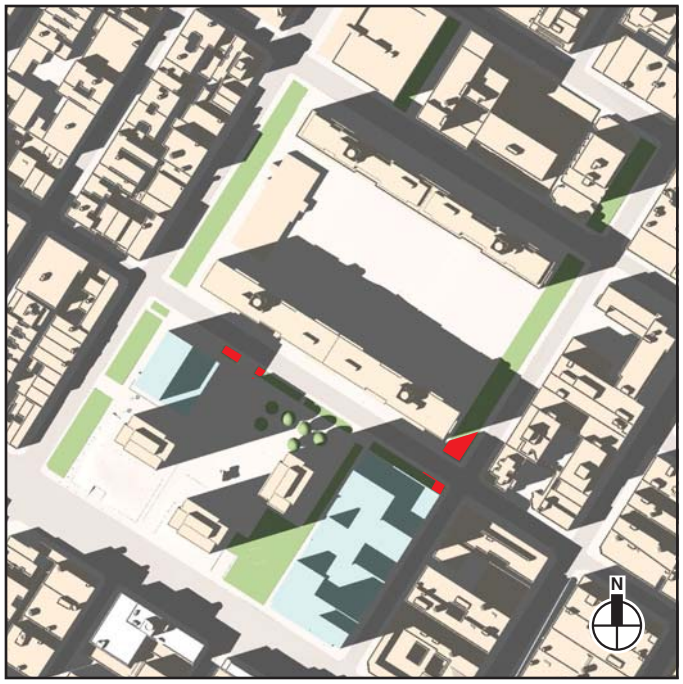
Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 1 (2021) - May 6 / August 6

Figure 6-16

9.30.11



3:00 PM



4:00 PM



5:00 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 1 (2021) - May 6 / August 6

Figure 6-17

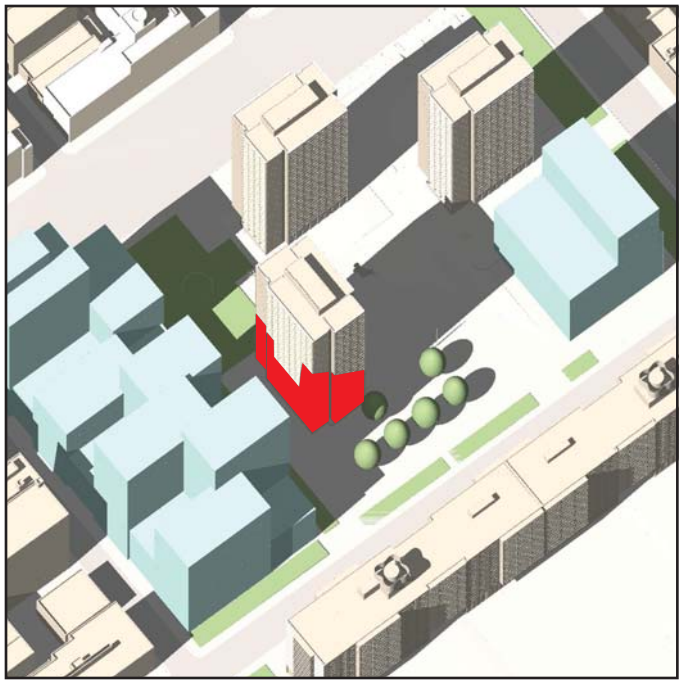
9.30.11



7:00 AM



8:15 AM



9:30 AM



10:45 AM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Incremental Shadow on University Village Facades

NYU Core

Phase 1 (2021) - May 6 / August 6

Figure 6-18

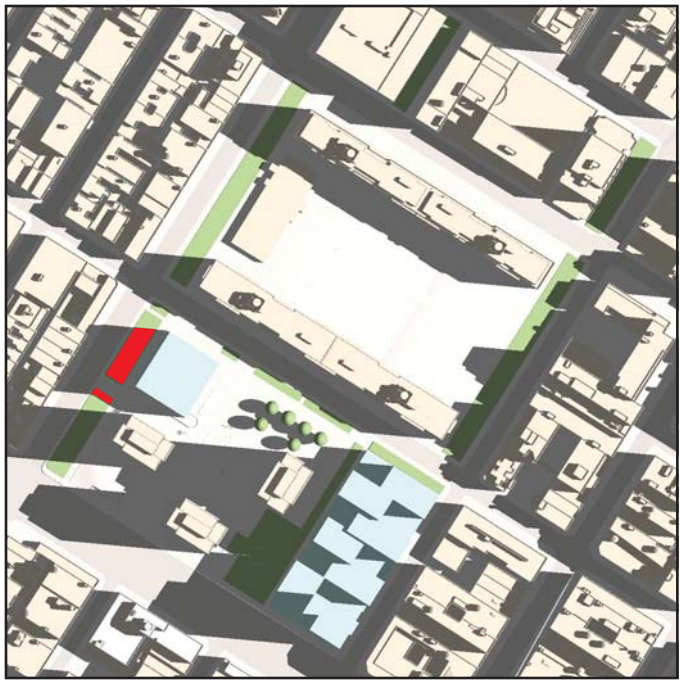
9.30.11



6:30 AM



7:30 AM



8:30 AM



9:30 AM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

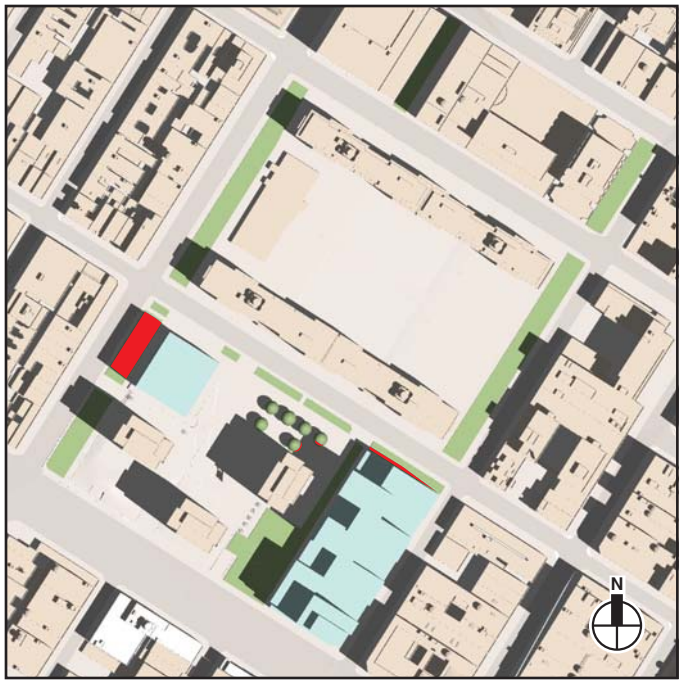
Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 1 (2021) - June 21

Figure 6-19

9.30.11



10:30 AM



11:30 AM



12:30 PM



1:30 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

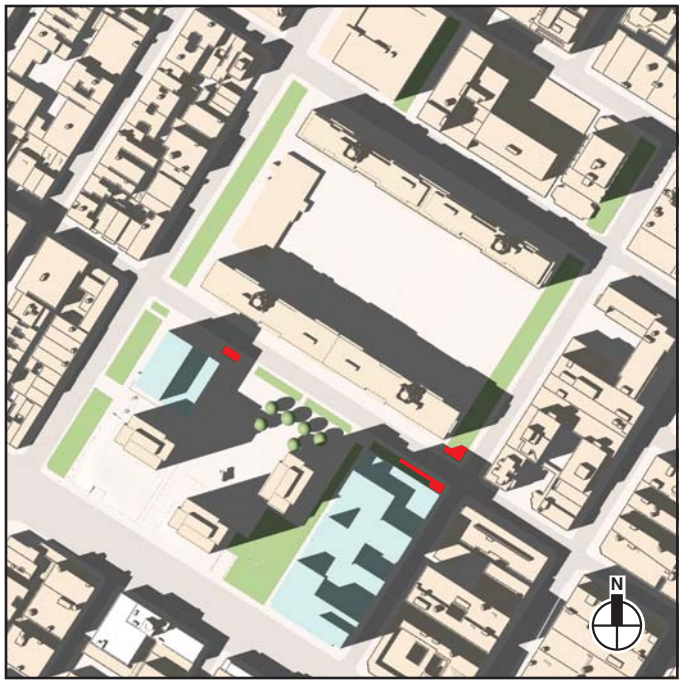
Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 1 (2021) - June 21

Figure 6-20

9.30.11



2:30 PM



3:30 PM



4:30 PM



5:30 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Incremental Shadow on Sun-Sensitive Resource

NYU Core

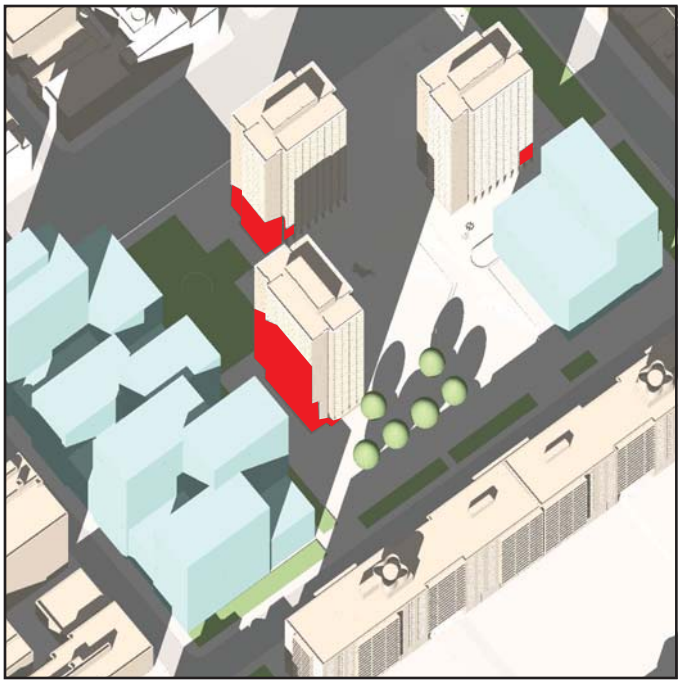
Phase 1 (2021) - June 21

Figure 6-21

9.30.11



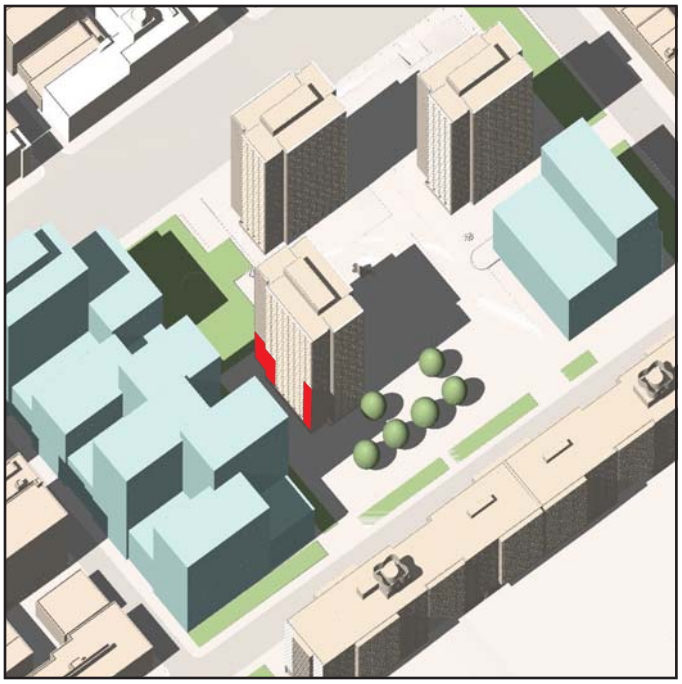
6:30 AM



7:45 AM



9:00 AM



10:15 AM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Incremental Shadow on University Village Facades

NYU Core

Phase 1 (2021) - June 21

Figure 6-22

LaGuardia Corner Gardens

On the morning of December 21, shadows fall to the northwest. The proposed Bleecker Building's shadow would fall northwest across portions of the adjacent LaGuardia Corner Gardens, eliminating the remaining areas of sunlight on the Garden between 8:51 AM and 10:30 AM. The incremental shadow would not occur during the growing season, and the public accessibility of the garden is extremely limited in the winter months. Therefore, the proposed project would not cause significant adverse shadow impacts to this open space during the winter months.

South Block/Bleecker Street landscaped areas

The landscaped areas along the north side of the South Block would receive areas of incremental shadow from both proposed buildings on the South Block for much of the December 21 analysis day. The incremental shadow would pass across the different sections of the landscaping over the course of the day. The vegetation would not be significantly impacted by the incremental shadow in the winter months.

LaGuardia Landscape

About two hours of incremental shadow would also fall on the LaGuardia Landscape, north of the proposed Bleecker Building. The area would experience sunlight in the afternoon, and in any case the vegetation would not be significantly impacted by the incremental shadow in the winter months.

Willow oaks

Portions of the Oak Grove area containing willow oaks would be shaded by the proposed Zipper Building from 9:00 AM to 1:30 PM. The incremental shadow would move west to east, passing across different individual oak trees during the course of the nearly four-hour period. The trees would not be significantly impacted by the incremental shadow in the winter months.

Mercer Street Playground

Beginning at 1:00 PM incremental shadow from the proposed Zipper Building would move onto the southwest corner of the landscaped area south of the Mercer Street Playground. At around 1:30 PM the shadow would move onto the playground area, and from 2:00 PM to 2:53 PM the incremental shadow would fall on most or the entire playground. However, most of the space would continue to get sun in the middle of the day prior to 2:00 PM, and the space would not experience significant shadow impacts as a result of the proposed project during the winter months.

Mercer Plaza

Shadow from the proposed Zipper Building would fall on part of Mercer Plaza for 20 minutes near the end of the December 21 analysis day, and this brief new shadow would not cause a significant adverse shadow impact to Mercer Plaza during the winter months.

Schwartz Plaza

Shadow from the proposed project would not reach past the Washington Square Village buildings to Schwartz Plaza during the winter months.

University Village

At the latitude of New York City, at the start of the December 21 analysis day at 8:51 AM, sunlight and shadows fall to the northwest, onto the east and south facades of buildings.

At 8:51 AM, the proposed Zipper Building's shadow, along with existing shadows, would fall on portions of all three of the University Village towers' east facades, and on a part of 100 Bleecker Street/Silver Tower II's south façade (see **Figure 6-9** showing 9:00 AM). The Zipper Building's shadow would decrease in size and move off 505 LaGuardia Place by 9:30 AM, and off 110 Bleecker Street /Silver Tower I by 9:50 AM, so each of those two buildings would be affected by incremental project shadows for an hour or less. Even during this early period on December 21, when the incremental shadow from the proposed Zipper Building would cover fairly large portions of the east facades of the University Village towers, and a portion of the south façade of 100 Bleecker Street/Silver Tower II, large areas of the south facades and parts of the east facades would be in direct sunlight (see **Figure 6-10** showing pedestrian views at 9:00 AM, including a view from the proposed Greene Street Walk).

Incremental shadow would continue to fall on fairly large portions of the east and south facades of 100 Bleecker Street/Silver Tower II until around 11:30 AM. During this hour-and-40-minute period, much or all of the south and east facades of the other two towers would be in sun, providing pedestrians with the opportunity to appreciate the play of light and shadow on the window bays and adjacent sheer facades (see **Figure 6-9** showing 10:15 AM and 11:30 AM).

After 11:30 AM the Zipper Building's shadow would decrease in size on 100 Bleecker Street/Silver Tower II. By noon, most of the east and south facades of 100 Bleecker Street/Silver Tower II would be in sun (the street grid in Manhattan is not aligned due north/south but rather northeast/southwest, following the alignment of the island itself, and at noon the sun still shines on the east, as well as south, facades of buildings). The Zipper Building's shadow would exit the south façade by 12:30 PM and the east façade by 1:00 PM (see **Figure 6-9** showing 12:45 PM).

Pedestrians walking in or by the project blocks would continue to have the opportunity to enjoy views of the sunlit facades of the University Village towers. The contrast of light and shadow on the facades would remain available throughout the day, and this feature of the architectural resource would continue to be available for appreciation by the public. In addition, the proposed project's Greene Street Walk would introduce a new publicly accessible vantage point from which to view the facades. Therefore, the project would not cause a significant adverse shadow impact on this architectural resource during the winter months.

MARCH 21/SEPTEMBER 21

March is considered the beginning of the growing season in New York City, and September 21, which has the same shadow patterns as March 21, is also within the growing season. Shadows on March 21 and September 21 are of moderate length.

Time Landscape

Early on the March 21/September 21 analysis day, shadows from both the Zipper and Bleecker Buildings would fall briefly on parts of the Time Landscape, for a combined total of 34 minutes. This space would receive ample sunlight through the rest of the analysis day, and no adverse shadow impacts from the proposed project would occur during this period.

LaGuardia Corner Gardens

Shadow from the Bleecker Building would fall on fairly substantial areas of the LaGuardia Corner Gardens from the 7:36 AM start of the analysis day until 11:50 AM, leaving only very small areas of sun for most of this period (see **Figures 6-11** and **6-12**). The garden would receive about four hours of sunlight in the afternoon, but the project-generated shadow through the morning could cause significant adverse impacts to shade-intolerant species planted in the garden due to the substantial extent and duration of the new shadow.

South Block/Bleecker Street landscaped areas

The landscaped areas along the north side of the South Block would receive small areas of incremental shadow from both proposed buildings on the South Block throughout the March 21/September 21 analysis day. Incremental shadow as well as existing shadow from the University Village towers would pass across the different sections of the landscaping during the course of the day, with each section experiencing both sun and shade. No adverse shadow impacts from the proposed project would occur during this period.

Willow oaks

Of the six willow oak trees located in the Oak Grove, two are already in serious decline and should be removed irrespective of the project. Each of the six willow oak trees would experience incremental shadows from the proposed Zipper Building, the duration ranging from one hour to three and a half hours depending on the individual tree. The incremental shadow would move east and clockwise across the Oak Grove area, beginning at 7:36 AM and exiting the last tree canopy at 12:10 PM. The incremental shadow would move across the space, shading different trees at different times, while existing shadows from the University Village towers would also pass across the trees beginning at about 9:20 AM.

Without the proposed project, the six willow oaks would receive between four and six hours of sunlight during the analysis period. Specifically, the two willow oaks in the more southern of the two rows would receive four to four and a half hours of sun, and the four willow oaks in the northern row would experience five and a half to six hours of sun.

With the proposed project, the two willow oaks in the southern row would receive one and a half to two and a half hours of sun, and the four in the northern row would receive two and a half to five hours of sun. Willow oaks are generally considered shade-intolerant[1], and as a result of the proposed project some of the six trees would receive less than the four-to-six-hour minimum threshold of daily sun that is recommended in the *CEQR Technical Manual*. However, as the willow oak typically does not begin to "leaf out" until the middle of April, these individuals are not expected to suffer seriously from incremental shading early in the growing season. Analysis of incremental shadows on April 21—representing a day during the peak growing season—found that all of the willow oaks would receive at least 5.5 hours of sunlight (see Table 6-2). Therefore, with the implementation of the tree maintenance plan outlined below, by 2021 the proposed project would not result in a significant adverse impact to the willow oak trees.

[1] Dey, John *The Ecological Basis for Oak Silviculture in Eastern North America* (http://www.uky.edu/~jmlhot2/Resources/Oak%20Forest%20Ecosystems-McShea-ch.5.pdf). "Shade Intolerant" is a comparative term to describe the ability of a tree species to survive and grow under low light levels.

Table 6-2
Duration of Direct Sunlight (in Hours) on Each of the Six Willow Oaks

	21-Mar		6-Apr		21-Apr		6-May		21-May	
	existing	With Proposed project	existing	With Proposed project	existing	With Proposed project	existing	With Proposed project	existing	With Proposed project
N1	6	5	6	6	7	6.5	8.5	7.5	9.5	8
N2	5.5	4	6.5	6	6.5	6.5	8	7.5	9	8
N3	5.5	3.5	7	5.5	7	6	7.5	7	8.5	7.5
N4	6	2.5	6.5	4	7	5	7	6	7.5	7
S5	4.5	2.5	6.5	5.5	6.5	6.5	7	6.5	8	7
S6	4	1.5	5.5	3.5	7	5.5	6.5	5.5	7.5	6.5

Notes:

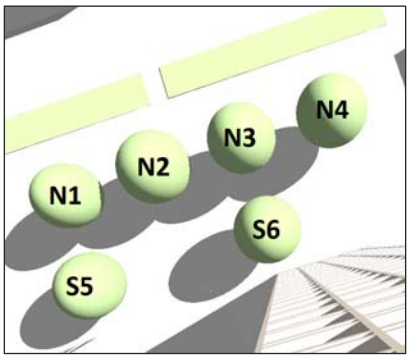
See graphic below for tree identification key.

Durations are approximate. Sunlight and shadows move across the tree canopies as the daylight hours pass; a tree was considered to be in sun when it was completely in sun or, as shadows were moving onto or off of its canopy, at least half (approximately) of the canopy was in sun.

The analysis period for each representative day begins an hour and a half after sunrise and ends an hour and a half before sunset.

In June and July, all the trees would receive at least seven hours of sunlight during the day.

To avoid the potential for significant adverse impacts on the willow oaks, NYU would implement the following maintenance plan for the four willow oaks not already in serious decline (i.e., N2, N3, S5, and S6 in graphic):



1. Pull back lawn from the base of the trees, by hand, to a radius of 6 feet around each tree. Be careful not to damage trunk or roots.
2. Use an Airspade or other supersonic air tool to loosen soils to a depth of at least 8 inches within this radius.
3. Mix ¾" of well-finished leaf compost into the loosened soil and till in the compost with the Airspade.
4. Cover the amended area with a 1-2" layer of clean mulch. Make sure that mulch is kept back at least 1 foot from the basal flare of the trunk on each tree.
5. Before, during and for two years following completion of the construction project, treat the root zones of the trees twice annually just after leaf-out in spring and again in late August-early September with Biopak Plus or equivalent. This material is rich in humates and helps the existing roots to throw new absorbing roots.
6. Before, during and for two years following completion of the construction project, test soils before each annual application to assess need for other macro or micro nutrients and apply accordingly.
7. Before, during and for two years following completion of the construction project, apply supplementary water to the trees during the summer when less than 1 inch of rain has fallen in the preceeding week. Apply 1 inch of water on each watering. This watering may be accomplished with a sprinkler, if desired. Set a measure can or other device in the area of throw to measure when the 1 inch has been supplied.

NYU proposes to implement the above-described maintenance plan for the full life expectancy of the willow oaks in the future without the Proposed Actions, which is estimated to be 2031.

LaGuardia Landscape

Shadow from the proposed Bleecker Building would pass across the southern end of LaGuardia Landscape from 11:20 AM to 1:10 PM. The incremental shadow would affect a relatively small portion of the landscape, and the open space would continue to be mostly in sun through the analysis day. Therefore the incremental shadow would not cause a significant adverse impact during this time period.

Mercer Street Playground

Shadow from the Zipper Building would pass across the southern part of the Mercer Street Playground for almost three and a half hours in the afternoon, including the fenced-off area of landscaping at the southern end of the block. The northern area of the space would remain mostly in sun during this time, and portions of the space would be in sun earlier in the day as well. The project would therefore not cause significant adverse shadow impacts to the playground during this time period.

Schwartz Plaza and Mercer Plaza

Shadow from the proposed project would not reach either Schwartz Plaza or Mercer Plaza on March 21/September 21, due to intervening buildings.

University Village

At the latitude of New York City, sunlight and shadows fall on the east facades of buildings at the start of the March 21/September 21 analysis day at 7:36 AM, and somewhat obliquely on the north facades as well. At around 9:00 AM the sun shines directly on east facades and by 9:15 AM begins to fall on the south facades as well as the east facades of buildings.

The proposed Zipper Building's shadows would fall on portions of the east facades of all three University Towers buildings from 7:36 AM until about 8:45 AM (see **Figure 6-13** showing 8:00 AM). It would also fall on the north facade of 100 Bleecker Street/Silver Tower II and, until 8:15 AM, a very small portion of the north façade of 110 Bleecker Street/Silver Tower I. During this initial hour-and-15-minute period of the analysis day, large areas of the University Village towers' east and north facades would remain in sunlight, particularly those of 110 Bleecker Street/Silver Tower I (see **Figure 6-13**).

From approximately 9:00 AM to 9:30 AM, incremental shadow from the Zipper Building would fall on the lower portions the east and south facades of 100 Bleecker Street/Silver Tower II and 110 Bleecker Street/Silver Tower I (see **Figure 6-13** showing 9:15 AM). The upper portions of these facades would all be in sunlight at this time. By 9:30 AM, the Zipper Building's shadow would move off the south façade of 110 Bleecker Street/Silver Tower I, and nearly off the south façade of 100 Bleecker Street/Silver Tower II (see **Figure 6-14** showing pedestrian-level views at 9:30 AM). The upper portions of the east facades of the three University Village buildings would be in sunlight, and most or all of the south facades of the two Silver Tower buildings as well (see **Figure 6-14**). As shown in **Figure 6-14**, The proposed Greene Street Walk would provide new publicly accessible views of the sunlit facades.

Shadow from the Zipper Building would exit the east façade of 110 Bleecker Street/Silver Tower I at 10:20 AM, and remain on the east façade, and very minimally on the south façade, of

100 Bleecker Street/Silver Tower II until noon (see **Figure 6-13** showing 10:30 AM and 11:45 AM).

Overall, large areas of the gridded and sheer concrete facades of the three University Village towers would remain in direct sunlight throughout the morning despite the incremental shadow, and the project would not result in significant adverse shadow impacts to any of the University Village building facades during this time period.

MAY 6/AUGUST 6

May 6 falls halfway between the March 21 equinox and the June 21 summer solstice. August 6 falls halfway between June 21 and the September 21 equinox, and has the same shadow patterns as May 6. The May 6/August 6 analysis day is representative of the growing season in the City. Shadows on this day are shorter than on the equinoxes, and the length of the day is longer.

Time Landscape

On the May 6 and August 6 analysis day shadow from the proposed Bleecker Building would fall on a portion of the Time Landscape for nearly three hours early in the morning, and in combination with existing shadows would remove all remaining sunlight from the space between 6:20 AM and 7:40 AM. The Time Landscape would continue to be mostly or entirely in sun from midmorning to late afternoon, and the project would not result in a significant adverse shadow impact on this day.

LaGuardia Corner Gardens

Shadow from the Bleecker Building would fall on the LaGuardia Corner Gardens for five and a half hours, covering large areas of the garden for much of that period, and leaving only very small areas of sun for most of this period (see **Figures 6-15** and **6-16**). The garden would be in sun for four and a half hours in the afternoon, but the project-generated shadow through the morning could cause significant adverse impacts to the shade intolerant species in the garden due to the substantial extent and duration of the new shadow.

South Block/Bleecker Street landscaped areas

The landscaped areas along the north side of the South Block would experience areas of incremental shadow from late morning through the afternoon. The incremental shadow would move across the different areas of the landscaping during the course of the day, with each section experiencing both sun and shade. Therefore the incremental shadow would not cause a significant adverse impact during this time period.

Willow oaks

Three of the six willow oaks on the eastern side of the Oak Grove area would experience between one and three hours of incremental shadow from the Zipper Building on the May 6/August 6 morning. Four of the willow oaks on the western side of the Oak Grove would experience up to an hour of incremental shadow and 15 minutes of incremental shadow in the late afternoon from the proposed Bleecker Building. Despite these durations of new shadow, even the trees that would experience the longest durations of new shadow (in the southeast part of the Grove), would still receive at least five to six hours of sun on during the analysis period on May 6/August 6, and consequently would not be significantly impacted by the proposed project.

University Village

At the start of the May 6/August 6 analysis day, sunlight and shadows fall on the north as well as east facades of buildings in the Manhattan street grid where the project site is located. Not until about 9:45 AM does the sun shine, and cast shadows, directly on the east facades of the University Village towers and surrounding buildings. After 9:45 AM the sun shines on the east and south facades.

The proposed Zipper Building's shadow would fall on the lower stories of the north and east facades of the two Silver Tower buildings from the start of the analysis day at 6:27 AM until 8:30 AM (see **Figure 6-18**). In addition, the Bleecker Building would cast a small incremental shadow on the north façade of the 505 LaGuardia Place building from 6:27 AM to 7:20 AM. Even during this early period, however, large areas of all three buildings' north and east facades would remain sunlit (see **Figure 6-18**).

From 8:30 AM to 9:30 AM the Zipper Building would no longer cast a shadow on the north façade of 110 Bleecker Street/Silver Tower I, but would continue to cast a small shadow at the base of that building's east façade. At the same time, from 8:30 AM until 9:45 AM the Zipper Building's shadow would also fall on the east and north facades of 100 Bleecker Street/Silver Tower II. Large portions of the east and north facades of all three buildings would remain sunlit during this time, as shown in **Figure 6-18**.

From 9:45 AM until 10:15 AM the Zipper Building's shadow would fall on the east and south facades of 110 Bleecker Street/Silver Tower I, and from 10:15 AM to 11:20 AM on the east façade only. Most or all of the east and south facades of all three University Village buildings would be in sun during this period, as shown in Figure 6-18.

Substantial areas of the gridded and sheer concrete facades would remain in direct sunlight throughout the May 6/August 6 morning, and particularly after the first hour of the analysis period. Therefore, the project would not result in significant adverse shadow impacts during this time period.

Church of Saint Anthony of Padua

The detailed analysis found that due to the intervening University Village towers, shadow from the Bleecker Building would not reach the north façade of the Church of Saint Anthony of Padua.

JUNE 21

June 21 has the longest amount of daylight of the year, with an analysis period of 12 hours. Shadows fall to the southwest early in the morning and to the southeast late in the afternoon, and shadows at mid-day on June 21 are shorter than at any other time of year. June 21 is also in the growing season.

Time Landscape

Shadow from the proposed Bleecker Building would fall on a portion of the Time Landscape on June 21 from 6:20 AM until 8:40 AM, and in combination with existing shadows would remove all remaining sunlight from the space between 6:20 AM and 7:30 AM. The Time Landscape would continue to be mostly or entirely in sun from midmorning to late afternoon, and the project would not result in a significant adverse shadow impact on this day.

LaGuardia Corner Gardens

Shadow from the Bleecker Building would fall on the LaGuardia Corner Gardens from 6:50 AM until noon, covering large areas of the garden for portions of that period. Although the garden would continue to receive sun for four and a half to five hours in the afternoon, the approximately five hours of project-generated shadow in the morning could cause significant adverse impacts to shade-intolerant species within the garden, due to the substantial extent and duration of the new shadow.

South Block/Bleecker Street landscaped areas

The landscaped areas along the north side of the South Block would experience areas of incremental shadow in the late morning and afternoon, but less than in other seasons, because shadows are shortest in June. The incremental shadow would move across the different areas of the landscaping, primarily on the east and west ends of the block. The middle areas would experience very little shadow, either project-generated or existing. Therefore, there would be no significant adverse shadow impact during this time period.

Willow oaks

The two willow oak trees nearest the southeastern corner of the Grove would receive up to one and a half hours of incremental shadow from the Zipper Building between 9:30 AM and 11:00 AM. Between one and all six willow oaks would receive incremental shadow from the Bleecker Building between 4:00 PM and 6:01 PM. However, all six willow oak trees would receive eight hours of sun or more during the June 21 analysis day, and no significant shadow impacts would occur.

University Village

At the start of the June 21 analysis day, sunlight and shadows fall on the north as well as east facades of buildings in the Manhattan street grid where the project site is located. At about 10:15 AM the sun shines, and cast shadows, directly on the east facades of the University Village towers and surrounding buildings. Beginning at about 10:40 AM the sun shines on the east and south facades.

The proposed Zipper Building's shadow would fall on the lower stories of the north and east facades of the two Silver Tower buildings from the start of the analysis day at 5:57 AM until 8:50 AM (see **Figure 6-22**); at 8:50 AM the incremental shadow would exit both facades of 110 Bleecker Street/Silver Tower I. The Bleecker Building would also cast a small incremental shadow on the north façade of the 505 LaGuardia Place building from 5:57 AM to 8:10 AM. Even during this early period, however, large areas of the three buildings' north and east facades would remain sunlit (see **Figure 6-22**).

The Zipper Building would continue to cast a shadow on a portion of the north and east façades of 100 Bleecker Street/Silver Tower II from 8:50 until 10:15, when the shadow could no longer fall on the north façade due to the sun's position in the sky. It would continue to fall on lower portions of 100 Bleecker Street/Silver Tower II's east façade until 11:00 AM, and would not be long enough to reach the south façade during this time.

Substantial areas of the facades would remain in sunlight throughout the June 21 morning. Therefore the project-generated shadow would not result in a significant adverse impact during this period.

Church of Saint Anthony of Padua

The detailed analysis found that shadow from the Bleecker Building would not reach the north façade of the Church of Saint Anthony of Padua on the May 6/August 6 analysis day, due to the intervening University Village towers.

PROPOSED SOUTH BLOCK OPEN SPACE

According to CEQR methodology, open space that would be developed as part of a project cannot experience adverse impacts from the project, because without the project the space wouldn't exist. However, a discussion of shadows on the proposed open space is often provided for informational purposes.

Similar to the other resources in the middle of the South Block, the proposed South Block open space would experience shadow from the adjacent Zipper Building during the mornings throughout the year, and shadow from the University Village towers in the afternoons. In the late spring and summer the southern area—the playground and dog run—would be in sun for long periods. Conversely, the Greene Street Walk adjacent to the Zipper Building would be in shade for most of the day in all seasons.

PHASE 2 (2031)

In Phase 2, the LaGuardia Landscape and Mercer Street Playground would be redeveloped with new project-generated publicly accessible open spaces. Therefore, the shadows cast by the proposed South Block buildings on these spaces in the interim analysis year, described above, would no longer occur.

In addition, as described below, by 2031 the Proposed Actions' shadow increments on the LaGuardia Garden would be less when compared to the 2031 future without the Proposed Actions, when an as-of-right redevelopment of the Morton Williams site would occur (the No Build building). Similar to the proposed Bleecker Building, the No Build building would cast substantial shadows on the LaGuardia Garden, although to a slightly lesser extent and duration than the proposed Bleecker Building. Incremental shadows attributable to the Proposed Actions would also be less in extent and duration on the willow oaks late in the May/August and June afternoons, also due to similar shadows cast by the No Build building.

In Phase 2, two buildings would be developed on the North Block as a result of the Proposed Actions—the LaGuardia Building and the Mercer Building. The two North Block buildings would not cast any incremental shadow at any time of the year on the LaGuardia Corner Gardens, the willow oaks, the University Towers facades, or any other resources on the South Block. The only incremental shadow that would result from the North Block development would be on Mercer Plaza; an additional ten minutes on the December 21 analysis day, and 30 minutes on the March 21/September 21 analysis day, both from the proposed Mercer Building.

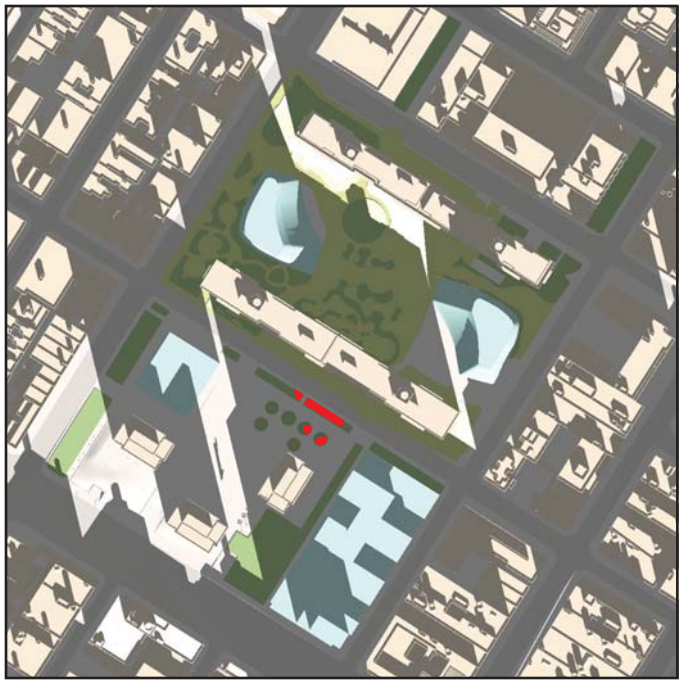
Table 6-3 shows the entry and exit times and total duration of incremental shadows on sun-sensitive resources for the full build out of the proposed project (including the proposed development on the South Block), resulting from its comparison to the future 2031 No Action condition. **Figures 6-23** to **6-26**[1] depict the incremental shadows that would occur in 2031 with the proposed development, on the days and times where they would differ from the incremental

[1] **Figure 6-27** is a map key showing pedestrian view locations for Figures 6-10 and 6-14.

9.30.11



9:00 AM



11:00 AM



1:00 PM



2:30 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

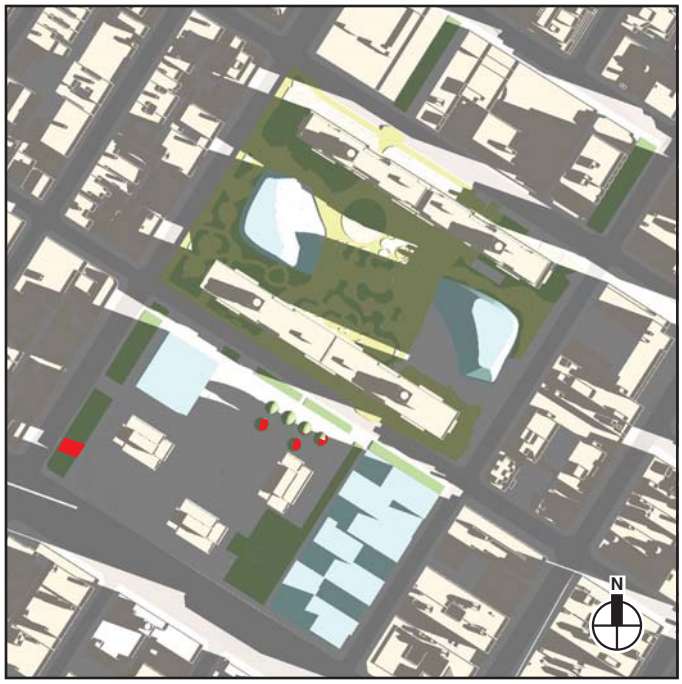
Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 2 (2031) - December 21

Figure 6-23

9.30.11



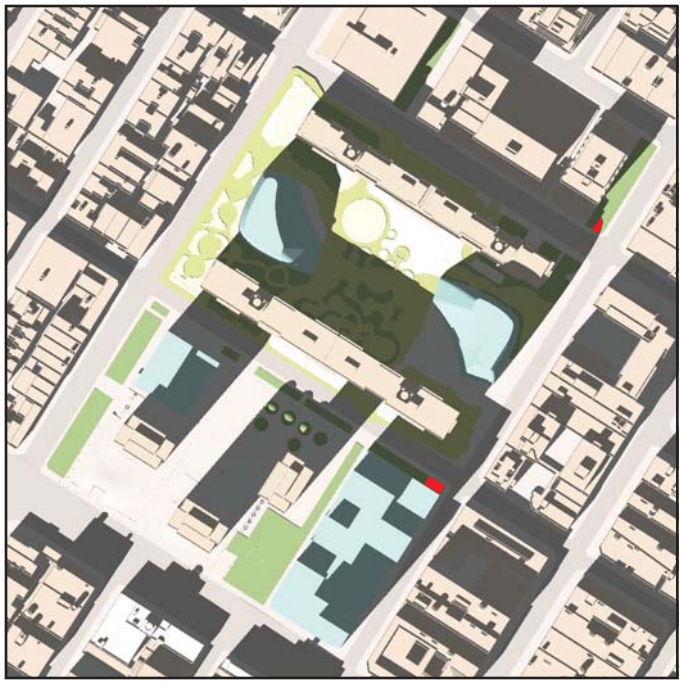
8:00 AM



10:00 AM



12:00 PM



2:00 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

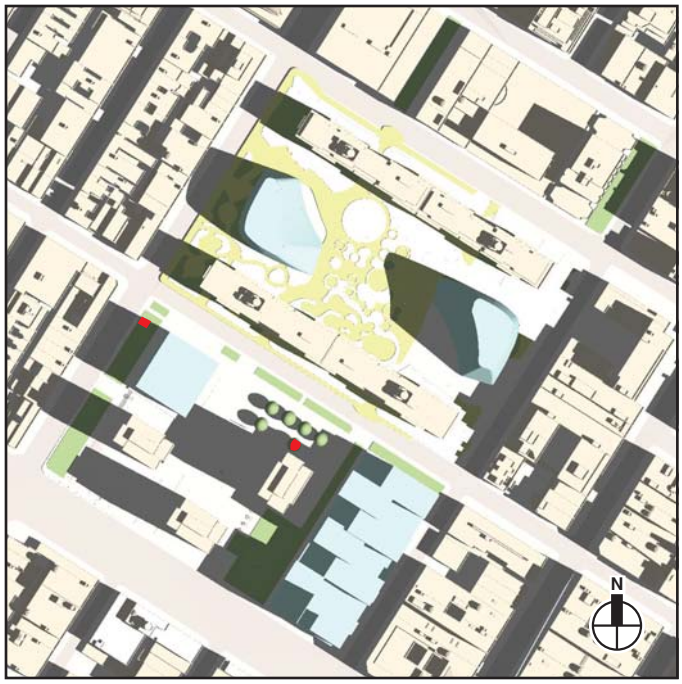
Incremental Shadow on Sun-Sensitive Resource

NYU Core

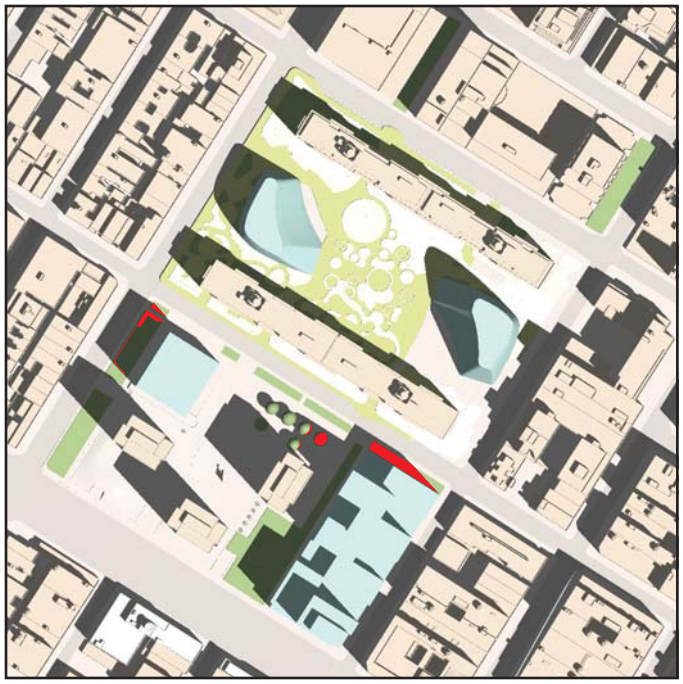
Phase 2 (2031) - March 21 / Sept. 21

Figure 6-24

9.30.11



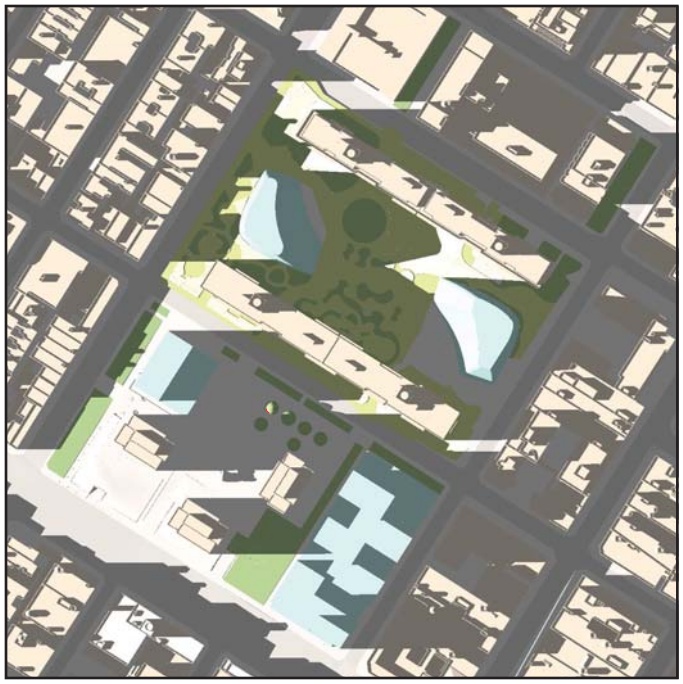
9:30 AM



10:30 AM



11:30 AM



4:30 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 2 (2031) - May 6 / August 6

Figure 6-25

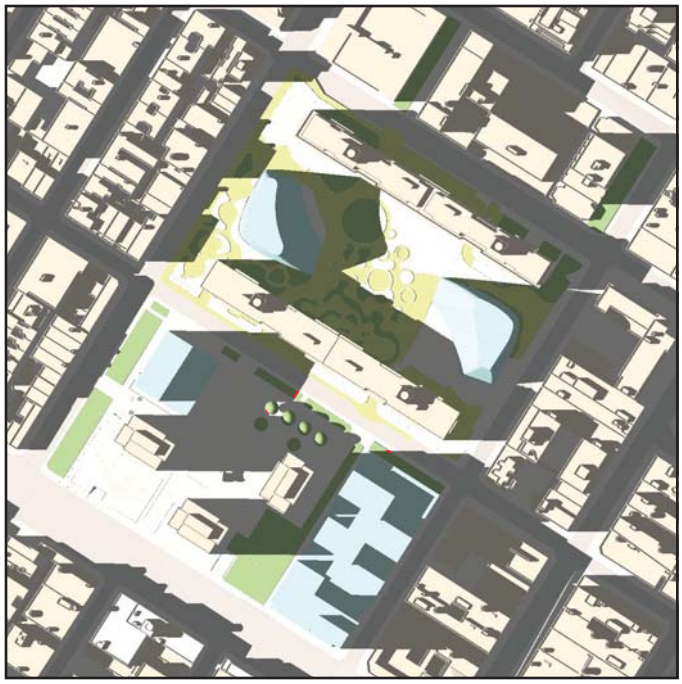
9.30.11



10:00 AM



11:00 AM



4:00 PM



5:00 PM

Note: Daylight Saving Time not used.

Proposed Buildings

Greenstreet, Community Garden, Natural Area or Publicly-Accessible Open Space

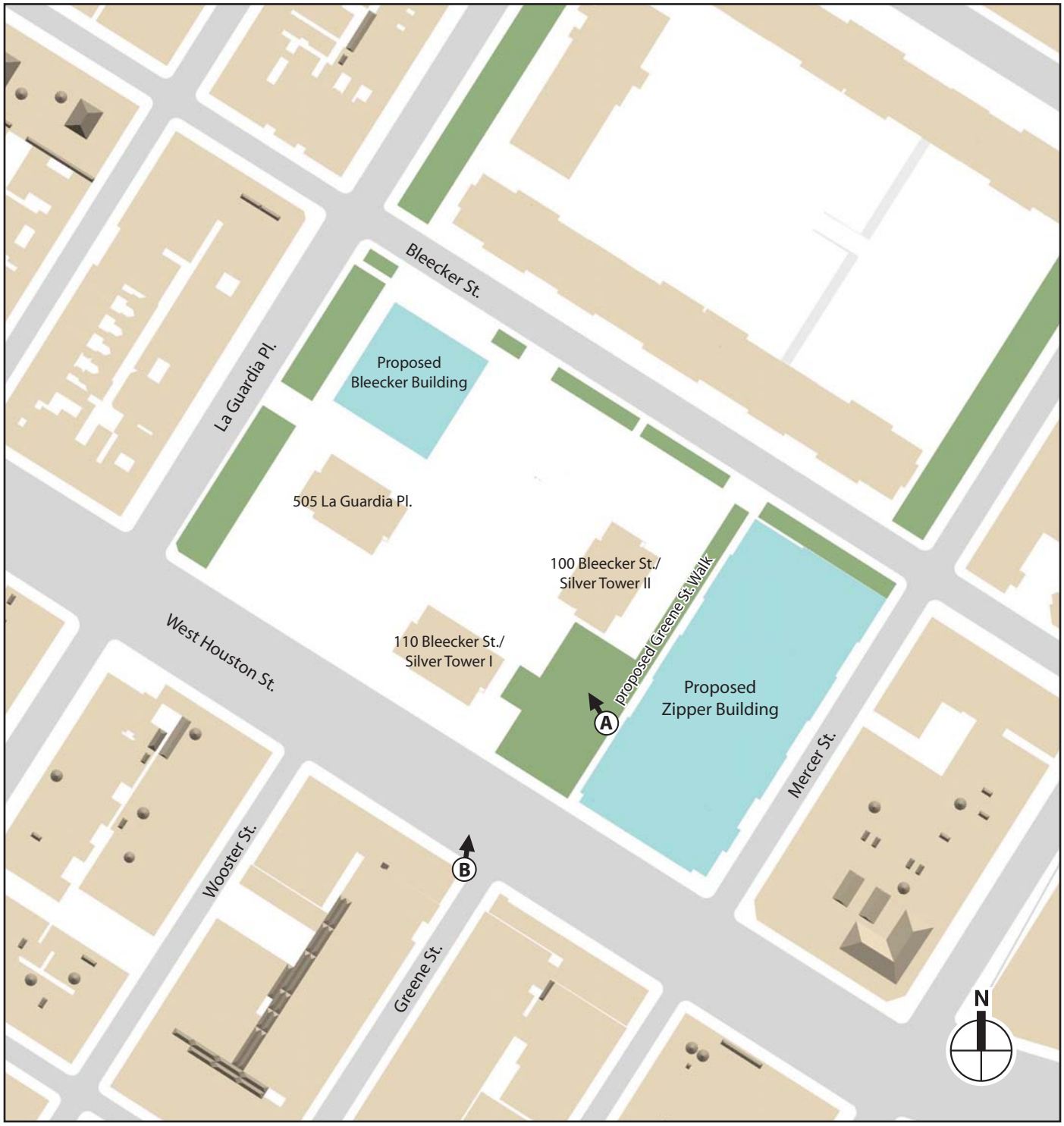
Incremental Shadow on Sun-Sensitive Resource

NYU Core

Phase 2 (2031) - June 21

Figure 6-26

11.28.11



A Pedestrian location and view direction references for pedestrian views in Figures 6-10 and 6-14.

Pedestrian View Locations
Figure 6-27

shadows in Phase 1[1]. The following section describes any additional or different shadow effects beyond those already described in the Phase 1 section.

Table 6-3
Incremental Shadow Durations – Phase 2 (2031)

	December 21 8:51 AM-2:53 PM	March 21 / Sept. 21 7:36 AM-4:29 PM	May 6 / August 6 6:27 AM-5:18 PM	June 21 5:57 AM-6:01 PM
PUBLICLY ACCESSIBLE OPEN SPACES				
South Block/Bleecker St. landscaped areas	9:20 AM–2:53 PM Total: 5 hr 33 min	9:00 AM–4:10 PM Total: 7 hr 10 min	10:00 AM–5:18 PM Total: 7 hr 18 min	10:30 AM–6:01 PM Total: 7 hr 31 min
Mercer Plaza	2:10 PM–2:40 PM Total: 30 min	1:50 PM–2:20 PM Total: 30 min	—	—
GREENSTREETS				
Time Landscape	—	7:36 AM–8:10 AM Total: 34 min	6:40 AM–8:20 AM Total: 1 hr 40 min	7:30 AM–8:30 AM Total: 1 hr
COMMUNITY GARDENS				
LaGuardia Corner Gardens	8:51 AM–9:20 AM Total: 29 min	9:10 AM–9:30 AM 10:00 AM–10:30 AM Total: 50 min	8:20 AM–12:20 PM Total: 4 hr	7:40 AM–12:10 PM Total: 4 hr 30 min
IMPORTANT NATURAL FEATURES				
Oak Grove willow oaks	9:00 AM–1:30 PM Total: 4 hr 30 min	7:36 AM–12:10 PM Total: 4 hr 34 min	8:10 AM–11:20 AM 4:10 PM–5:18 PM Total: 4 hr 18 min	9:30 AM–11:00 AM 4:00 PM–6:01 PM Total: 3 hr 1 min
HISTORIC RESOURCES				
University Village – 100 Bleecker St./ Silver Tower II	8:51 AM–1:00 PM Total: 4 hr 9 min	7:36 AM–12:00 PM Total: 4 hr 24 min	6:27 AM–11:20 AM Total:4 hr 53 min	5:57 AM–11:00 AM Total:5 hr 3 min
University Village – 110 Bleecker St./ Silver Tower I	8:51 AM–9:50 AM Total: 59 min	7:36 AM–10:20 AM Total: 2 hr 44 min	6:27 AM–9:30 AM Total: 3 hr 3 min	5:57 AM–8:50 AM Total: 2 hr 53 min
University Village – 505 LaGuardia Pl.	8:51 AM–9:30 AM Total: 39 min	7:36 AM–8:50 AM Total: 1 hr 14 min	6:27 AM–7:20 AM Total: 53 min	5:57 AM–8:10 AM Total: 2 hr 13 min

Notes:
Table indicates entry and exit times and total duration of incremental shadow for each sunlight-sensitive resource.
Daylight saving time is not used.

DECEMBER 21

LaGuardia Corner Gardens

The proposed Bleecker Building would cast very similar shadows on the LaGuardia Corner Gardens to the as-of-right building at the same location, adding just a small additional area of shadow for the first half-hour of the day. Therefore, by 2031 any significant adverse impacts to shade-intolerant species would occur with or without the Proposed Actions.

Mercer Plaza

Shadow from the proposed Mercer Building would add 10 minutes of incremental shadow to Mercer Plaza, such that the total duration of project-generated shadows would be 30 minutes instead of 20 minutes. This brief incremental shadow would not cause a significant adverse shadow impact to Mercer Plaza during this period.

[1] The representative times of day shown in the Phase 2 figures do not always match those shown in the Phase 1 figures; for example, for the morning of May 6/August 6, times are shown every hour on the hour in the Phase 1 figures, and every hour on the half-hour in the Phase 2 figures. In each case the times were selected to best demonstrate the shadow patterns on the resources of interest, given the particular entry and exit times of the incremental shadow and the nature of the extent. Given that the Phase 2 buildings do not alter the incremental shadows cast on resources from Phase 1 buildings, the different times presented for Phase 2 also provide additional points of time to view shadowing from Phase 1 buildings.

Washington Square Park

The detailed analysis found that due to intervening buildings, the shadow from the proposed buildings on the North Block would not fall on Washington Square Park.

MARCH 21/SEPTEMBER 21

LaGuardia Corner Gardens

The proposed Bleecker Building would cast very similar shadows on the LaGuardia Corner Gardens to the No Build building at the same location, adding small additional areas of shadow from 9:10 AM to 9:30 AM, and 10:00 AM to 10:30 AM. Therefore, by 2031 any significant adverse impacts to shade-intolerant species would occur with or without the Proposed Actions during this period.

Mercer Plaza

There would be 30 minutes of new shadow from the Mercer Building on Mercer Plaza. It would be limited to a small area, and would not cause a significant adverse shadow impact during this period.

MAY 6/AUGUST 6

Time Landscape

The proposed Bleecker Building would cast very similar shadows on the Time Landscape to the No Build building at the same location, adding a small area of incremental shadow for an hour and 40 minutes early in the morning. The incremental shadow attributable to the Proposed Actions would not result in significant adverse shadow impacts during this time period.

LaGuardia Corner Gardens

From 8:20 AM until about 10:45 AM, the proposed Bleecker Building would cast a slightly larger shadow on the LaGuardia Corner Gardens than would the No Build building at the same location without the proposed project, resulting in very small incremental shadows during this two and a half hour period. After 10:45 AM, shadows from the shorter No Build building would begin to move off the west side of the Garden, as compared to the taller proposed Bleecker Building, which would cast substantial incremental shadow from 11:00 AM until 12:20 PM. Given the extent of this incremental shadow, potential significant adverse shadow impacts to shade-intolerant species would be attributable to the Proposed Actions.

Willow oaks

From 4:10 PM to 5:18 PM the proposed Bleecker Building would add a small extent of new shadow on the Oak Grove area, beyond what the No Build building at that location would cast during this period.

JUNE 21

Time Landscape

By 2031, the proposed Bleecker Building would cast very similar shadows on the Time Landscape as compared to the No Build building at the same location. Between 7:30 AM and 9:00 AM, there would be small areas of incremental shadow, reduced shadow or both from the

proposed Bleecker Building, due to differences in height and bulk between the proposed and No Build buildings. Therefore, there would be no significant adverse shadow impact attributable to the Proposed Actions during this period.

LaGuardia Corner Gardens

The proposed Bleecker Building would cast a slightly larger shadow on the LaGuardia Corner Gardens than would the No Build building at the same location from 7:40 AM until about 10:30 AM, when shadow from the shorter as-of-right building would begin to move off the garden. The extent of incremental shadow would be more substantial from 10:30 AM until 12:10 PM, when it would exit the garden. Given the extent of this incremental shadow, potential significant adverse shadow impacts to shade-intolerant species would be attributable to the Proposed Actions.

Willow Oaks

In the afternoon, from approximately 4:00 PM until the end of the analysis day at 6:01 PM, the Bleecker Building would add a very small extent of new shadow on the Oak Grove area, beyond what the No Build building at that location would cast during this period.

PROPOSED OPEN SPACE ON THE NORTH BLOCK

The southern half of the proposed North Block open spaces would be in shadow or partial shadow from the Washington Square Village 3 & 4 throughout the day in the fall, winter and spring, and to a lesser extent in the summer. The northern portion of the open space, and the eastern and western areas along LaGuardia Place and Bleecker Street, would be mostly in sun during the spring, summer and fall analysis days. ✷