

A. INTRODUCTION

This chapter assesses the potential for the Proposed Actions to result in incremental shadows long enough to reach any nearby publicly accessible open spaces or other sunlight-sensitive resources. According to the 2020 *City Environmental Quality Review (CEQR) Technical Manual*, a shadows assessment is required if a proposed action would result in structures (or additions to existing structures) of 50 feet in height or greater, or those that would be located adjacent to, or across the street from, a sunlight sensitive resource. As discussed in Chapter 1, “Project Description,” the Proposed Project would facilitate a complex of six new buildings, four of which would be greater than 50 feet in height, located adjacent to several sunlight-sensitive resources. As such, a detailed shadows analysis was prepared in accordance with *CEQR Technical Manual* guidance to determine the potential for the Proposed Actions to result in significant adverse impacts on sunlight-sensitive resources.

B. PRINCIPAL CONCLUSIONS

The Proposed Actions would result in incremental shadow coverage (i.e. additional, or new, shadow coverage) on portions of one sunlight-sensitive open space resource: Space Time Playground. The extent and duration of the incremental shadows on this open space resource would not significantly reduce or completely eliminate direct sunlight exposure on any of the open space resource’s sunlight-sensitive features; nor would they significantly alter the public’s utilization or enjoyment of the open space resource’s facilities, or threaten the viability of vegetation or other sunlight-sensitive features within the open space resource. Therefore, incremental shadows from the Proposed Project on Space Time Playground would not be considered a significant adverse impact, in accordance with *CEQR Technical Manual* methodology.

C. METHODOLOGY

According to the *CEQR Technical Manual*, the longest shadow a structure will cast in New York City, except for periods close to dawn or dusk, is 4.3 times its height. For projects or actions resulting in structures less than 50 feet tall, a shadow assessment is generally not necessary, unless the site is adjacent to a park, historic resource, or important natural feature (if the feature that makes the structure significant depends on sunlight).

First, a preliminary screening assessment must be conducted to ascertain whether shadows resulting from a project could reach any sunlight-sensitive resource at any time of year. The *CEQR Technical Manual* defines sunlight-sensitive resources as those resources that depend on sunlight or for which direct sunlight is necessary to maintain the resource’s usability or architectural integrity. The following are considered to be sunlight-sensitive resources:

- *Public open space* (e.g., parks, playgrounds, plazas, schoolyards, greenways, and landscaped medians with seating). Planted areas within unused portions of roadbeds that are part of the Greenstreets program are also considered sunlight-sensitive resources. The use of vegetation in an open space establishes its sensitivity to shadows. This sensitivity is assessed for both (1) warm-weather dependent features, like wading pools and sandboxes, or vegetation that could be affected by loss of sunlight during the growing season (i.e., March through October); and (2) features, such as benches, that could be affected by a loss of winter sunlight. Uses that rely on sunlight include: passive use, such as sitting or sunning; active use, such as playfields or paved courts; and such activities as gardening, or children's wading pools and sprinklers. Where lawns are actively used, the turf requires extensive sunlight. Vegetation requiring direct sunlight includes the tree canopy, flowering plants, and plots in community gardens. Generally, four to six hours a day of sunlight, particularly in the growing season, is a minimum requirement.
- *Features of historic architectural resources that depend on sunlight for their enjoyment by the public.* Only the sunlight-sensitive features are considered, as opposed to the entire architectural resource. Sunlight-sensitive features include the following: design elements that are part of a recognized architectural style that depends on the contrast between light and dark (e.g., deep recesses or voids, such as open galleries, arcades, recessed balconies, deep window reveals, and prominent rustication); elaborate, highly carved ornamentation; stained glass windows; exterior building materials and color that depend on direct sunlight for visual character (e.g., the polychromy [multicolored] features found on Victorian Gothic Revival or Art Deco facades); historic landscapes, such as scenic landmarks, including vegetation recognized as an historic feature of the landscape; and structural features for which the effect of direct sunlight is described as playing a significant role in the structure's importance as an 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.

The preliminary screening assessment consists of three tiers of analysis. The first tier determines a simple radius around the proposed building(s) representing the longest shadow that could be cast. If there are sunlight-sensitive resources within the radius, the analysis proceeds to the second tier, which reduces the area that could be affected by project-generated shadows by accounting for a specific range of angles that can never receive shade in New York City due to the path of the sun in the northern hemisphere. 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 new shadows by looking at specific representative days of the year and determining the maximum 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.

In accordance with the *CEQR Technical Manual*, shadows on sunlight-sensitive resources of concern are modeled for four representative days of the year. For the New York City area, the months of interest for an open space resource encompass the growing season (i.e., March through October) and one month between November and February representing a cold-weather month (usually December). Representative days for the growing season are generally the March 21st vernal equinox (or the September 21st autumnal equinox, which is approximately the same), the June 21st summer solstice, and a spring or summer day halfway between the summer solstice and equinoxes, such as May 6th or August 6th (which

are approximately the same). For the cold-weather months, the December 21st winter solstice is included to demonstrate conditions when open space users rely most heavily on available sunlight warmth. As these months and days are representative of the full range of possible shadows, they are also used for assessing shadows on sunlight-sensitive historic and natural resources.

The *CEQR Technical Manual* defines the temporal limits of a shadow analysis period to fall from an hour and a half after sunrise to an hour and a half before sunset.

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 result of the analysis and assessment are documented with graphics, a table of incremental shadow durations, and narrative text. As described in the *CEQR Technical Manual*, an incremental shadow is generally not considered significant when its duration is no longer than ten minutes at any time of year and the resource continues to receive substantial direct sunlight. A significant shadow impact generally occurs when an incremental shadow of ten minutes or longer falls on a sunlight-sensitive resource and results in one of the following:

- *Vegetation*: a substantial reduction in sunlight available to sunlight-sensitive features of the resource to less than the minimum time necessary for its survival (when there would be sufficient sunlight in the future without the project), or a reduction in direct sunlight exposure where the sensitive feature of the resource is already subject to substandard sunlight (i.e., less than the minimum time necessary for its survival).
- *Historic and cultural resources*: a substantial reduction in sunlight available for the enjoyment or appreciation of the sunlight-sensitive features of an historic or cultural resource.
- *Open space utilization*: a substantial reduction in the usability of open space as a result of increased shadow, including information regarding anticipated new users and the open space's utilization rates throughout the affected time periods.
- *For any sunlight-sensitive feature of a resource*: complete elimination of all direct sunlight on the sunlight-sensitive feature of the resource, when the complete elimination results in substantial effects on the survival, enjoyment, or, in the case of open space or natural resources, the use of the resource.

In general, a significant adverse shadow impact occurs when the incremental shadow added by a proposed action falls on a sunlight-sensitive resource and substantially reduces or completely eliminates direct sunlight exposure, thereby significantly altering the public's use of the resource or threatening the viability of vegetation or other resources.

D. PRELIMINARY SCREENING

Tier 1 Screening Assessment

According to the *CEQR Technical Manual*, the longest shadow that a structure will cast in New York City, except for periods close to dawn or dusk, is 4.3 times its height. The maximum shadow radius from the Development Site (645 feet) was determined using the Proposed Project's maximum height of approximately 150 feet, which includes bulkhead and rooftop mechanical equipment of the tallest of the

six proposed buildings, Building B2 (Tier 1 Assessment).¹ Within this longest shadow study area, there are five potentially sunlight-sensitive open space resources.² Therefore, further screening was warranted in order to determine whether any resources could be affected by project-generated shadows.

Tier 2 Screening Assessment

Due to the path of the sun 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. The purpose of the Tier 2 screening is to determine whether the sunlight-sensitive resources identified in the Tier 1 screening are located within portions of the longest shadow study area that can receive shade from the Proposed Project.

Figure 6-1 provides a base map illustrating the results of the Tier 1 and Tier 2 screening assessments (i.e., the portion of the longest shadow study area lying within -108 degrees from the true north and +108 degrees from true north as measured from southernmost portion of the Development Site). A total of five resources were identified as sunlight-sensitive resources that warranted further assessment. A list of these resources is provided below in Table 6-1.

TABLE 6-1
Sunlight-Sensitive Resources Warranting Further Assessment Based on Tier 1 & 2 Screening

No. ¹	Sunlight-Sensitive Open Space Resources
1	Greenstreet (Beach Ave. & Seward Ave. & Soundview Ave.)
2	Story Playground
3	Space Time Playground
4	Stevenson Commons Plaza
5	Bronx Guild

Note:

¹ Numbers keyed to Figure 6-1.

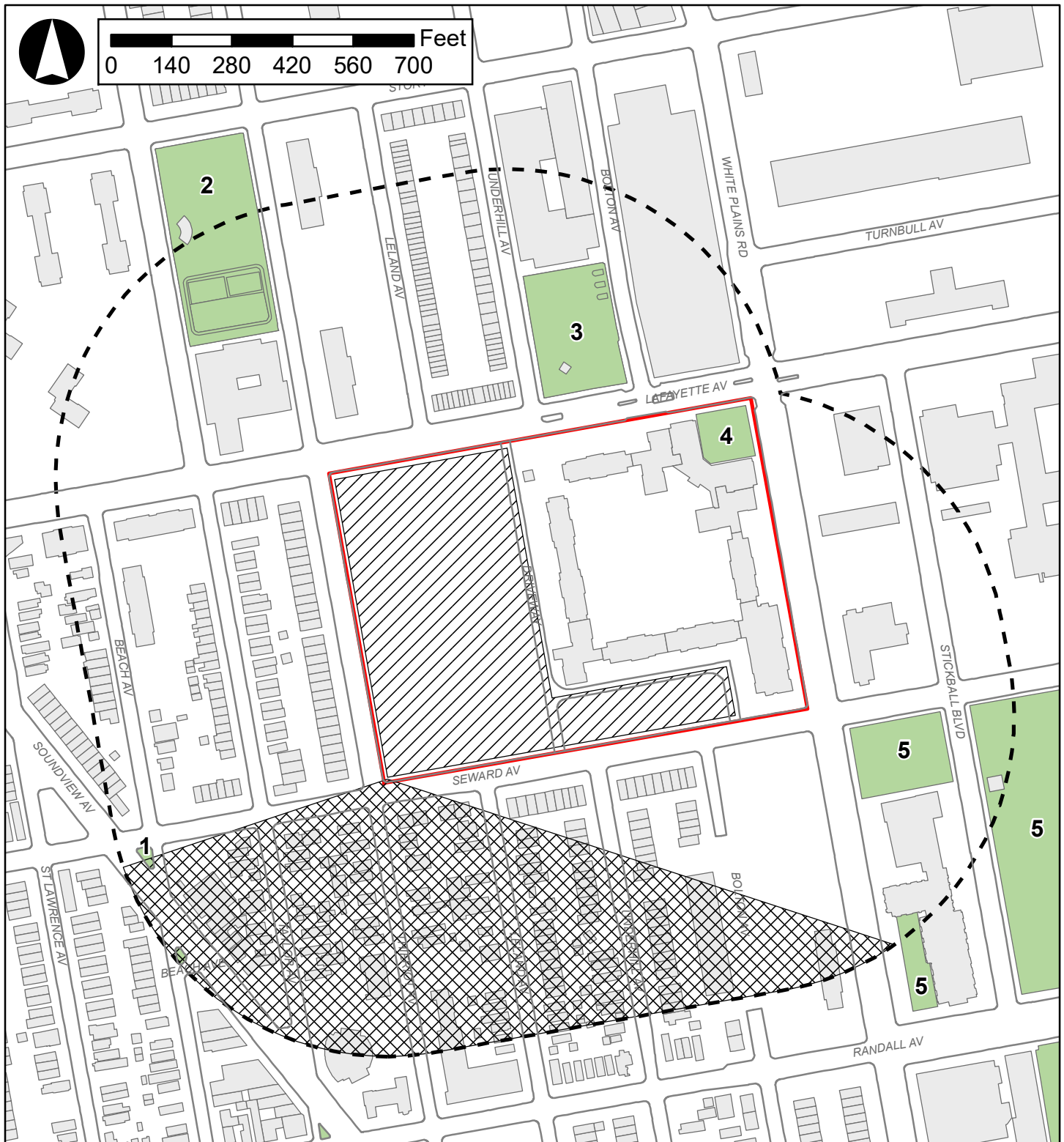
Tier 3 Screening Assessment

According to the *CEQR Technical Manual*, a Tier 3 screening assessment should be performed to determine if, in the absence of intervening buildings, shadows resulting from a proposed action can reach a sunlight-sensitive resource, thereby warranting a detailed shadow analysis. The Tier 3 screening assessment is used to determine if shadows resulting from a proposed action can reach a sunlight-sensitive resource at any time between 1.5 hours after sunrise and 1.5 hours before sunset on representative analysis dates.

As project-generated shadows could reach a number of sunlight-sensitive resources, a Tier 3 assessment was performed using three dimensional (3D) computer mapping software. A 3D model was used to calculate and display project-generated shadows on individual representative analysis dates. The model

¹ In accordance with *CEQR Technical Manual* guidance, the maximum shadow radius was calculated by combining the maximum building height of the Proposed Project's tallest building (approximately 138 feet) and the proposed bulkhead and rooftop mechanical equipment (12 feet) (totaling approximately 150 feet), and multiplying that number by 4.3.

² Within the longest shadow study area, there is one S/NR-eligible historic resource: PS 100, located at 800 Taylor Avenue (Block 3641, Lot 1). However, it was determined that this eligible historic resource does not contain any sunlight-sensitive features or rely on sunlight for its historic significance, and therefore, no further analysis of PS 100 is warranted.



Legend

- Project Area
- Tier I: Longest Shadow Study Area
- Sunlight Sensitive Resources
- Development Site
- Tier II: Area That Cannot Be Shaded
- Building Footprints

contained 3D representations of the elements in the base map used in the preceding assessments and a 3D model of the Proposed Project. Per *CEQR Technical Manual* guidance, at this stage of the assessment, surrounding buildings within the study area were not included in the model so that it may be determined whether project-generated shadows would reach any sunlight sensitive resources.

As shown in Figures 6-2a and 6-2b, three sunlight-sensitive resources would not receive project-generated shadows on any of the four analysis days, and therefore do not require any further analysis: the greenstreet located at the intersection of Beach Avenue, Seward Avenue, and Soundview Avenue, the Stevenson Commons Plaza located at the southwestern corner of Lafayette Avenue and White Plains Road, and Bronx Guild. Table 6-2 presents a summary of the Tier 3 assessment, showing the two sunlight-sensitive open space resources that could, in the absence of intervening buildings, receive project-generated shadows, and on which analysis days the new shadows would occur.

TABLE 6-2
Tier 3 Assessment Results

No. ¹	Name	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	December 21 8:51 AM – 2:53 PM	Number of Analysis Days
1	Greenstreet (Beach Ave. & Seward Ave. & Soundview Ave.)	NO	NO	NO	NO	0
2	Story Playground	NO	NO	NO	YES	1
3	Space Time Playground	NO	NO	NO	YES	1
4	Stevenson Commons Plaza	NO	NO	NO	NO	0
5	Bronx Guild	NO	NO	NO	NO	0

Note:

¹ Numbers keyed to Figure 6-1.

E. DETAILED ASSESSMENT

Resources of Concern

Story Playground

Story Playground is an approximately 2.08-acre jointly-operated playground (JOP). The playground, located to the northwest of the Development Site, is bounded by Story Avenue to the north, ~~P.S.~~PS 100 to the south, Taylor Avenue to the west, and Thieriot Avenue to the east (Block 3641, Lot 1). Story Playground is largely covered in pavement and features a comfort station, basketball courts, handball courts, fitness equipment, playgrounds, spray showers, benches, as well as landscaped areas and mature trees. Story Playground is open to the public daily from dawn to dusk.

Space Time Playground

Space Time Playground is an approximately 1.28-acre jointly-operated playground (JOP). The playground, located to the northeast of the Development Site, is bounded by ~~S.~~IS 131 to the north, Lafayette Avenue to the south, Underhill Avenue to the west, and Bolton Avenue to the east (Block 3644, Lot 1). Space Time Playground is largely covered in pavement and features a comfort station, basketball courts, handball




MARCH 21/SEPTEMBER 21



MAY 6/AUGUST 6

 Proposed Project

 Open Space

 Incremental Shadow

Note: Resources keyed to Table 6-1



JUNE 21



DECEMBER 21



Proposed Project



Open Space



Incremental Shadow

Note: Resources keyed to Table 6-1

courts, playgrounds, spray showers, benches, as well as mature trees. Space Time Playground is open to the public daily from dawn to dusk.

Shadows Analysis

Per 2020 CEQR Technical Manual guidance, shadow analyses were performed for the two sunlight-sensitive resources identified above on one of the four representative days of the year: December 21, the winter solstice and shortest day of the year (based on the Tier 3 assessment detailed above, analyses of the two sunlight-sensitive resources were not required on March 21/September 21, the equinoxes; May 6, the midpoint between the summer solstice and the equinox (and equivalent to August 6); and June 21, the summer solstice and the longest day of the year). CEQR guidance define the temporal limits of a shadow analysis period to fall from 1.5 hours after sunrise to 1.5 hours before sunset. As discussed above, the results of the shadows analysis show the incremental difference in shadow impact between the No-Action and With-Action conditions (refer to Table 6-3). Per the 2020 CEQR Technical Manual, all times reported herein are Eastern Standard Time and do not reflect adjustments for daylight savings time that is in effect from mid-March to early November.

As shown in Table 6-3, incremental project-generated shadows would reach one of the two sunlight-sensitive resources identified in the Tier 3 assessment. It was determined that no increases in shadow coverage would occur at Story Playground on the December 21 representative analysis day. Increases in shadow coverage would occur at Space Time Playground on the December 21 representative analysis day. Figures 6-3a through 6-3c, provided at the end of this chapter, show representative shadow views for Space Time Playground on the December 21 representative analysis day.

TABLE 6-3
Duration of Shadows on Sunlight Sensitive Resources (Increment Compared to No-Action Condition)

Resource	Analysis Day	March 21/Sept. 21	May 6/August 6	June 21	December 21
		7:36 AM – 4:29 PM	6:27 AM – 5:18 PM	5:57 AM – 6:01 PM	8:51 AM – 2:53 PM
Story Playground	Shadow enter-exit time	N/A	N/A	N/A	N/A
	Incremental shadow duration	N/A	N/A	N/A	N/A
Space Time Playground	Shadow enter-exit time	N/A	N/A	N/A	12:54 – 2:53 PM
	Incremental shadow duration	N/A	N/A	N/A	1 hour 59 minutes

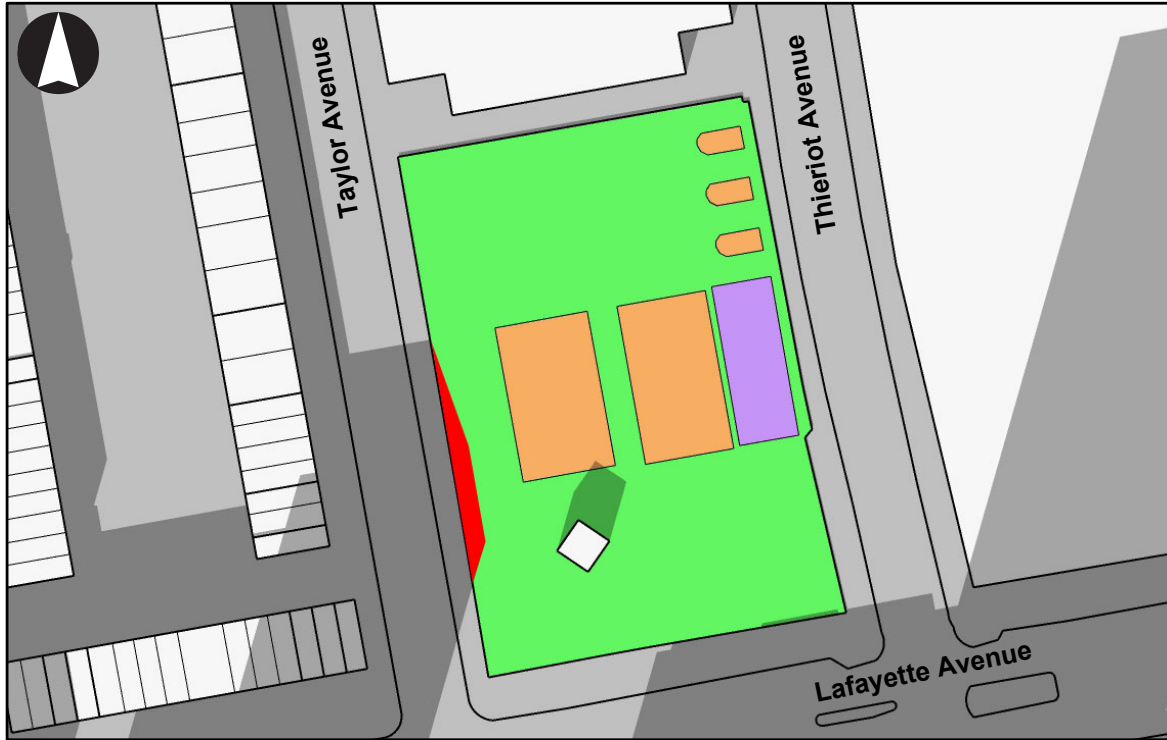
Note: All times are Eastern Standard Time. Table indicates the entry and exit times and total duration of incremental shadow for each sunlight-sensitive resource.

December 21

On December 21 the time period for shadows analysis begins at 8:51 AM and continues until 2:53 PM. On the winter solstice, which is the day of the year with the shortest period of daylight, the sun is low in the sky and shadows are at their longest but move rapidly. On this date, the Proposed Project would cast incremental shadows on Space Time Playground.

The incremental shadows cast on Space Time Playground would begin at 12:54 PM and continue until the end of the analysis day at 2:53 PM, for a duration of approximately 1 hour and 59 minutes. Prior to 12:54

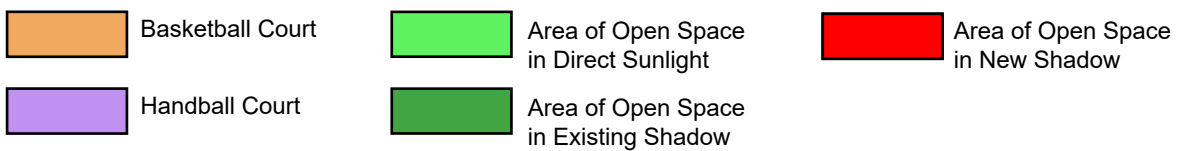
Incremental Shadows on December 21st - Space Time Playground



1:00 PM



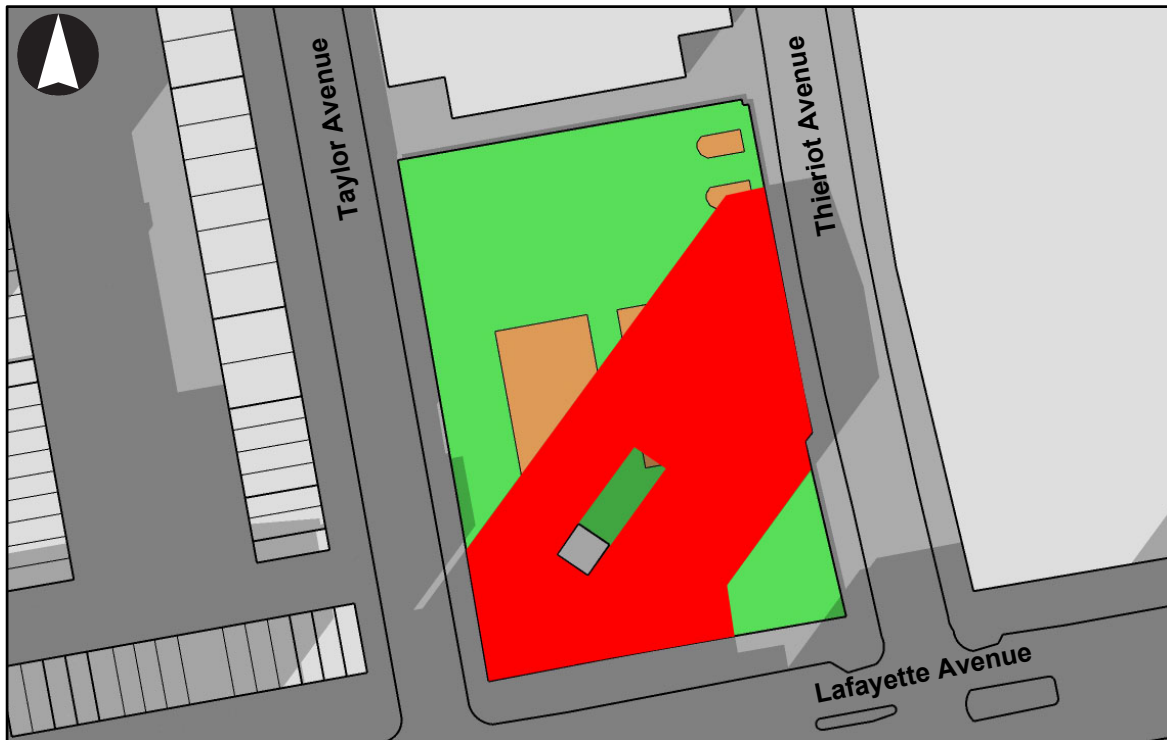
1:30 PM



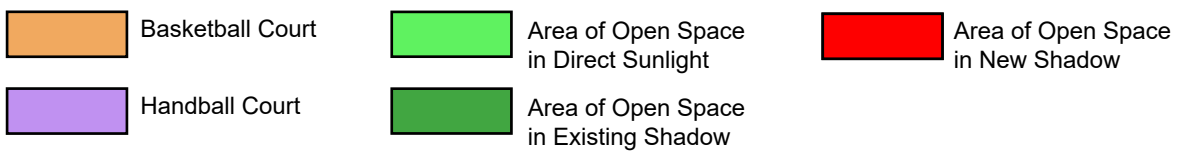
Incremental Shadows on December 21st - Space Time Playground



2:00 PM




2:30 PM




Incremental Shadows on December 21st - Space Time Playground




2:53 PM

 Basketball Court

 Area of Open Space in Direct Sunlight

 Area of Open Space in New Shadow

 Handball Court

 Area of Open Space in Existing Shadow

PM the open space would not experience any incremental shadow coverage as a result of the Proposed Project. As indicated in Figures 6-3a, 6-3b, and 6-3c, by 12:54 PM incremental shadows would enter the western portion of the open space, and by 2:53 PM, the end of the analysis day, incremental shadow coverage would increase to cover eastern, southern, and western portions of Space Time Playground; northern portions of the open space would continue to receive direct sunlight throughout the afternoon. The areas of Space Time Playground that would experience incremental shadow coverage are paved areas containing active uses, including playgrounds, basketball courts, and handball courts, as well as passive uses, including benches. In addition, several mature trees are located within the areas of Space Time Playground that would experience incremental shadow coverage.

Assessment

As described above, a shadow impact occurs when the incremental shadow from a proposed project falls on a sunlight sensitive resource or feature and reduces its direct sunlight exposure. Determining whether this impact is significant or not depends on the extent and duration of the incremental shadow and the specific context in which the impact occurs. For sunlight-sensitive open space resources, the uses and features of the space indicate its sensitivity to shadows. Shadows occurring during the cold-weather months of interest generally do not affect the growing season of outdoor vegetation; therefore, this sensitivity is assessed for both (1) warm-weather-dependent features or vegetation that could be affected by a loss of sunlight during the growing season; and (2) features, such as benches, that could be affected by a loss of winter sunlight. Uses that rely on sunlight include: passive use, such as sitting or sunning; active use, such as playfields or paved courts; and such activities as gardening, or children's wading pools and sprinklers. Generally, 4four to 6six hours a day of sunlight, particularly in the growing season, is often a minimum requirement. Consequently, the assessment of an open space resource's sensitivity to increased shadow focuses on identifying the existing conditions of its facilities, plantings, and uses, and the sunlight requirements for each.

Space Time Playground

The Proposed Project would cast incremental shadows on Space Time Playground on one of the four representative analysis days: December 21. Incremental shadow duration would occur for approximately 1 hour and 59 minutes on December 21, and would generally be limited to the afternoon hours after 1:00 PM. Incremental shadow coverage would generally be limited to eastern, southern, and western portions of the open space and would not be cast on any single area of the open space for an extended period of time, as shadows move from west to east throughout the day, allowing the open space's sunlight-sensitive features to receive adequate direct sunlight (at least four to six hours) throughout the analysis day.

As shown in Figure 6-4, incremental shadow coverage would affect the open space's passive uses (demarked with a dashed yellow line), including bench seating located in the open space's southern portion. However, bench seating located in the open space's southern portion would receive direct sunlight throughout the morning and early afternoon time periods. As also shown in Figure 6-4, although incremental shadow coverage would affect some of the open space's active uses (demarked with a solid red-orange line), including playgrounds, basketball courts, and handball courts located in the open space's eastern, southern, and western portions; these active uses would also continue to receive direct sunlight throughout the morning and early afternoon time periods. It should also be noted that the open space's northern portion, which contains additional active uses, would not be affected by incremental shadow coverage. Furthermore, the mature trees located in the southern portion of the open space would not be affected, as the incremental shadow coverage would occur during winter, outside of the growing season



(March to September as defined by the *CEQR Technical Manual*). Therefore, as the extent and duration of the incremental shadows would: (1) not significantly reduce or completely eliminate direct sunlight exposure on any of the sunlight-sensitive features found within the open space; and (2) would not significantly alter the public's use of the open space resource or threaten the viability of vegetation or other sunlight-sensitive features, incremental shadows from the Proposed Project on Space Time Playground would not be considered a significant adverse impact, in accordance with *CEQR Technical Manual* guidance.

Project-Generated Open Space

Pursuant to *CEQR Technical Manual* guidance, shadows on project-generated open space are not considered significant. However, as future project-generated open space is included as part of the analysis in Chapter 5, "Open Space," a discussion of how shadows could affect the new open space planned as part of the Proposed Project is provided below.

As discussed in Chapter 5, "Open Space," the Proposed Project is expected to include approximately 1.94 acres of publicly accessible open space and an additional 0.68 acres of private open space. The newly created publicly accessible open space is expected to include approximately 0.60 acres of tennis courts, a 0.23-acre day care play area, and 1.12 acres of grassy areas. It is estimated that approximately 1.12 acres of the total publicly accessible open space added on the Development Site would be for passive use and approximately 0.82 acres would be for active uses.

On all representative analysis days, project-generated shadow coverage on future open space is expected to be greatest during the early morning hours (after the start of the analysis period) and the late evening hours (shortly before the end of the analysis period). As shadows are not static and move from west to east throughout the day, the amount of coverage would decrease by late morning and future open space areas would generally receive direct sunlight throughout the late morning and early afternoon hours on all analysis days. It is anticipated that the majority of future open space areas would receive adequate direct sunlight throughout the day (at least the four to six hour minimum specified in the *CEQR Technical Manual*), and vegetation would not be affected. As the programming for the project-generated open space is not yet finalized, it is difficult to project what types of features and amenities would experience incremental shadow coverage. However, it is expected that the future open space areas would be designed to account for project-generated shadows.