

West 108th Street WSFSSH Development

Chapter 4: Shadows

A. INTRODUCTION

This attachment assesses the potential for the Proposed Project to result in incremental shadows long enough to reach any nearby publicly accessible open spaces or other sunlight-sensitive resources. According to the *City Environmental Quality Review (CEQR) Technical Manual*, a shadows assessment is required if a proposed project 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 comprise two new buildings greater than 50 feet in height adjacent to an open space resource (Anibal Aviles Playground). As such, a detailed shadows analysis was prepared to determine the potential for the Proposed Project to result in significant adverse impacts on sunlight-sensitive resources.

B. PRINCIPAL CONCLUSIONS

The Proposed Project would result in incremental shadow coverage (i.e. additional, or new, shadow coverage) on portions of two sunlight-sensitive open space resources: Anibal Aviles Playground and Booker T. Washington Playground. As the extent and duration of the incremental shadows on these two open space resources would (1) not significantly reduce or completely eliminate direct sunlight exposure on any of the sunlight-sensitive features found within these two open spaces; and (2) would not significantly alter the public’s use of the playgrounds or threaten the viability of vegetation or other elements located within the open spaces. Therefore, incremental shadows from the Proposed Project on Anibal Aviles Playground and Booker T. Washington 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 resources¹:

¹According to the *CEQR Technical Manual*, city streets, sidewalks, and private open spaces (such as private residential front and back yards, stoops, and vacant lots) are not 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 or roadbeds that are part of the Greenstreets program are also considered sunlight-sensitive resources. Sunlight 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 of an architectural resource are considered in a shadows analysis. 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 buildings 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 – or the additional, or new, shadow that a building or other built structure resulting from a proposed project would cast on a sunlight-sensitive resource during the year – resulting from the project. Incremental shadows are determined by establishing a baseline condition (the No-Action condition) and comparing it to the future condition resulting from the Proposed Project (the With-Action condition), thus illustrating the shadows cast by existing or future buildings and distinguishing the additional (incremental) shadows cast by a Proposed Project. In accordance with the *CEQR Technical Manual*, shadows on sunlight-sensitive resources of concern were 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 21 vernal equinox (or the September 21 autumnal equinox, which is approximately the same), the June 21 summer solstice, and a spring or summer day halfway between the summer solstice and equinoxes, such as May 6 or August 6 (which are approximately the same). For the cold weather months, the December 21 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 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 incremental 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 project 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 height of each of the Proposed Project buildings, including mechanical bulkhead (130 feet for Building 1 and 118 feet

for Building 2), was used to determine the maximum shadow radius of 559 feet (Tier 1 Assessment). Within this longest shadow study area, there are a number of potentially sunlight-sensitive resources, including both existing open spaces and New York City Landmarks Preservation Commission- (LPC-) designated historic resources with stained-glass windows. 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 4-1 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 the southernmost corner of the Development Site). A total of four open space resources and two LPC-designated historic resources with stained-glass windows were identified as sunlight-sensitive resources that warranted further assessment. A list of these resources is provided below in **Table 4-1**.

TABLE 4-1
Sunlight-Sensitive Resources Warranting
Further Analysis Based on Tier 1 and 2
Screening

No. ¹	Resources
1	Anibal Aviles Playground
2	Booker T. Washington Playground
3	Morningside Park
4	Greenstreet
5	1021 Amsterdam Avenue (East)
6	1025 Amsterdam Avenue (West)

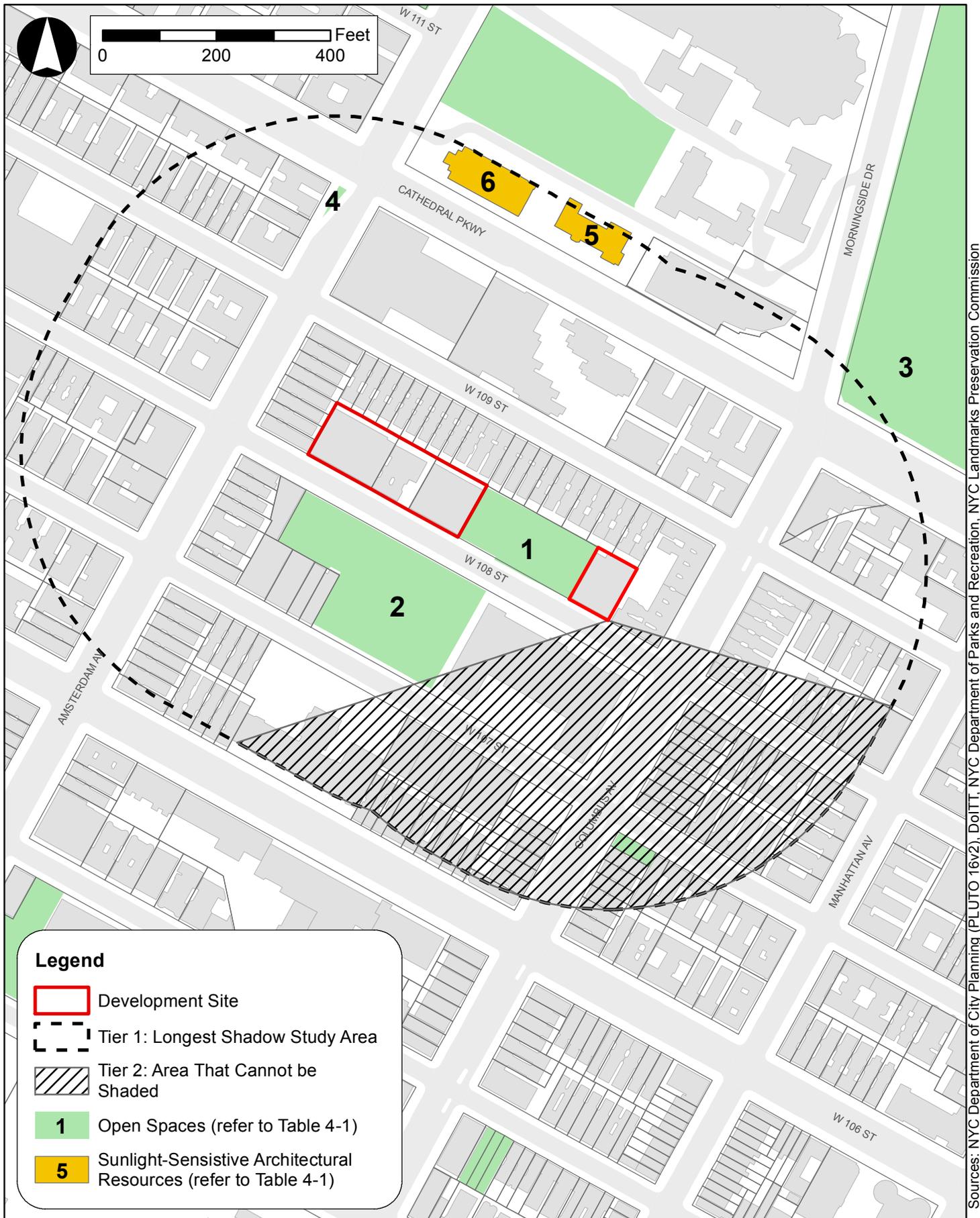
Notes:

¹ Numbers keyed to **Figure 4-1**.

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 project 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 project 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 of the Proposed Project was used to calculate and display project-generated shadows on individual representative analysis dates. The model contained 3D representations of the elements in the base map used in the preceding assessments and a 3D model of the Proposed Project. At this stage of



Sources: NYC Department of City Planning (PLUTO 16v2), DoITT, NYC Department of Parks and Recreation, NYC Landmarks Preservation Commission

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 **Figure 4-2**, the Tier 3 results determined that of the six sunlight-sensitive resources, Morningside Park (location 3 in **Figure 4-1**) and the Greenstreet at Amsterdam Avenue and Cathedral Parkway (location 4 in **Figure 4-1**) would not receive project-generated shadows on any of the four analysis days and, therefore, did not require any further analysis. **Table 4-2** presents a summary of the Tier 3 assessment, showing the remaining four sunlight-sensitive resources (two open space resources and two LPC-designated historic resources with stained-glass windows) that could, in the absence of intervening buildings, receive project-generated shadows, and on which analysis days the new shadows could occur. As presented in **Table 4-2**, based on the Tier 3 screening assessment, the potential for new incremental shadows to be cast on Anibal Aviles Playground on all four analysis days, on Booker T. Washington Playground on two analysis days, and on the LPC-designated buildings located at 1021 and 2015 Amsterdam Avenue on one analysis day, could not be ruled out, and a detailed shadows analysis is warranted for these four sunlight-sensitive resources.

TABLE 4-2
Sunlight-Sensitive Resources Warranting Further Analysis Based on Tier 3 Screening

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	Anibal Aviles Playground	YES	YES	YES	YES	4
2	Booker T. Washington Playground	NO	YES	YES	NO	2
3	Morningside Park	NO	NO	NO	NO	0
4	Greenstreet	NO	NO	NO	NO	0
5	1021 Amsterdam Avenue (East)	NO	NO	NO	YES	1
6	1025 Amsterdam Avenue (West)	NO	NO	NO	YES	1

Notes:

¹ Numbers keyed to **Figure 4-1**.

E. DETAILED ANALYSIS OF SHADOW IMPACTS

Resources Potentially Affected by Project-Generated Shadows

Anibal Aviles Playground

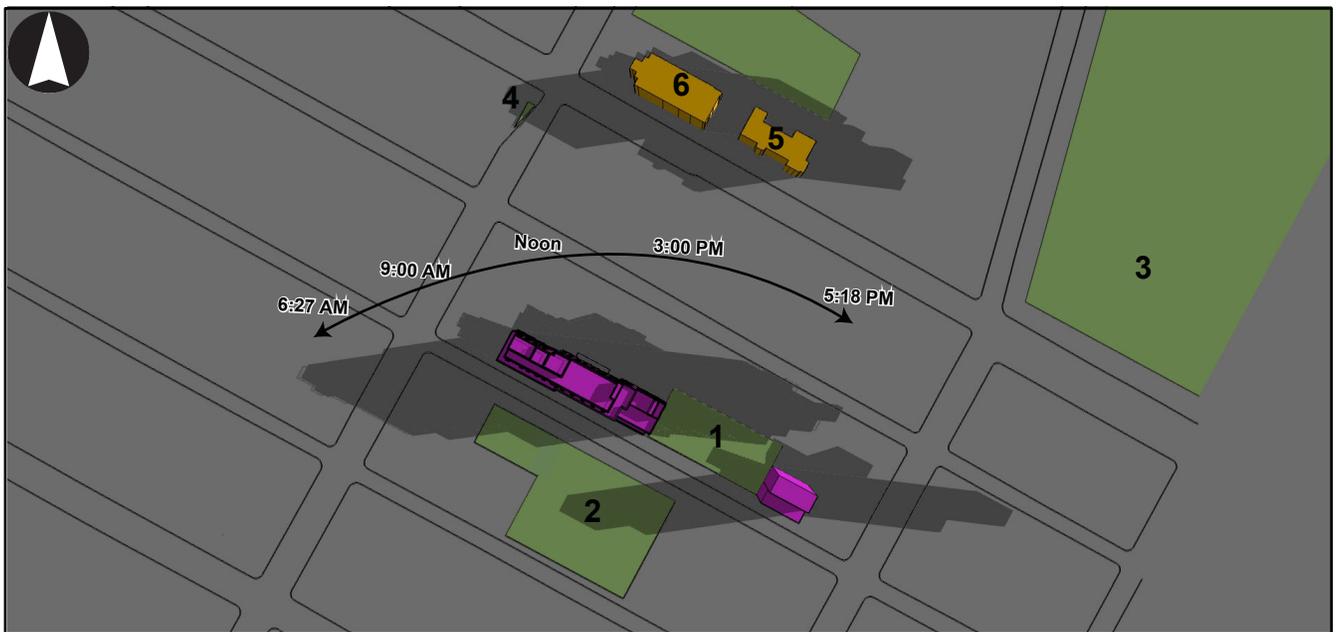
The Anibal Aviles Playground is a 0.52-acre playground operated by the New York City Department of Parks and Recreation (DPR). It is located within the Project Area (on the north side of West 108th Street between Amsterdam and Columbus avenues) on Block 1863, Lot 17 (between the Development Site lots). Its features include playground equipment, spray showers, seating, benches, and trees. Its operating hours are from 6 AM until dusk.

Booker T. Washington Playground

The Booker T. Washington Playground is a 1.44-acre playground jointly-operated by DPR and the New



MARCH 21/SEPTEMBER 21



MAY 6/AUGUST 6



Proposed Project



Open Space

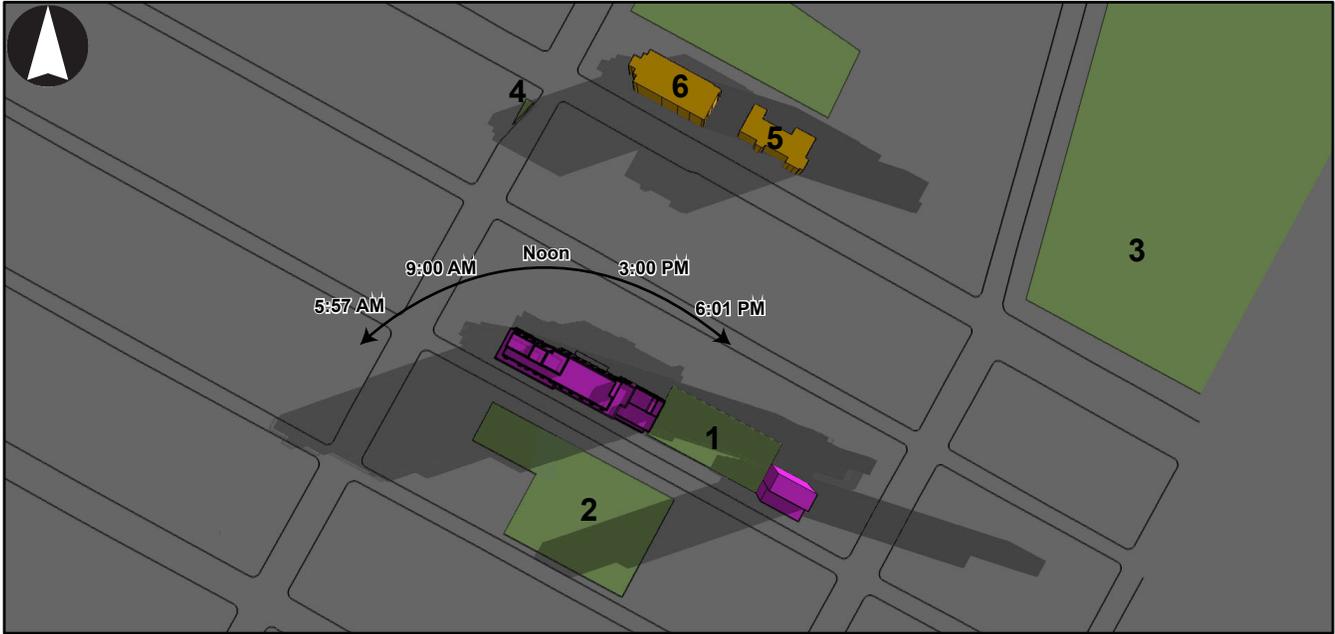


Incremental Shadow

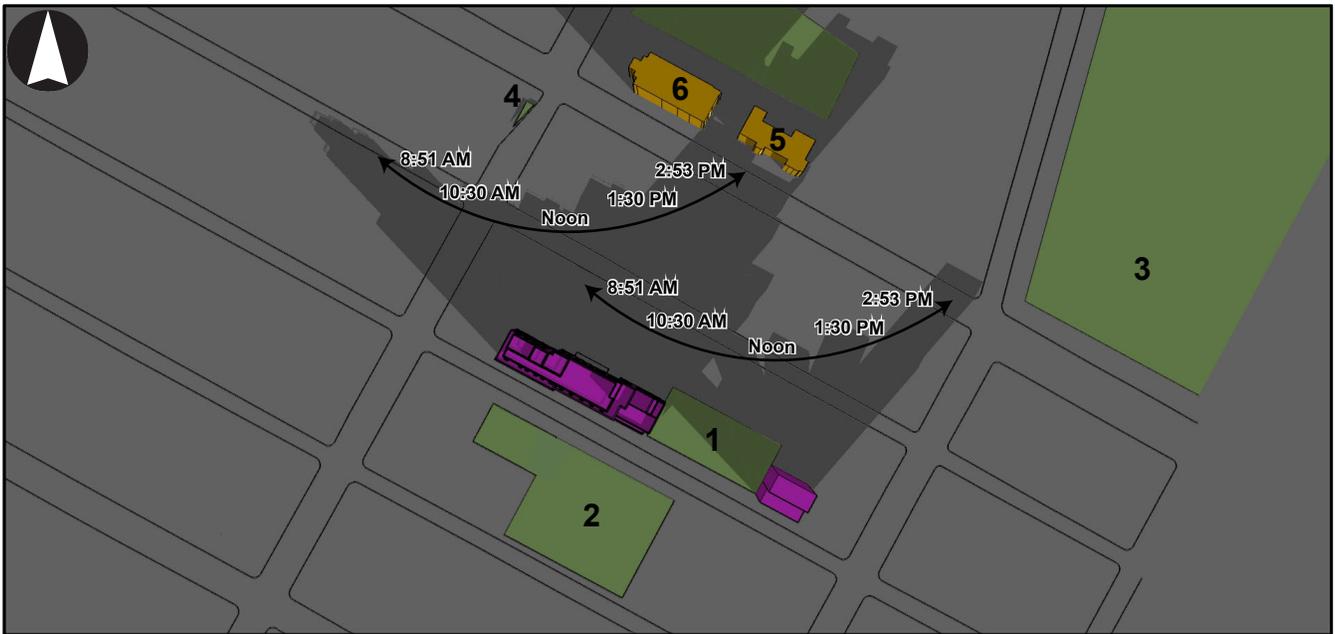


Sunlight Sensitive
Architectural Resource

Note: Resources keyed to Table 4-1



JUNE 21



DECEMBER 21



Proposed Project



1 Open Space



Incremental Shadow

Note: Resources keyed to Table 4-1



5 Sunlight Sensitive
Architectural Resource

York City Department of Education (DOE). It is located on the south side of West 108th Street between Amsterdam and Columbus avenues across the street from the Project Area, occupying Block 1862, Lot 11. The playground primarily serves the neighboring Booker T. Washington Middle School for sports activities, and its features include basketball courts, handball courts, and a turf-cover soccer field. It is open to the public during non-school hours from 6 AM until dusk. It should be noted that the handball and basketball courts located in the northwestern portion of the playground are currently under construction.

1021 Amsterdam Avenue and 1025 Amsterdam Avenue

The two buildings located at 1021 Amsterdam Avenue and 1025 Amsterdam Avenue are part of the Cathedral of St. John the Divine complex and are each LPC-designated historic resources. The two buildings are five and three stories tall, respectively, and have stained-glass windows adorning their southern facades (facing West 110th Street).

Detailed Shadows Analysis

Per *CEQR Technical Manual* guidelines, shadow analyses were performed for the four sunlight-sensitive resources identified above on four representative days of the year: March 21/September 21 (the equinoxes); May 6 (the midpoint between the summer solstice and the equinox, and equivalent to August 6); June 21 (the summer solstice and the longest day of the year); and December 21 (the winter solstice and shortest day of the year). These four representative days indicate the range of shadows over the course of the year. As noted previously, *CEQR Technical Manual* guidelines define the temporal limits of a shadow analysis period to fall from 1.5 hours after sunrise to 1.5 hours before sunset. The results of the shadows analysis show the incremental difference in shadow impact between the No-Action and With-Action conditions, the results of which are summarized in **Table 4-3**. It should be noted that, due to the bulk of the existing building on the western portion of the Development Site and the proposed bulk of future Building 1, incremental shadows from Building 1 would be minimal; Building 2, in comparison, is expected to generate greater incremental shadows, contributing to the shadow durations presented in **Table 4-3**.

TABLE 4-3
Duration of Shadows on Sunlight Sensitive Resources (Increment Compared to No-Action)

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
Anibal Aviles Playground	Shadow enter-exit time	7:36 AM – 1:20 PM 1:23 – 2:49 PM	6:35 AM – 12:43 PM 12:45 – 4:29 PM	6:41 AM – 12:36 PM 12:43 – 5:50 PM	8:51 AM – 1:48 PM 1:56 – 2:53 pm
	Incremental shadow duration	5 hours 44 minutes 1 hour 26 minutes	6 hours 8 minutes 3 hours 44 minutes	5 hours 55 minutes 5 hours 7 minutes	4 hours 57 minutes 57 minutes
Booker T. Washington Playground	Shadow enter-exit time		6:27 – 7:25 AM	5:57 – 7:33 AM	
	Incremental shadow duration		58 minutes	1 hour 36 minutes	

Note: All times are Eastern Standard Time; Daylight Savings Time was not accounted for per *CEQR Technical Manual* guidelines. Table indicates the entry and exit times and total duration of incremental shadow for each sunlight-sensitive resource.

As shown in **Table 4-3**, incremental project-generated shadows would reach two of the sunlight-sensitive resources identified in the Tier 3 assessment. Increases in shadow coverage would occur at Anibal Aviles Playground on all four representative analysis days (March 21/September 21, May 6/August 6, June 21, and December 21), while increases in shadow coverage would occur at Booker T. Washington Playground on only two of the four analysis days (May 6/August 6 and June 21). The sunlight-sensitive resources at

1021 and 1025 Amsterdam Avenue would not experience any incremental shadow coverage as a result of the Proposed Project on any of the representative analysis days. **Figures 4-3a through 4-3j** and **Figures 4-4a and 4-4b** (all provided at the end of this chapter) show representative shadow views for Anibal Aviles Playground and Booker T. Washington Playground, respectively, on each of the representative analysis days on which incremental shadows would occur (refer to **Table 4-3**).

It should be noted that, per the *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 such, the times reported in this attachment for March 21/September 21, May 6/August 6, and June 21 need to have one hour added to reflect the Eastern Daylight Saving Time.

March 21/September 21

On March 21/September 21, the time period for shadows analysis begins at 7:36 AM and continues until 4:29 PM. 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. On the March 21/September 21 analysis day, incremental shadows would reach portions of Anibal Aviles Playground. No other sunlight-sensitive resource would experience incremental shadow coverage on this analysis day.

The Proposed Project would cast incremental shadows on portions of Anibal Aviles Playground for a total of seven hours and ten minutes on the March 21/September 21 analysis day. Initially, incremental shadows would enter the playground at 7:36 AM and continue until 1:20 PM, for a duration of five hours and 44 minutes. Shortly after (at 1:23 PM), shadows would reenter the open space before exiting again at 2:49 PM, for a duration of one hour and 26 minutes. After 2:49 PM the playground would not experience any incremental shadow coverage. As indicated in **Figures 4-3a** and **4-3b**, during the morning hours, shadow coverage would be concentrated on the southern portion of the open space fronting West 108th Street. By midday incremental shadow coverage would decrease, moving in a northeasterly direction until exiting the open space, and the majority of the playground would receive direct sunlight. When reentering the open space at 1:23 PM, incremental shadows would be concentrated in the western portion of the playground and coverage would be minimal. The maximum area of incremental shadow coverage that would cover the playground on this analysis day would be approximately 4,976 sf, or approximately 21.9 percent of added coverage; the maximum total shadow coverage from both existing buildings and the proposed buildings would be approximately 14,173 sf, or 62.4 percent of the total playground area.

The areas of Anibal Aviles Playground that would experience incremental shadow coverage feature playground equipment, bench seating, and trees; while these areas, combined, would experience incremental shadows for a cumulative total of seven hours and ten minutes, no single feature of the open space would be cast in incremental shadows for an extended period of time due to the speed and movement of these shadows across the open space. Specifically, the playground equipment located on the eastern portion of the playground would experience incremental shadows for no longer than three hours on any given feature, while the playground equipment located on the western portion of the playground would experience incremental shadows for no longer than one hour; though several benches lining the playground's southern frontage facing West 108th Street would experience incremental shadows during the early morning hours, shadow coverage would generally last no more than two hours on any given bench; and though incremental shadow coverage would reach the playground's trees for a total of seven hours and ten minutes on the March 21/September 21 analysis day, no single tree would receive direct sunlight for less than four to six hours, which, according to the *CEQR Technical Manual*, is the general minimum requirement for the survival of vegetation during the growing season.

May 6/August 6

On May 6/August 6 (the midpoint between the equinoxes and solstices), the time period for shadows analysis begins at 6:27 AM and continues until 5:18 PM. On this analysis day, incremental shadows would reach portions of Anibal Aviles Playground and Booker T. Washington Playground. No other sunlight-sensitive resource would experience incremental shadow coverage.

The Proposed Project would cast incremental shadows on portions of Anibal Aviles Playground for a total of nine hours and 52 minutes on the May 6/August 6 analysis day. Initially, incremental shadows would enter the playground at 6:35 AM and continue until 12:43 PM, for a duration of six hours and eight minutes. Shortly after, at 12:45 PM, shadows would reenter the open space before exiting again at 4:29 PM, for a duration of three hours and 44 minutes. Prior to 6:35 AM and following 4:29 PM the playground would not experience any incremental shadow coverage. As indicated in **Figures 4-3c** and **4-3d**, during the morning hours incremental shadows would be limited to the southern portion of the playground fronting West 108th Street. By midday, incremental shadow coverage would decrease, moving in a northeasterly direction throughout the afternoon until exiting the open space. At 12:45 PM, incremental shadows would reenter the open space at the western portion of the playground and would be minimal in size. The maximum area of incremental shadow coverage that would cover the playground on this analysis day would be approximately 3,057 sf, or approximately 13.5 percent of added coverage; the maximum total shadow coverage from both existing buildings and the proposed buildings would be approximately 4,623 sf, or 20.4 percent of the total playground area.

The areas of Anibal Aviles Playground experiencing shadow coverage would be limited to some playground equipment, bench seating, and trees; while these areas, combined, would experience incremental shadows for a cumulative total of nine hours and 52 minutes, no single feature of the open space would be cast in incremental shadows for an extended period of time due to the speed and movement of these shadows across the open space. Specifically, the playground equipment located on the eastern portion of the playground would experience incremental shadows for no longer than three hours, while the playground equipment located on the western portion of the playground would experience incremental shadows for no longer than one hour; though several benches lining the playground's southern frontage facing West 108th Street would experience incremental shadows during the early morning hours, shadow coverage would generally last no more than two hours on any given bench; and though incremental shadow coverage would reach the playground's trees for a total of nine hours and 52 minutes on the May 6/August 6 analysis day, no single tree would receive direct sunlight for less than four to six hours, which, according to the *CEQR Technical Manual*, is the general minimum requirement for the survival of vegetation during the growing season.

The Proposed Project would cast incremental shadows on portions of Booker T. Washington Playground for a total of 58 minutes on the May 6/August 6 analysis day (beginning at 6:27 AM and continuing until 7:25 AM). Following 7:25 AM, the playground would not experience any incremental shadow coverage. As indicated in **Figure 4-4a**, during the limited (58-minute) incremental shadow period, incremental shadows would only occur within the northeastern and northwestern portions of the playground. Incremental shadows would move in a northeasterly direction throughout the morning, and a majority of the playground would continue to receive direct sunlight throughout the day. The areas of Booker T. Washington Playground experiencing shadow coverage feature basketball courts, handball courts, and a turf-cover soccer field.

June 21

On June 21 (the summer solstice), the time period for shadows analysis begins at 5:57 AM and continues

until 6:01 PM. On the summer solstice, which is the day of the year with the longest period of daylight, the sun is most directly overhead and generally shadows are shortest and move across the widest angular range from west to east. On this date, incremental shadows would be cast on portions of Anibal Aviles Playground and Booker T. Washington Playground. No other sunlight-sensitive resource would experience incremental shadow coverage.

The Proposed Project would cast incremental shadows on portions of Anibal Aviles Playground for a total of 11 hours and two minutes on the June 21 analysis day. Initially, incremental shadows would enter the playground beginning at 6:41 AM and continue until 12:36 PM, for a duration of five hours and 55 minutes. Shortly after (at 12:43 PM) shadows would reenter the open space before exiting again at 5:50 PM, for a duration of five hours and seven minutes. As indicated in **Figures 4-3e** and **4-3f**, incremental shadows would be located in the southern portion of the playground fronting West 108th Street during the morning hours. By midday, incremental shadows would decrease, moving in a northeasterly direction, until exiting the open space. At 12:43 PM, incremental shadows would reenter the open space at the western portion of the playground. Incremental shadow coverage would decrease throughout the late afternoon hours and would remain limited in size, with the majority of the playground continuing to receive direct sunlight throughout the day. The maximum area of incremental shadow coverage that would cover the playground on this analysis day would be approximately 1,350 sf, or approximately 5.9 percent of added coverage; the maximum total shadow coverage from both existing buildings and the proposed buildings would be approximately 10,899 sf, or 48.0 percent of the total playground area.

The areas of Anibal Aviles Playground experiencing shadow coverage would be limited to playground equipment, bench seating, and trees; while these areas, combined, would experience incremental shadows for an accumulative total of 11 hours and two minutes, no single feature of the open space would be cast in incremental shadows for an extended period of time due to the speed and movement of these shadows across the open space. Specifically, the playground equipment located on the eastern portion of the playground would experience incremental shadows for no longer than two hours, while the playground equipment located on the western portion of the playground would experience incremental shadows for no longer than 30 minutes; though several benches lining the playground's southern frontage facing West 108th Street would experience incremental shadows during the early morning hours, shadow coverage would generally last no more than two hours on any given bench; and though incremental shadow coverage would reach the playground's trees for a total of 11 hours and two minutes on the June 21 analysis day, no single tree would receive direct sunlight for less than four to six hours, which, according to the *CEQR Technical Manual*, is the general minimum requirement for the survival of vegetation during the growing season..

The Proposed Project would cast incremental shadows on portions of Booker T. Washington Playground beginning at 5:57 AM and continuing until 7:33 AM (for a duration of one hour and 36 minutes) on the June 21 analysis day. Following 7:33 AM, the playground would not experience any incremental shadow coverage. As indicated in **Figure 4-4b**, incremental shadows would be limited to the southern, northeastern, and northwestern portions of the playground during the early morning hours. Incremental shadows would move in a northeasterly direction throughout the morning. By 7:00 AM, incremental shadow coverage would decrease, and a majority of the playground would continue to receive direct sunlight throughout the day. The areas of Booker T. Washington Playground experiencing shadow coverage feature basketball courts, handball courts, and a turf-cover soccer field.

December 21

On the winter solstice (December 21), 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 incremental shadows would

be cast by the Proposed Project on portions of Anibal Aviles Playground. No other sunlight-sensitive resource would experience incremental shadow coverage.

The Proposed Project would cast incremental shadows on portions of Anibal Aviles Playground for a total of five hours and 54 minutes on the December 21 analysis day. Initially, incremental shadows would enter the playground beginning at 8:51 AM and continue until 1:48 PM, for a duration of four hours and 57 minutes. Shortly after (at 1:56 PM) shadows would reenter the open space and would remain until the end of the analysis period (2:53 PM), for a duration of 57 minutes. As indicated in **Figures 4-3g** and **4-3h**, incremental shadows would be limited to the northern portions of the playground during the morning hours, moving very quickly in an easterly direction throughout the morning and afternoon until exiting the open space at 1:48 PM. At 1:56 PM, incremental shadows would reenter the open space at the western portion of the playground, and shadow coverage would be minimal in size; the majority of the playground would continue to receive direct sunlight throughout the day. The maximum area of incremental shadow coverage that would cover the playground on this analysis day would be approximately 2,734 sf, or approximately 12.0 percent of added coverage; the maximum total shadow coverage from both existing buildings and the proposed buildings would be approximately 13,148 sf, or 57.9 percent of the total playground area.

The areas of Anibal Aviles Playground experiencing shadow coverage feature playground equipment, bench seating, and trees; while these areas, combined, would experience incremental shadows for a cumulative total of five hours and 54 minutes, no single feature of the open space would be cast in incremental shadows for an extended period of time due to the speed and movement of these shadows across the open space. Specifically, the playground equipment located on the eastern and western portions of the playground would experience incremental shadows for no longer than one hour; only a few benches located on the northern frontage of the playground would experience incremental shadows during the early morning hours, which would generally last no more than one hour on any given bench; and—though the December 21 analysis day is not considered to be part of the plant growing season—it should be noted that no single tree would experience an incremental shadow of more than two hours during this representative analysis day.

Assessment

Anibal Aviles Playground

The Proposed Project would cast incremental shadows on portions of Anibal Aviles Playground on all four of the representative analysis days. Cumulative incremental shadow duration would range from five hours and 54 minutes on December 21 to 11 hours and two minutes on June 21. Incremental shadow coverage would generally be limited to northeastern and northwestern portions of the playground and would not be cast on a single part of the playground for an extended period of time, allowing the playground's sunlight-sensitive resources to continue to receive adequate direct sunlight throughout the day (see **Figures 4-3a** through **4-3h**).

The areas affected by incremental shadows are paved and are predominantly used for active recreation, with swing sets located at the eastern and western ends of the playground, two jungle gyms located adjacent to the swing sets, and a spray shower located in the central portion of the playground (see **Figure 4-5**). As outlined above, the active playground equipment located in the eastern portion of the playground would experience a maximum of three hours of incremental shadows on the March 21/September 21 and May 6/August 6 analysis days, with shorter incremental shadow durations on the June 21 and December 21 analysis days. The active playground equipment located in the western portion of the playground

would experience a maximum of one hour of incremental shadows on the March 21/September 21, May 6/August 6, and December 21 analysis days, with a total incremental shadow duration of only 30 minutes on the June 21 analysis day. At no point would both active recreation areas be cast in incremental shadows, and, at the points of maximum total shadow coverage on the March 21/September 21, May 6/August 6, June 21, and December 21 analysis days (including incremental shadows and shadows cast by existing area buildings), a minimum of 38, 80, 52, and 42 percent of the playground, respectively, would continue to receive sunlight. As such, while incremental shadows would be cast on the actively programmed playground equipment of Anibal Aviles Playground, given the fact that one of the two jungle gyms would receive direct sunlight at all times, that the tree canopy during the growing season would offer dappled shade conditions (see **Figure 4-6**), and that incremental shadow coverage on these features would generally occur in the morning and early afternoon hours, when playgrounds are typically less utilized (compared to afterschool peak periods), incremental shadows are not expected to have a significant effect on the utilization or enjoyment of this resource.

There are a limited number of benches lining the northern and southern fences of the playground and within the center of the asphalt portion of the playground. As presented above, no one bench in the playground would experience incremental shadow durations of greater than one hour. In addition, given the multiple locations of benches throughout the open space that are not currently heavily utilized, when any one bench would be cast in incremental shadow, ample alternate seating opportunities would be available to park users.

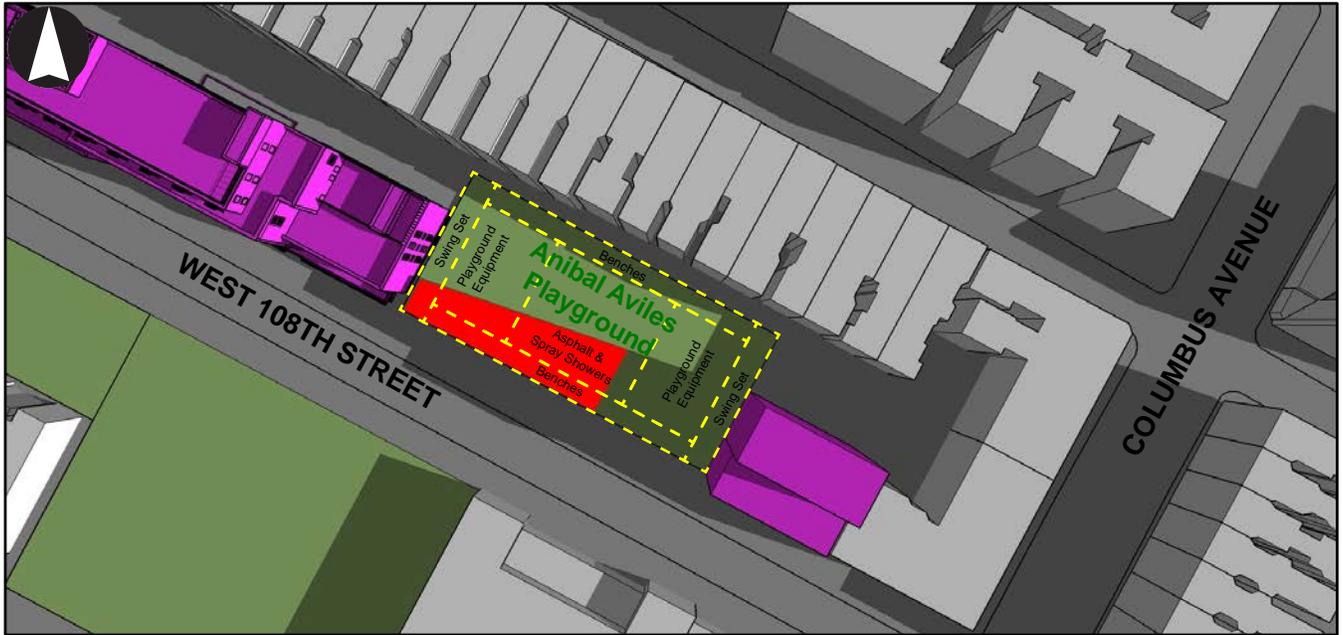
Lastly, as described above, Anibal Aviles Playground features a number of trees growing in tree pits (in the center of the asphalt portion of the playground). While the Proposed Project would cast incremental shadows on trees located in the playground, the maximum shadow duration on any one tree during the plant growing season would be four hours (on the March 21/September 21 analysis days), with lesser incremental shadow durations on the two other analysis days in the plant growing season. As such, it is expected that the playground's trees would continue to receive adequate sunlight, with no tree receiving less than four to six hours of direct sunlight per day during the plant growing season, which, according to the *CEQR Technical Manual*, is the general minimum requirement for the survival of vegetation during the growing season.

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 resources found within this open space; and (2) would not significantly alter the public's use of the playground or threaten the viability of vegetation or other resources located within this open space, incremental shadows from the Proposed Project on Anibal Aviles Playground would not be considered a significant adverse impact, in accordance with *CEQR Technical Manual* methodology,

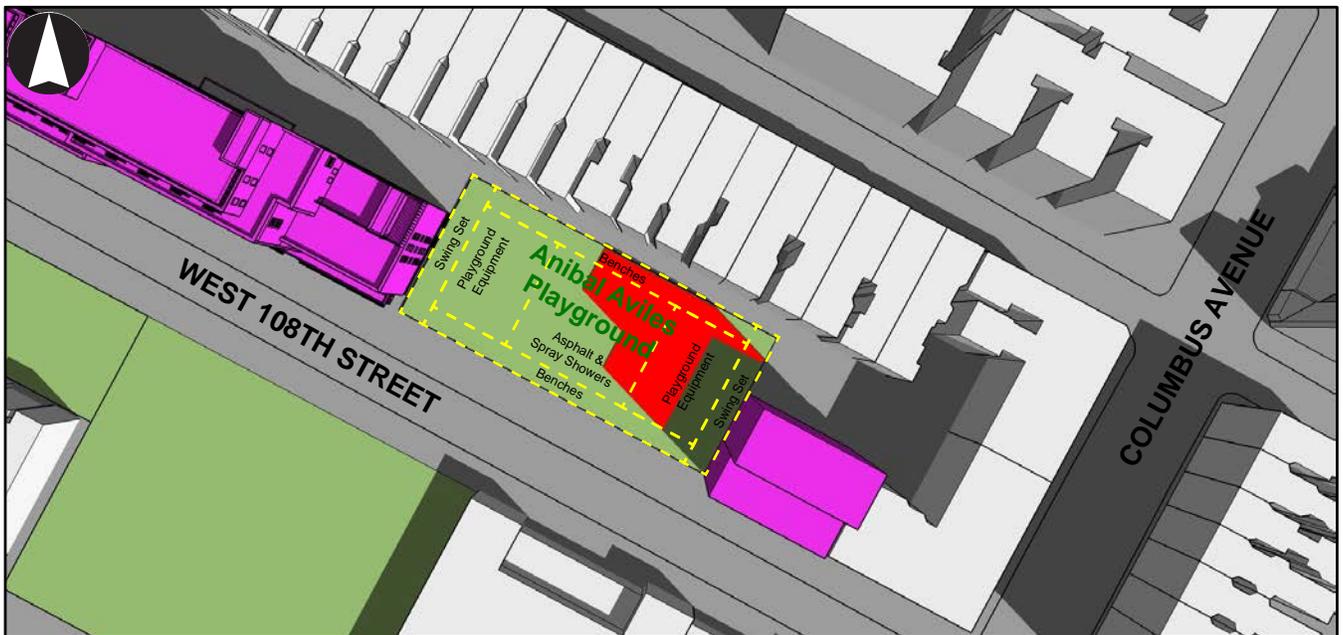
Booker T. Washington Playground

The Proposed Project would cast incremental shadows on portions of Booker T. Washington Playground on two of the four representative analysis days. Incremental shadow duration would be minimal, ranging from 58 minutes on May 6/August 6 to one hour and 36 minutes on June 21. Shadow coverage would generally be limited to the northeastern and northwestern portions of the playground and would not be cast on a single part of the playground for an extended period of time, allowing the playground's sunlight-sensitive resources to receive adequate direct sunlight throughout the day (see **Figures 4-4a** and **4-4b**). Further, as the areas affected by incremental shadows are either paved (basketball and handball courts) or covered in artificial turf (soccer field) and primarily used for active recreational uses (such as basketball, soccer, football, and baseball) (see **Figure 4-5**), and as the incremental shadow coverage on these features would generally occur in the early morning hours, when playgrounds are typically comparatively less

utilized, incremental shadows are not expected to have a significant effect on the utilization or enjoyment of this resource. 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 resources found within this open space; and (2) would not significantly alter the public's use of the playground or threaten the viability of vegetation or other resources, incremental shadows from the Proposed Project on Booker T. Washington Playground would not be considered a significant adverse impact, in accordance with *CEQR Technical Manual* methodology.



8:00 AM

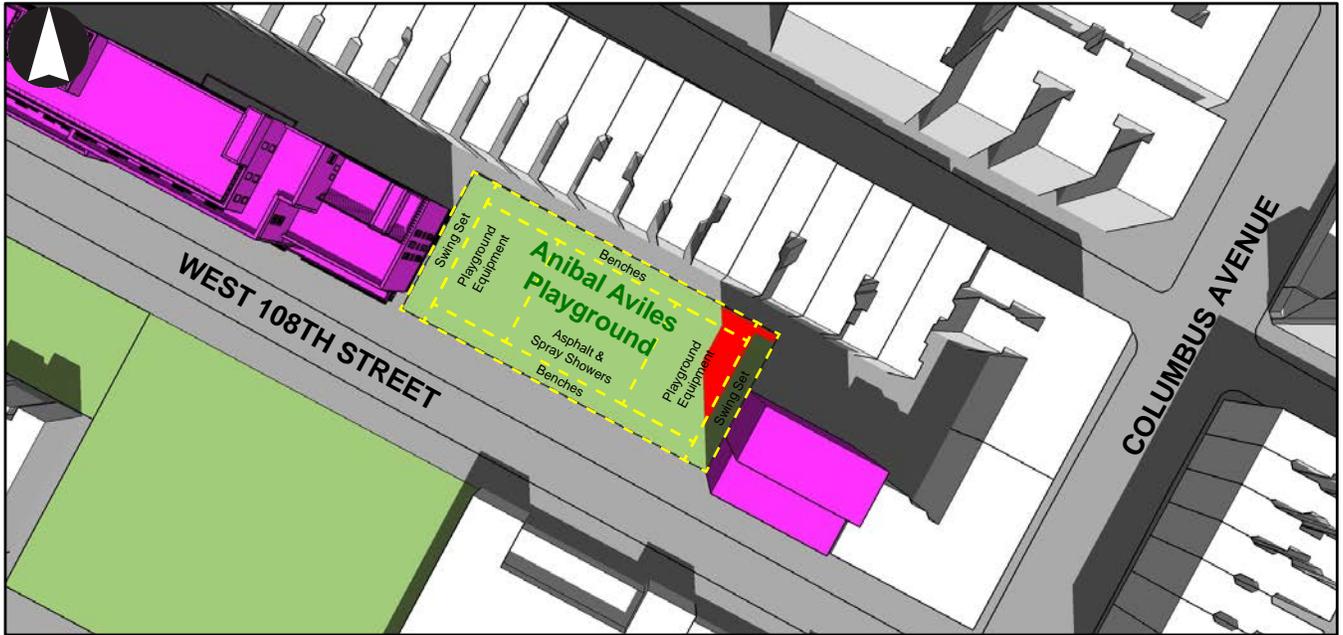


10:00 AM

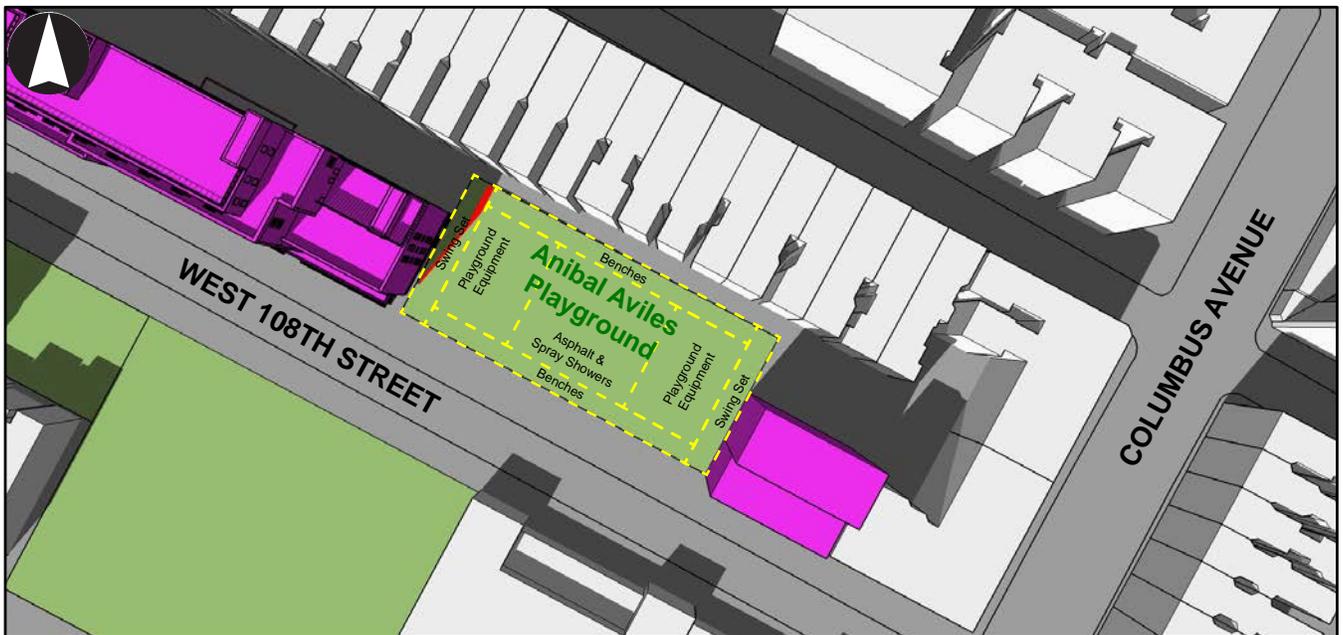
 Proposed Project

 Open Space

 Incremental Shadow



12:00 PM

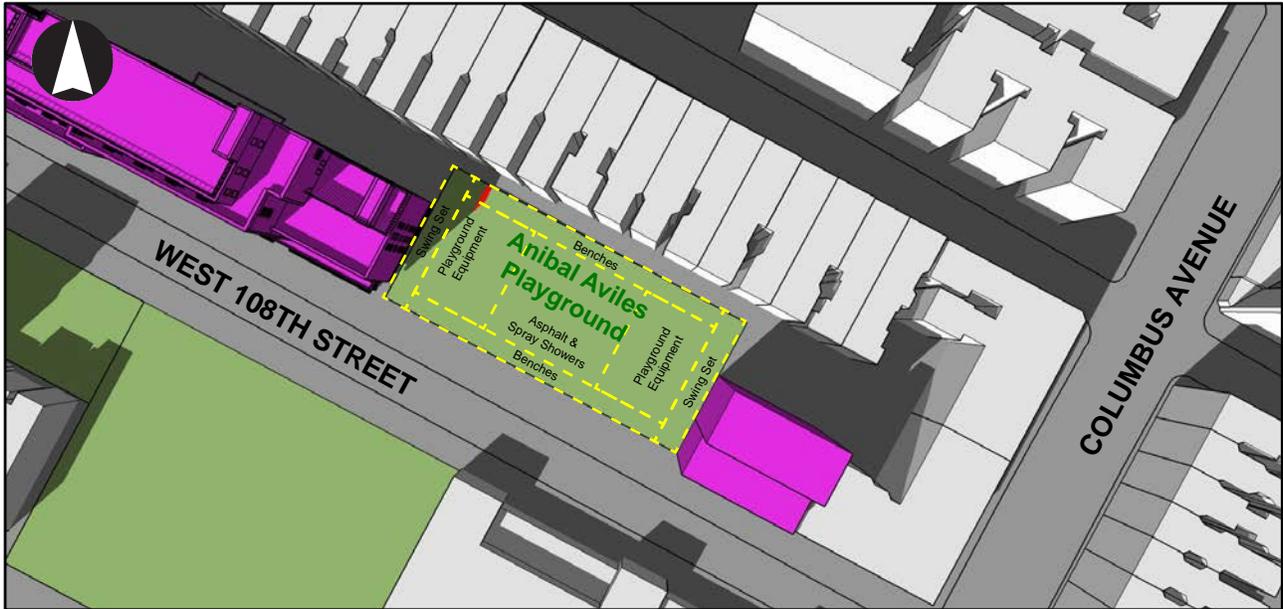


2:00 PM

 Proposed Project

 Open Space

 Incremental Shadow



2:30 PM



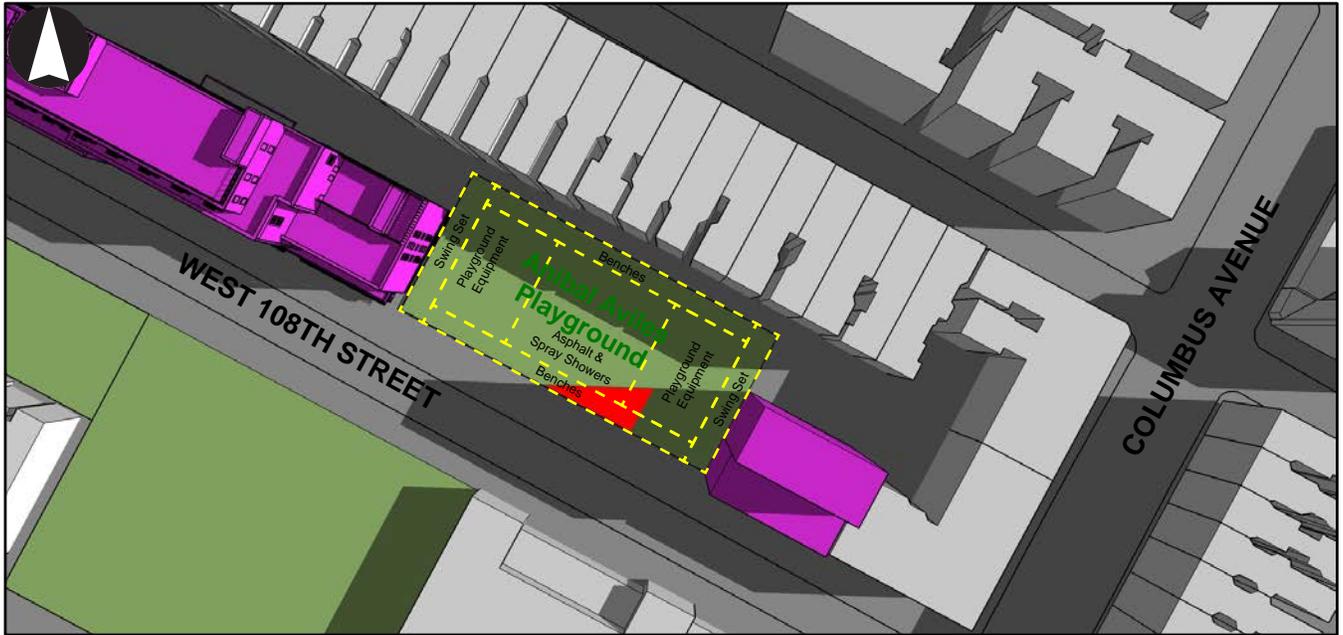
Proposed Project



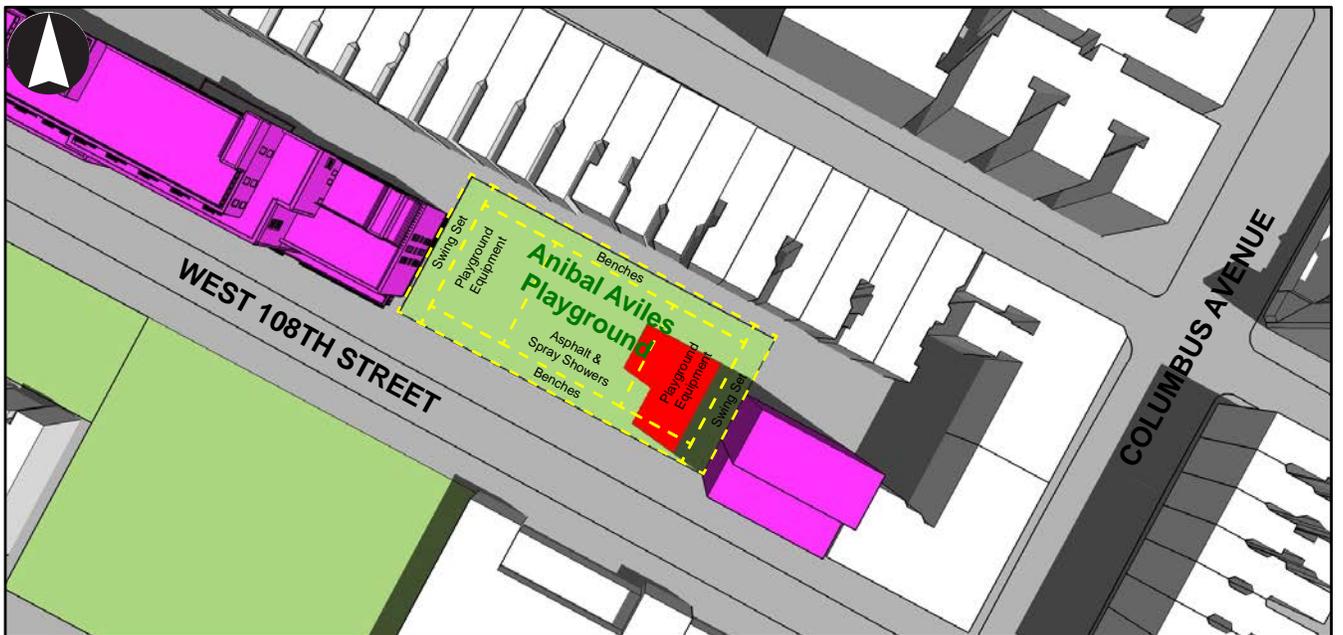
Open Space



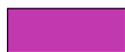
Incremental Shadow



7:30 AM

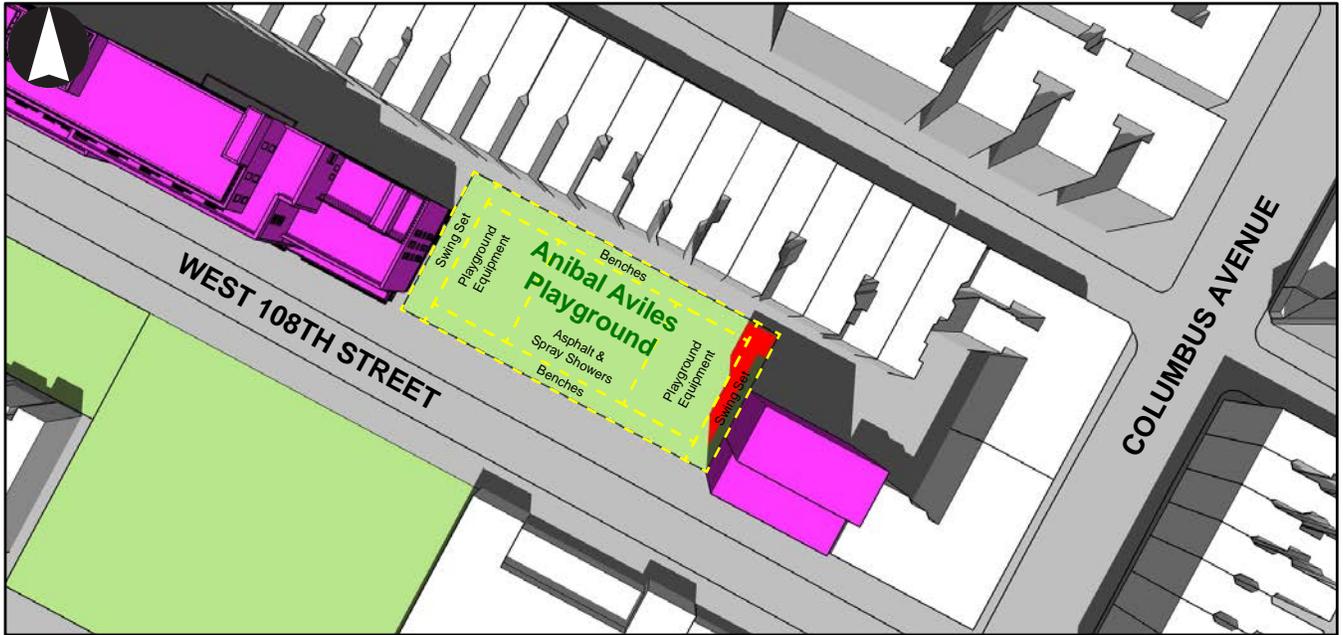


10:00 AM

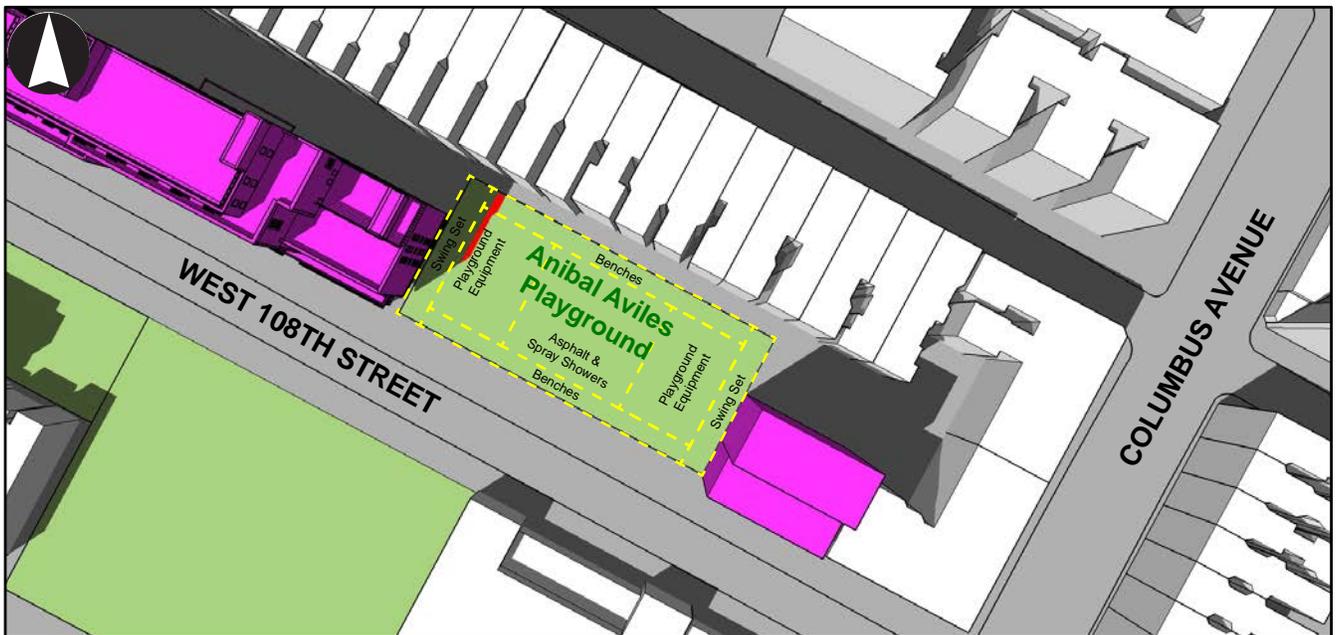
 Proposed Project

 Open Space

 Incremental Shadow



12:00 PM

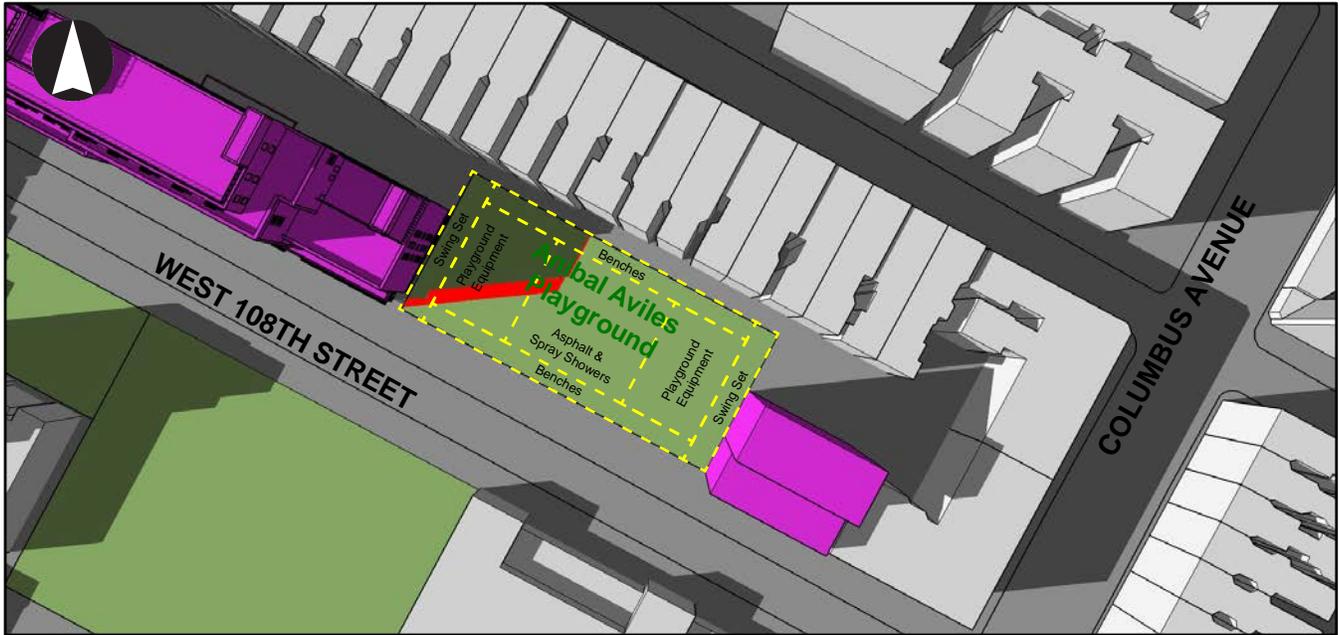


2:00 PM

 Proposed Project

 Open Space

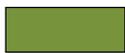
 Incremental Shadow



4:00 PM



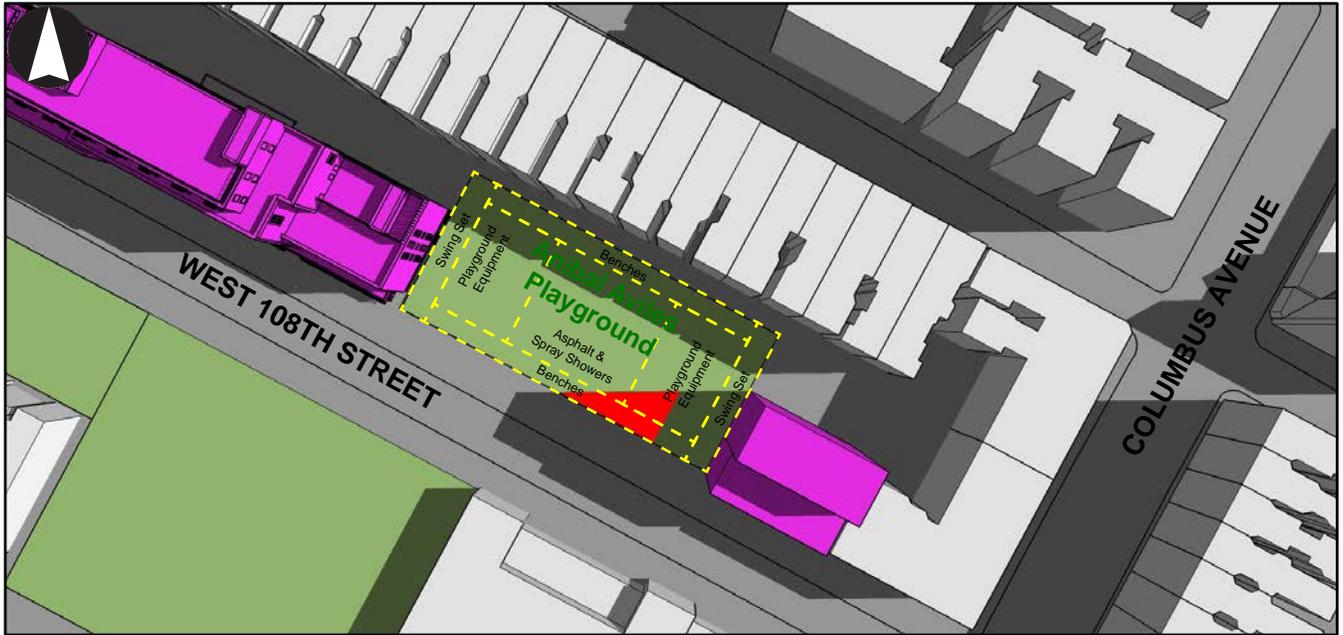
Proposed Project



Open Space



Incremental Shadow



8:00 AM

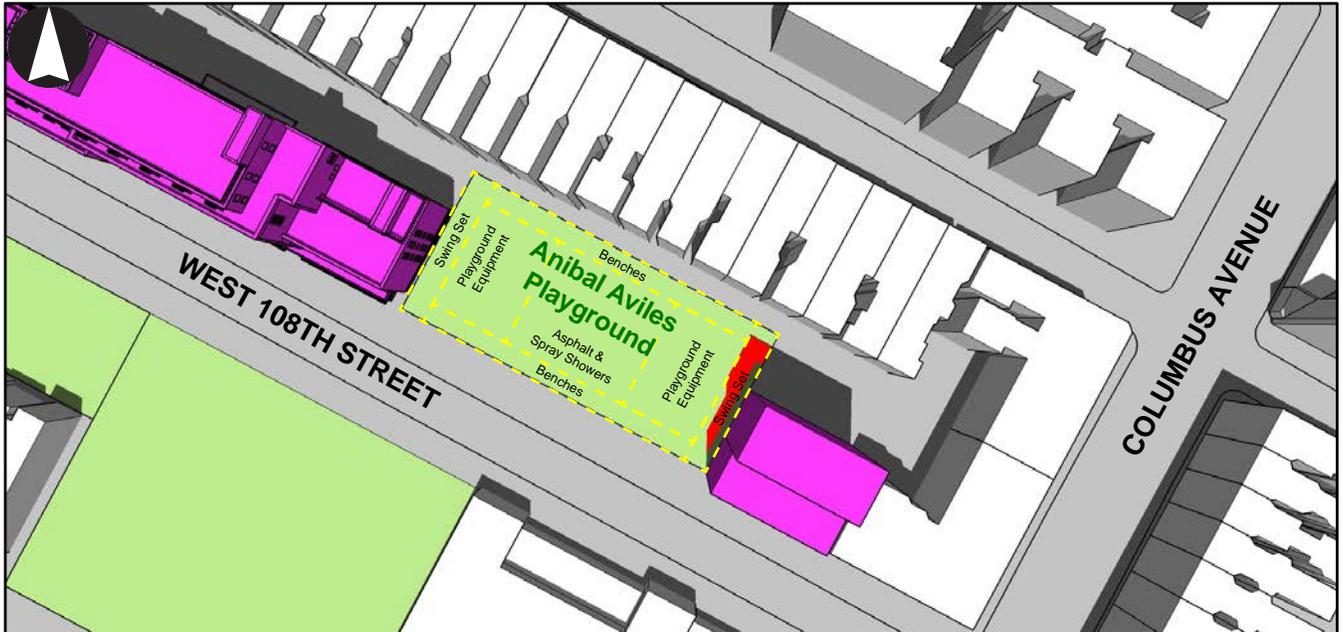


10:00 AM

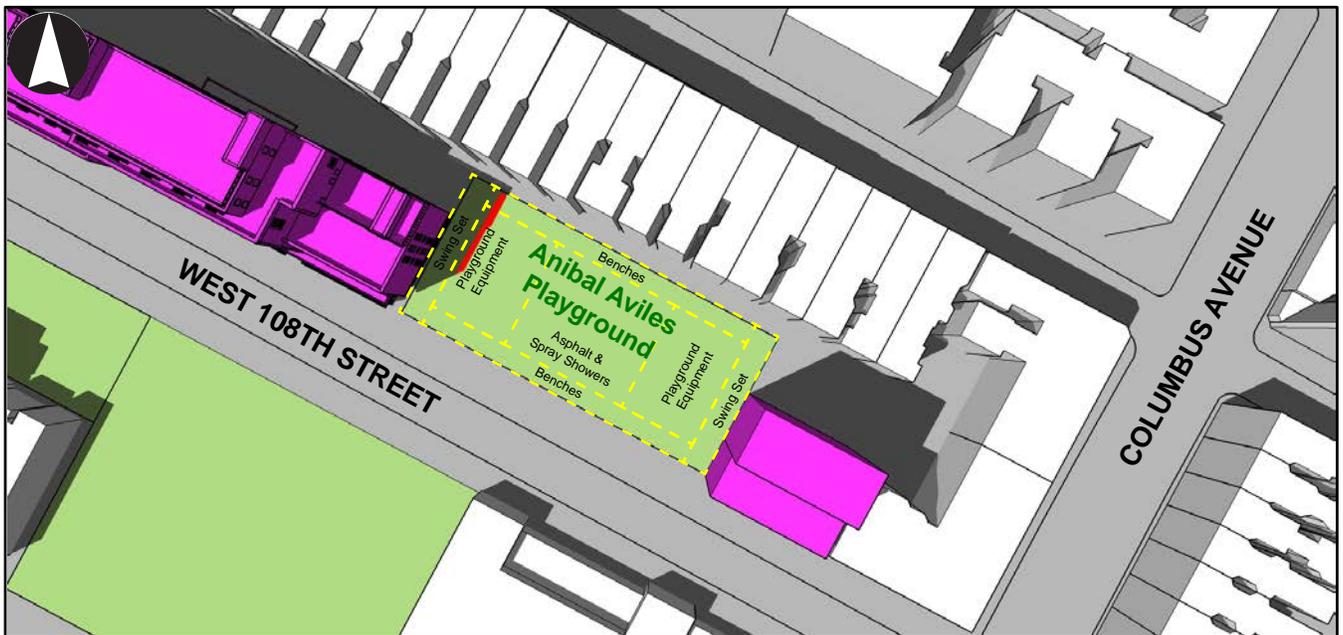
 Proposed Project

 Open Space

 Incremental Shadow



12:00 PM

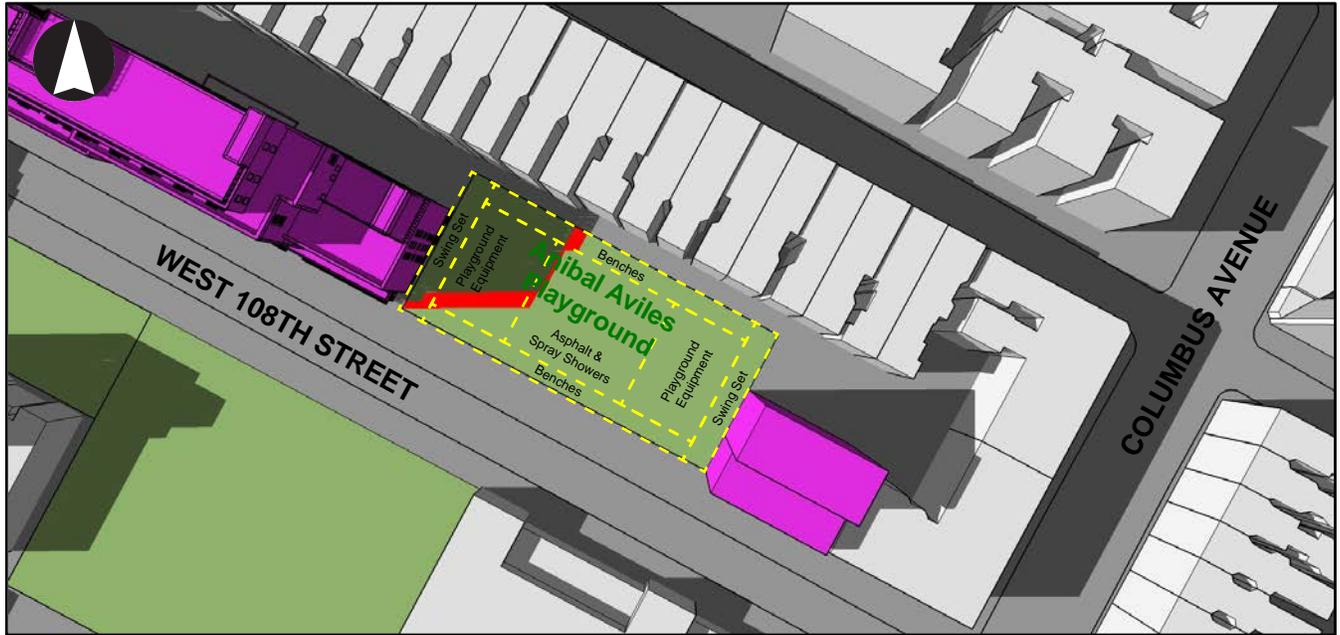


2:00 PM

 Proposed Project

 Open Space

 Incremental Shadow



4:00 PM



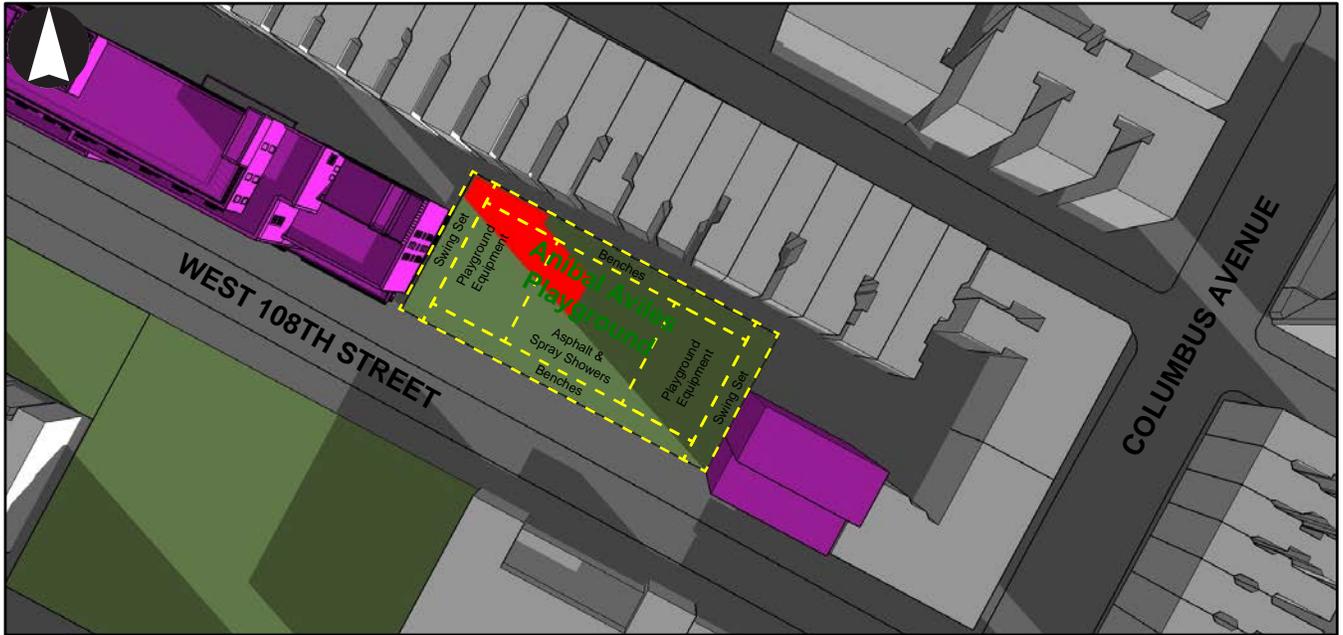
Proposed Project



Open Space



Incremental Shadow



9:00 AM



11:00 AM

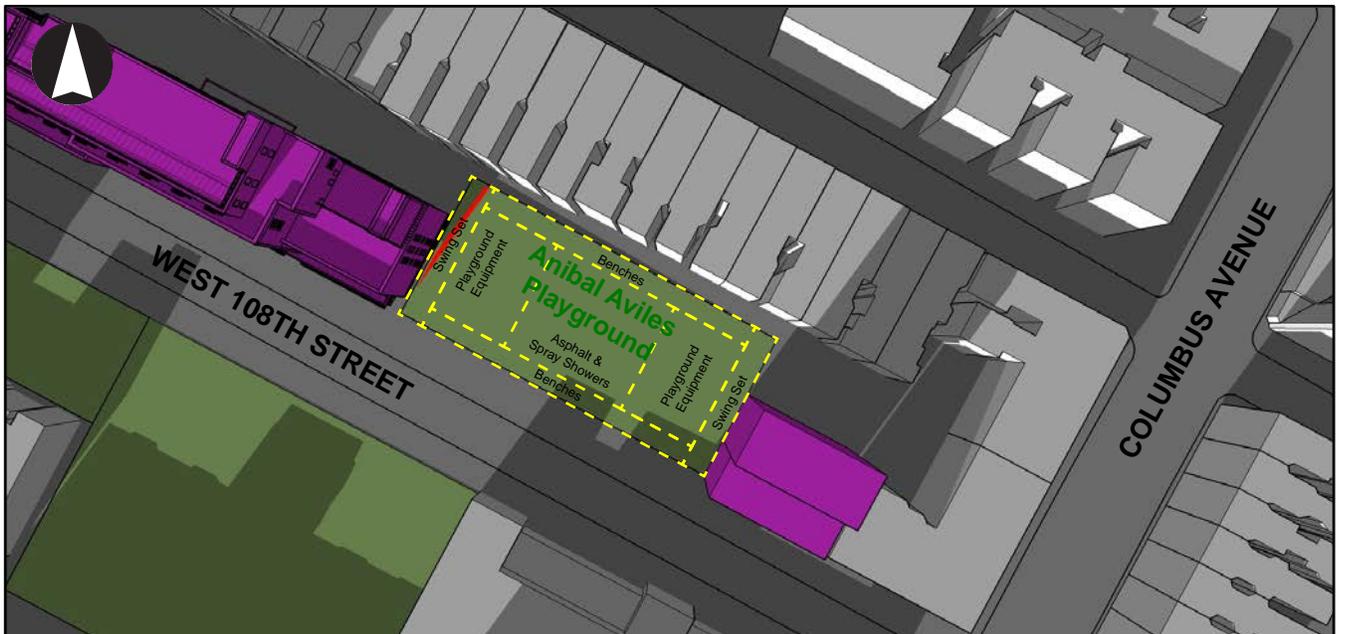
 Proposed Project

 Open Space

 Incremental Shadow



1:00 PM



2:30 PM



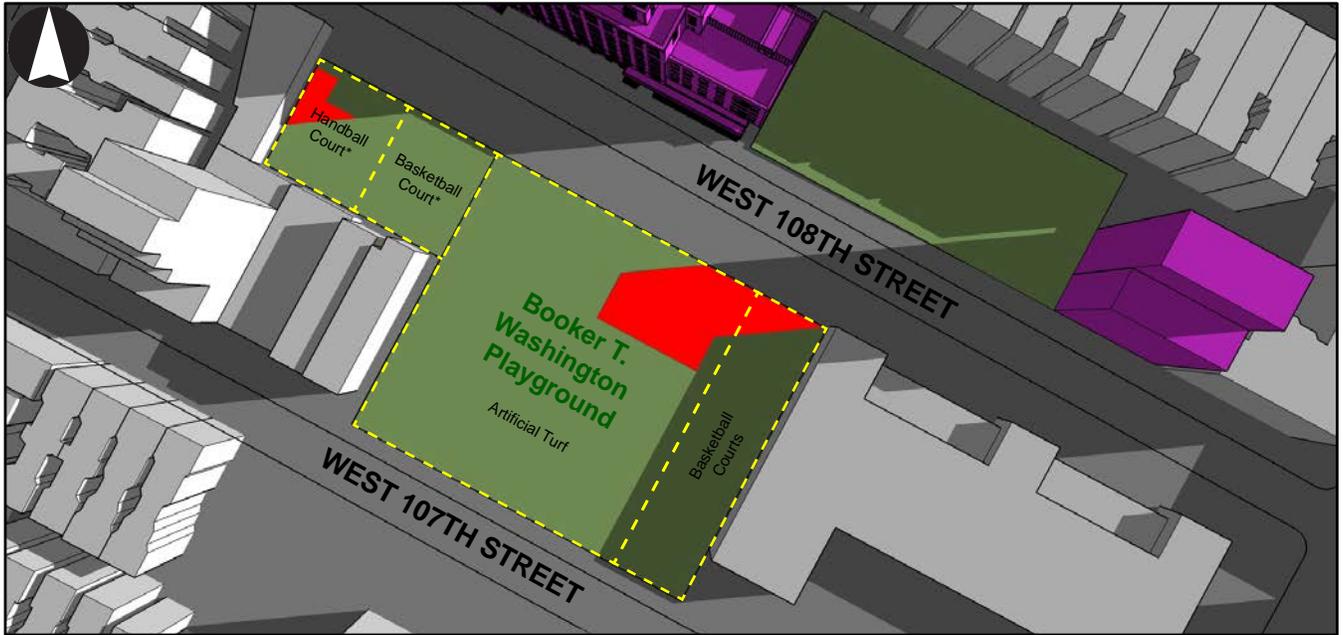
Proposed Project



Open Space



Incremental Shadow



*Currently under construction

6:45 AM



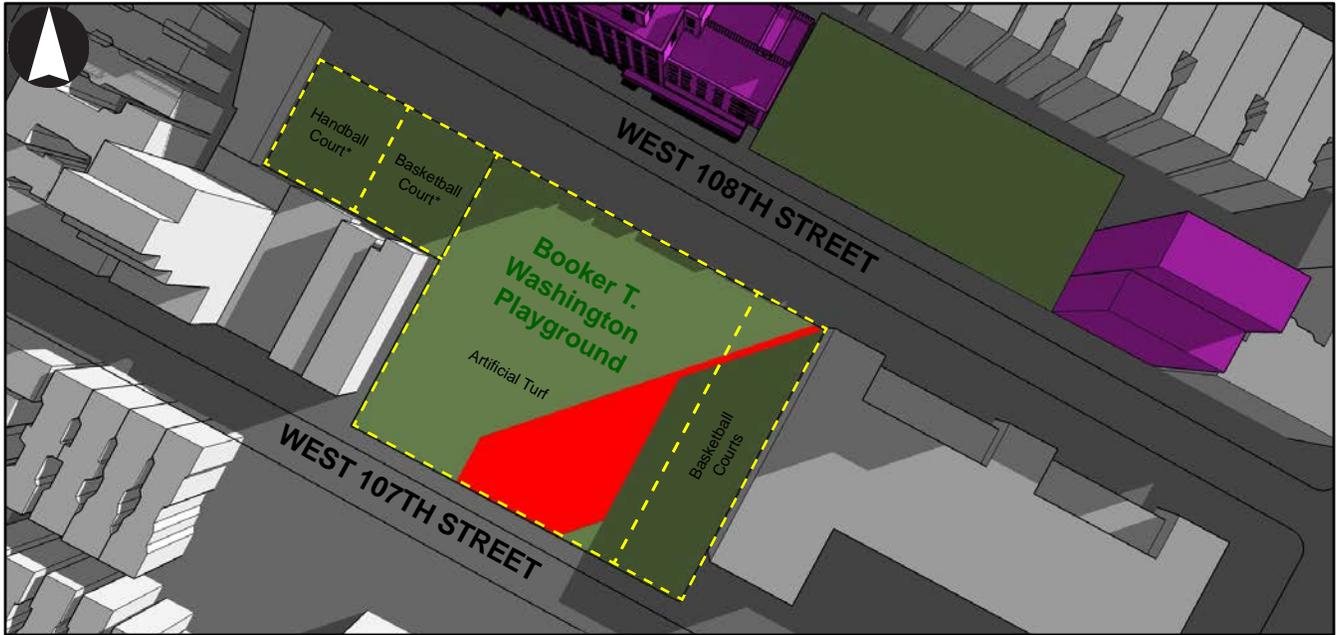
Proposed Project



Open Space



Incremental Shadow



*Currently under construction

6:00 AM



*Currently under construction

7:00 AM



Proposed Project

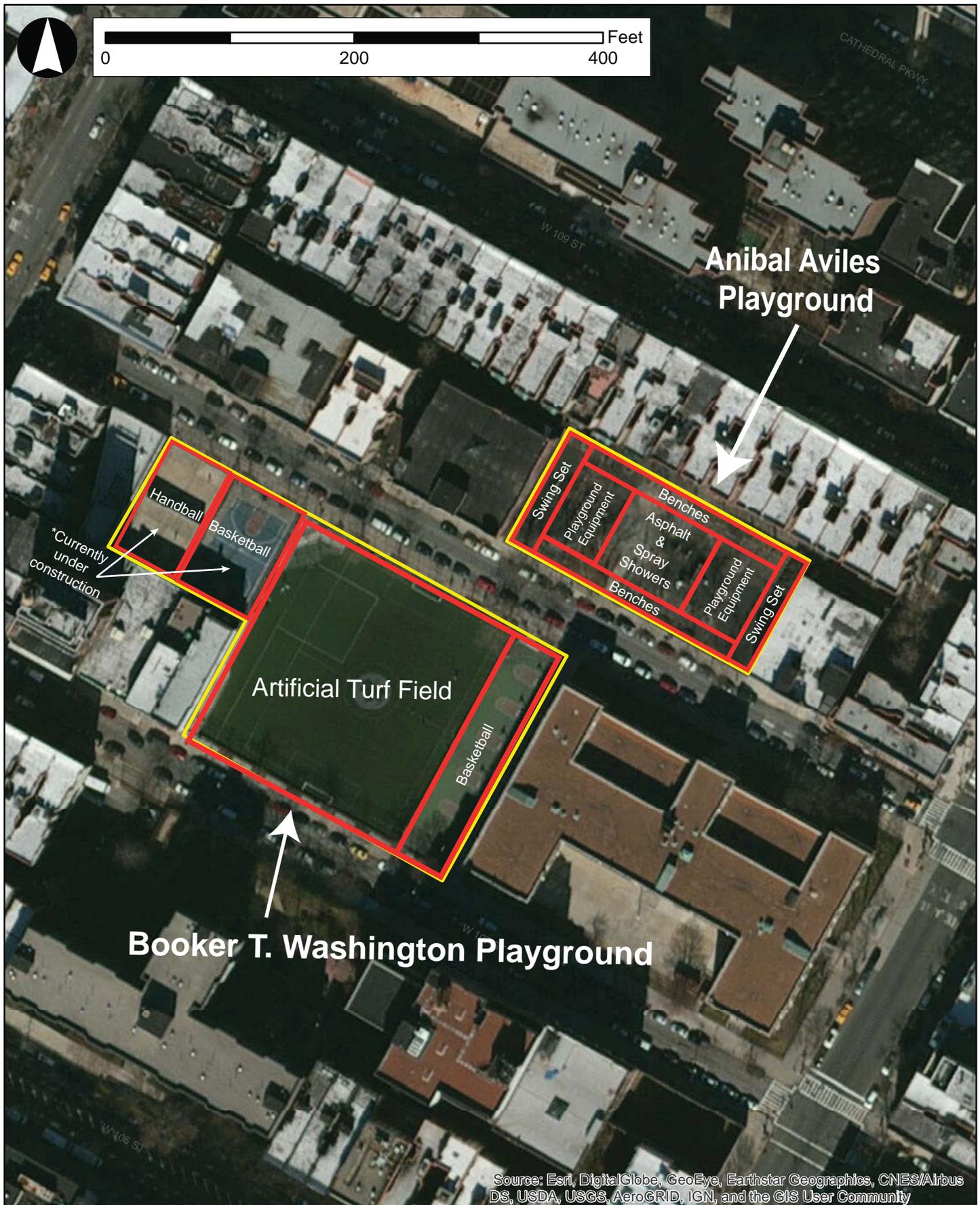


Open Space



Incremental Shadow

Anibal Aviles Playground and Booker T. Washington Playground - Aerial View





West 108th Street WSFSSH Development

Figure 4-6
Street View of Anibal Aviles Playground