A. INTRODUCTION

According to the *CEQR Technical Manual*, a shadow is defined as the circumstance in which a building or other built structure blocks the sun from the land. An adverse shadow impact is considered to occur when the incremental shadow from 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. Sunlight-sensitive resources include publicly accessible open space, historic architectural resources if the features that make the resource significant depend on sunlight, natural resources, and greenstreets. In general, shadows on city streets and sidewalks or on other buildings are not considered significant under CEQR. In addition, shadows occurring within an hour and a half of sunrise or sunset generally are also not considered significant under CEQR.

According to the *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 area affected by the Proposed Action covers approximately 90 blocks in the West Harlem neighborhood of Manhattan. According to the *CEQR Technical Manual*, the longest shadow a structure will cast, except for periods close to dawn or dusk is 4.3 times its height. Projected and potential developments resulting from the Proposed Action would range in building heights from 30 to 175 feet and would therefore cast maximum shadows of 129 to 753 feet (refer to Tables A-3 and A-4 in Chapter 1, "Project Description"). Preliminary assessment of the projected and potential development sites and the shadows they would cast found that several would cast shadows long enough to reach open spaces and architectural resources. Therefore, in accordance with *2012 CEQR Technical Manual* guidelines, this chapter provides a shadow screening analysis for the projected and potential development sites to determine whether the Proposed Action has the potential to result in significant shadow impacts.

B. PRINCIPAL CONCLUSIONS

As discussed in detail below, projected and potential development sites resulting from the Proposed Action would cast new shadows at times throughout the year on some of the existing open space and historic resources in the study area. However, the West Harlem neighborhood of Manhattan is already developed and the incremental shadows from the RWCDS would have significant adverse impacts on only one historic resource on only one of the four analysis days: St. Mary's Episcopal Church, located at 517 West 126th Street. The incremental shadows would be cast on the eastern (side) façade of the church, which contains large stained and leaded glass windows that are considered a sunlight-sensitive feature, for a duration of approximately 1 hour and 33 minutes on the December 21 analysis day. Measures to mitigate this impact (e.g., special lighting features) will be considered between the Draft and Final EIS. Absent the identification and implementation of feasible and practicable mitigation measures, the Proposed Action could have an unmitigated significant adverse shadows impact on St. Mary's Protestant Episcopal Church.

The remaining open spaces and historic resources in the study area would not be significantly affected or affected at all. No incremental shadows would be cast on the Manhattanville Houses Open Space, St. Nicholas Park, Alexander Hamilton Playground, Mo' Pals Community Garden, Carmansville Playground,

or RC Church of the Annunciation on any of the analysis days. Although the remaining open spaces (including Jackie Robinson Park, Maher Circle greenstreet, Highbridge Park, Riverside Park North, Broadway Malls, Serenity Gardens, Sheltering Arms Park, and General Grant Houses I) and sunlight-sensitive historic resources would be subject to varying amounts of incremental shadows as a result of the Proposed Action, these increments would be not be significant due to their limited extent and/or duration, and other site specific factors, as presented in the detailed assessment below.

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 actions resulting in structures less than 50 feet high, a shadow assessment is generally not necessary unless the site is adjacent to a park, historic resource, or important natural feature (if the features that make the structure significant depend on sunlight).

First, a preliminary screening assessment must be conducted to ascertain whether a project's shadow could reach any 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 building representing the longest shadow that could be cast. If there are sunlight-sensitive resources within this radius, the analysis proceeds to the second tier, which reduces the area that could be affected by project shadow 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 shadow 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 proposed action. 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.

D. PRELIMINARY SCREENING ASSESSMENT

A base map was developed (see Figure 6-1) showing the location of the projected and potential development sites and the surrounding street layout. In coordination with the open space and historic and cultural resources analyses, sunlight-sensitive resources were identified and shown on the map. Following *CEQR Technical Manual*, guidelines, a radius of 4.3 times the maximum height of each projected and potential development site was drawn (Tier 1 Assessment).[1] The Tier 1 assessment was not performed for sites with existing structures that are projected to be converted or reused, specifically, projected development sites 51 through 55 and potential development site 56.

As shown in Figure 6-1, the radius was adjusted to exclude the triangular area south of each site between –108 degrees from true north and 108 degrees from true north, as in New York City no shadow can be

[1] For the purposes of this chapter, RWCDS 4 (no deed restriction on site 6 and new development on site 40) was determined to be the most conservative for analysis purposes, as it assumes the taller building height for site 40.

Open Space and Historic Resources within Maximum Shadow Radius (Tiers 1 and 2)



cast from a building within this triangular area (Tier 2 Assessment). Any resource that fell outside the resultant shadow radius was screened out from further consideration, as no shadows cast by projected or potential development sites would reach it.

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 the proposed project can reach a sunlight-sensitive resource, thereby warranting a detailed shadow analysis. However, given the presence and proximity of several sunlight-sensitive resources within the defined shadow radius (refer to Figure 6-1), it was apparent that shadows from the projected and potential development sites would reach several resources on at least one of the representative analysis days. As such, this intermediate step in the assessment (Tier 3) was skipped, and a detailed shadow assessment was conducted, as detailed in Section F below.

E. RESOURCES OF CONCERN

In coordination with the analysis set forth in Chapter 5, "Open Space," and Chapter 7, "Historic Resources," publicly accessible open spaces, greenstreets, and sunlight-sensitive architectural resources to the north, east and west of the projected and potential development sites were identified, as shadows created by the development associated with the RWCDS could potentially fall on these resources. According to the *CEQR Technical Manual*, historic resources that need to be considered in a shadows analysis must have sunlight-dependent features such as stained glass windows, historic landscapes, design elements that are part of a recognized architectural style that depends on contrast between light and dark design features, exterior materials and color that depend on direct sunlight for visual character, or elaborate, highly carved ornamentation. Only those resources that are sunlight sensitive and were found to be within the shadow radius (as discussed above) of a projected or potential development site were included in the analysis.

Open Space Resources

As illustrated in Figure 6-1 and listed in Table 6-1a, 13 open space resources fall within the maximum shadow radius for the Proposed Action, each of which is described briefly below.

TABLE 6-1a
Resources of Concern within Defined Shadow Radius – Open Spaces

Map #	Resources	Location
1	Jackie Robinson Park	West 155th to West 145th Streets, Edgecombe & Bradhurst Aves.
2	Greenstreet/Maher Circle	W. 155th Street, Edgecombe Avenue and St. Nicholas Place
3	Highbridge Park	West 155th to W. 159th Sts. between Harlem River & Edgecombe Ave.
4	Riverside Park North	W. 135th to W. 158th Street, Riverside Drive & Henry Hudson Parkway
5	Broadway Malls	Broadway, West 135th to 158th Street
6	Serenity Gardens	522 West 146th Street
7	Sheltering Arms Park	W. 126th Street to W. 129th Sts. between Amsterdam Ave. & Broadway
8	General Grant Houses I	LaSalle to W. 125th Street, Broadway to Amsterdam Ave.
9	Manhattanville Houses	W. 128th to W. 133rd Streets, Amsterdam Avenue and Broadway
10	St. Nicholas Park	St. Nicholas Avenue to St. Nicholas Terrace, W. 128th to W. 141st Streets
11	Alexander Hamilton Playground	Hamilton Place from W. 140th to W. 141st Streets
12	Mo' Pals Community Garden	545 W. 147th Street, between Broadway and Amsterdam Avenues
13	Carmansville Playground	Amsterdam Avenue between W. 151st and W. 152nd Streets

Notes: (Map # corresponds to Figure 6-1)

Jackie Robinson Park

Jackie Robinson Park is a 12.77-acre park that extends from West 155th Street south to West 145th Street, between Bradhurst and Edgecombe Avenues, which provides ten blocks of recreational resources. The park was originally built as a neighborhood playground to encourage organized play for city children, and is one of the ten original parks to receive a City pool. Along with its pool opening in 1936, a recreation center was created the same year. Equipped with traditional cardiovascular equipment, weight room, and gymnasium, the recreation center also includes a library, computer resource center, and an arts & crafts room, among other features. The park's other features include two baseball diamonds, basketball courts, volleyball courts, and two playgrounds, one with a water play area. In addition, Jackie Robinson Park includes a bandshell that hosts concerts throughout the warm season. The small portion of Jackie Robinson Park that falls within the defined shadow radius consists mostly of vegetated areas with paths and benches, and does not include any of the park's most notable recreational facilities (pool, playground, etc.).

Greenstreet/Plaza Area

As shown in Figure 6-1, a greenstreet, a.k.a. Maher Circle, falls within the shadow radius. Maher Circle is a traffic island at the intersection of Edgecombe Avenue, St. Nicholas Place and West 155th Street. It contains the Hooper Fountain near the western tip of the traffic island, and a small fenced planted area to the east, with various flowers and bushes, and one tree. The Circle does not host any recreational activity nor does it contain any benches, and is more of a visual marker. Although this area functions as a traffic island and does not host any recreational activity – and hence was not included in the open space analysis in Chapter 5 – it is included in the detailed shadows assessment below because the *CEQR Technical Manual* lists greenstreets as sunlight-sensitive resources.

Highbridge Park

The 130-acre Highbridge Park is located just north of the rezoning area, and extends north to Dykman Street in Upper Manhattan, between Edgecombe Avenue and the Harlem River. The southern area of the park that falls within the defined maximum shadow radius is comprised mostly of vegetated areas, with grass and trees, and is mostly surrounded by low fencing, with few benches. None of the park's active recreational features, such as playgrounds, ballfields, or pool, are located within this area. The closest active play area is Coogan's Bluff Playground, which is located approximately near West 157th Street, and falls outside the maximum shadow radius. For shadows analysis purposes, the park has been divided into three areas (western, central, and eastern).

Riverside Park North

A portion of the 20.8-acre Riverside Park North falls within the maximum shadow radius. As shown in Figure 6-1, the maximum shadow radius encompasses the area of the park between approximately West 143rd and West 147th streets. This area is comprised mostly of wide paved walkways lined with vegetated areas and large mature trees, and includes benches located along Riverside Drive facing the park, as well as benches further within the park that offer views of the Hudson River. Riverbank Playground is located north of West 148th Street, and falls outside the maximum shadow radius, and another playground is located between West 142nd and West 143rd Street, which also falls outside the maximum shadow radius.

Broadway Malls

The Broadway Malls are maintained by the Broadway Mall Association (BMA), a non-profit organization that works in partnership with community residents, businesses, other non-profit groups, and DPR, to

maintain them from the Upper West Side, through Harlem, to Washington Heights. The West Harlem segment of the malls traverses the study area from West 135th to West 155th Streets. According to BMA's website, the mall from West 135th to West 136th streets is the gateway mall to West Harlem, with bold plantings in the end beds. The Broadway Malls were among the sites chosen for the first plantings to inaugurate the Heritage Rose District of New York City. The first of its kind in the country, the Heritage Rose District is a collaborative project of Manhattan Borough President Scott M. Stringer and the Heritage Rose Foundation. Inspired by recent plantings of heritage rose bushes at the graves of notable New Yorkers interred in Trinity Church Cemetery, community leaders conceived of the Heritage Rose District as a means to strengthen the public's ties to the rich heritage of Washington Heights and West Harlem and to raise the visibility of these neighborhoods. Among the heritage roses planted in the Broadway malls is 'Audubon' a red rose celebrating the famed naturalist John James Audubon whose estate became Trinity Church Cemetery in the mid 19th century.

The portion of the Malls that falls within the maximum shadow radius is generally located between West 144th and West 148th streets. The Malls between West 146th and West 148th streets are mostly paved, with plant beds, bushes and trees lining the edges along Broadway, and benches located throughout the malls facing inward. The section of the malls that is located between West 144th and West 146th streets is mostly planted (although the central area is occupied by subway grates), with grassy areas, many rosebushes and flower beds, trees and other vegetation, and benches located only at the street intersections, facing out.

Serenity Gardens

Serenity Gardens is an approximately 0.09-acre community garden, located on the north side of West 146th Street, between Broadway and Amsterdam Avenue. The garden features flowers, benches, and a gazebo.

Sheltering Arms Park

Located between West 126th Street and West 129th Streets, Amsterdam Avenue and Broadway, this 1.43-acre open space includes a brick men's and women's changing pavilion opening to a 1'3"-deep wading pool, and a larger, 3'6"-deep pool for casual swimming, as well as two handball courts and play equipment. Trees and bushes are planted in the garden area, and the park also includes paved walkways and benches.

General Grant Houses I

General Ulysses S. Grant Houses in Manhattan consists of 5 high-rise apartment buildings, located between LaSalle and West 125th Streets, Amsterdam Avenue and Broadway. Interspersed between the buildings are a total of approximately 2.33 acres of open space, including basketball courts, playgrounds and jungle gyms, benches, grass, trees, landscaped paths, and planted areas.

Manhattanville Houses

The New York City Housing Authority (NYCHA) owns and operates an approximately 2-acre open space associated with the Manhattanville Houses located east of Broadway, between West 129th and West 133rd Streets. This development has a tower-in-the-park configuration, which typically consists of a superblock with residential towers surrounded by lawns, trees, walkways, benches, playgrounds, basketball and handball courts, and sometimes parking and community centers. The open space is equipped with jungle gyms, slides, basketball courts, swings, benches, and paths.

St. Nicholas Park

St. Nicholas Park, a 22.74-acre park that stretches from West 128th Street to West 141st Street between St. Nicholas Avenue and St. Nicholas Terrace, is devoted to both active and passive uses. Such amenities as swings, slides, basketball courts, handball courts, and jungle gyms enable visitors to enjoy the park's active open space. In addition, paved walkways, benches, trees, and planters are part of the passive open space.

Alexander Hamilton Playground

Located on Hamilton Place between West 140th and West 141st Streets, the 0.81-acre Alexander Hamilton Playground comprises passive and active open space. Equipped with swings, slides, handball courts, and jungle gyms, this active open space also contains various passive amenities, such as benches, trees, paved walkways, and well-maintained landscaping.

Mo' Pals Community Garden

This small 0.04-acre community garden is located on West 147th Street between Broadway and Amsterdam Avenue. It features a vegetable and flower garden.

Carmansville Playground

Carmansville Playground, located on Amsterdam Avenue between 151st and 152nd Streets, is a 0.57-acre active resource, with playground equipment, basketball and handball courts. There are also a few benches located in the area occupied by the playground.

Historic Resources

According to the *CEQR Technical Manual*, historic resources are considered to be sunlight-sensitive if the features that make the resource significant depend on sunlight, which is a function of its design and setting. As per CEQR guidelines, only the following sunlight-sensitive features should be considered, as opposed to the entire architectural resource:

- Buildings containing design elements that are part of a recognized architectural style that depends on the contrast between light and dark design elements (e.g. deep recesses or voids such as open galleries, arcades, recessed balconies, deep window reveals, and prominent rustication).
- Buildings distinguished by elaborate, highly carved ornamentation.
- Buildings with stained glass windows.
- Exterior materials and color that depend on direct sunlight for visual character (e.g. the 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.
- Features in structures where the effect of direct sunlight is described as playing a significant role in the structure's significance as a historic landmark.

The historic resources falling within the shadow radius shown in Figure 6-1 were evaluated to determine whether they contain any of the features listed above, and the results of this assessment are shown in Table 6-1b and summarized below. As part of the screening, the location of the resource in relation to

TABLE 6-1b
Resources of Concern within Defined Shadow Radius – Historic Resources

Map #	Resources	Sunlight Sensitive Features
Designated Resources		
A	Macombs Dam Bridge and Viaduct	None. This resource is therefore screened out from further assessment.
B	409 Edgecombe Avenue	None. Also, resource is to the south of projected development site 2, and the main façade is facing away from projected development sites 1 and 2, therefore only the secondary façade could potentially be affected. This resource is therefore screened out from further assessment.
C	Loth Ribbon Mill	None. This resource is therefore screened out from further assessment.
D	Former Hamilton Theater	None. Although the Broadway and West 146th Street facades are dominated by large round-arched windows, the designation report makes no mention of direct sunlight as playing a significant role in the structure's significance as a historic landmark. This resource is therefore screened out from further assessment.
E	Hamilton Grange Branch, NYPL	None. This resource is therefore screened out from further assessment.
F	Jackie Robinson Pool and Colonial Park Play center	Yes – pool. (Note: the remainder of Jackie Robinson park is analyzed as an open space resource for shadows purposes).
G	Claremont Theater	None. Also, the main façades of this resource are facing away from the development sites in the vicinity (projected development sites 11 and 12), therefore only the secondary façade or the roof could potentially be affected. This resource is therefore screened out from further assessment.
H	George Bruce Branch NYPL	Yes – the windows on the front facade, which are noted in the designation report as providing light into the library.
I	St. Mary's Protestant Episcopal Church, Parish House, and Sunday School	Yes – Gothic leaden glass and stained glass windows on the church's east, south, and west facades. The parish house and Sunday school do not contain any sunlight-sensitive features and are therefore screened out from further assessment.
J	Former P.S. 157	None. Also, the main façades of this resource are facing away from the development sites in the vicinity, therefore only the secondary façade or the roof could potentially be affected. This resource is therefore screened out from further assessment.
various	Sugar Hill S/NR	See discussion below.
HD1	Hamilton Heights/Sugar Hill NE HD	See discussion below.
HD2	Hamilton Heights/Sugar Hill NW HD	See discussion below.
HD3	Hamilton Heights/Sugar Hill HD Extension	See discussion below.
HD3	Hamilton Heights/Sugar Hill HD	See discussion below.
HD4	Hamilton Heights HD	See discussion below.
HD4	Hamilton Heights HD Extension	See discussion below.
Eligible Resources		
K	Engine Co. 23	None. This resource is therefore screened out from further assessment.
L	Houses at 505-517 West 135th Street	None. This resource is therefore screened out from further assessment.
M	Roman Catholic Church of the Annunciation	Yes – stained glass windows on east and south facades.
N	Manhattanville JHS	None. This resource is therefore screened out from further assessment.
O	Former McDermott-Bunger Dairy	None. This resource is therefore screened out from further assessment.
P	Engine Co. 37	None. This resource is therefore screened out from further assessment.
Q	Mink Building complex	None. Also, it should be noted that this is a projected development site. This eligible resource is therefore screened out from further assessment.
R	Residences at 2-14 convent avenue	None. This resource is therefore screened out from further assessment.
S	St. Joseph's RC Church Complex	Yes – stained glass windows on all facades.
HD5	Upper Riverside Drive HD	See discussion below.
HD6	Loth HD	None. This resource is therefore screened out from further assessment.
HD7	Hamilton Place HD	See discussion below.
HD8	Convent Garden HD	See discussion below.

HD: Historic District

projected and potential development sites was also evaluated, for example, it was noted that only those facades of a resource that face a projected or potential development site could be covered by shadows created by the proposed buildings. Those resources that are identified in Table 6-1b as having sunlight-sensitive features are discussed briefly below.

Jackie Robinson Pool and Recreation Center

The Jackie Robinson Pool and Recreation Center occupies the southern area of Jackie Robinson Park. As noted above, the remainder of Jackie Robinson park is analyzed as an open space resource for shadows purposes. Originally named the Colonial Park Play Center, the complex is set within a 1.28-acre narrow hillside. The exterior of the imposing two-story bathhouse features Romanesque Revival-inspired details, and incorporates elements of the Art Moderne style. The pool, which measures 82 feet by 236 feet and owes its unusual shape to the narrow site, is located above the grade of Bradhurst Avenue. While the exterior of the bath house does not contain any of the sunlight-sensitive features specified in the *CEQR Technical Manual*, the pool is considered a sunlight-sensitive recreational resource.

George Bruce Branch, NYPL

The George Bruce Branch of the New York Public is located on the south side of West 125th Street between Broadway and Amsterdam Avenue. Designed by Carrere & Hastings in 1915, the library is a three-story building in the Georgian Revival-style. The upper stories are red brick, and the base is clad in white marble. At grade, there are four large square windows and an arched entryway with a small circular window above it. On the second level, three exceptionally tall windows to the east of the entrance provide light into the library. Smaller windows on the third floor light the children's library space. As the LPC designation report makes specific reference to the windows, they are considered a sunlight-sensitive feature and are therefore assessed for potential incremental shadows resulting from the Proposed Action.

St. Mary's Protestant Episcopal Church, Parish House, and Sunday School

St. Mary's Protestant Episcopal Church, Parish House, and Sunday School are located on the north side of West 126th Street between Old Broadway and Amsterdam Avenue. St. Mary's was built in 1908 on the site of the original white clapboard church constructed in 1826. The church is clad in brick with a central gothic leaden glass window and bellcote topped with a stone cross on the principal West 126th Street façade. The eastern and western side elevations of the church are punctuated with broad pointed-arch window openings with tracery containing stained and leaded glass (the designation report notes that non-historic protective panels have been placed over the window openings on the west side). The original wood frame clapboard rectory, now the church's Parish House, has been enlarged and modified several times since its construction in 1851. The Sunday School building, designed in 1890, is a two-story brick building located behind the church, and is visible on its eastern, western, and northern elevations. The yard and garden in front of the three buildings is paved with flagstones and contains several large trees.

Roman Catholic Church of the Annunciation

This resource, located at 80 Convent Avenue at the corner of West 131st Street, is representative of Late Gothic Revival design. Built in 1907, the church features pointed arched window and door openings, engaged buttresses, a prominent stained glass window at the front with elaborate tracery, and a tripartite entrance porch. The property includes a hall and rectory to the north and school to the west of the church building.

St. Joseph's Roman Catholic Church Complex

This building complex consists of a church and rectory fronting West 125th Street at the northwest corner of Morningside Avenue, and a school and convent located one block to the north. The church is a representative example of Romanesque Revival religious design. The main façade of this brick church has two tall round arches flanking a central round-arched entrance with a round-arched statuary niche and tower above. Stained glass windows are prominently displayed on the eastern, southern and western facades of the church building. A small open space and backyard garden area are present behind the church, though these are not publicly accessible spaces and were therefore not considered in this shadow impact analysis.

Historic Districts

As shown in Figure 6-1, some facades within several historic districts would fall within the maximum shadow radius. As noted above, only those street frontages that face projected or potential development sites would potentially be affected by shadows cast by those buildings, whereas for all remaining buildings on those blocks, any shadows would fall on their roofs or secondary facades (mostly blank walls). Those include the following street frontages:

- East and west side of St. Nicholas Place between West 153rd and West 154th (LPC Hamilton Heights/Sugar Hill Northeast and S/NR Sugar Hill historic districts).
- West side of St. Nicholas Avenue between West 153rd and West 155th streets, and the southwest corner of West 151st Street and Convent Avenue (LPC Hamilton Heights/Sugar Hill Northwest and S/NR Sugar Hill historic districts).
- West side of St. Nicholas Avenue between West 145th and West 146th streets, and the north side of West 145th Street, just west of St. Nicholas Avenue (LPC Hamilton Heights /Sugar Hill and S/NR Sugar Hill historic districts).
- Southeast corner of West 145th Street and Amsterdam Avenue, southwest corner of West 145th Street and St. Nicholas Avenue (LPC Hamilton Height historic district expansion), and east side of Amsterdam Avenue between West 141st and West 142nd Streets (LPC Hamilton Height historic district expansion and S/NR Hamilton Heights historic district).
- West side of Hamilton Place between West 141st and West 142nd streets, and north side of West 141st Street west of Hamilton Place (LPC-eligible Hamilton Place historic district).
- West side of Amsterdam Avenue between West 150th and West 151st streets (LPC-eligible Loth Building Area historic district).
- East side of Convent Avenue Avenue between West 129th and West 130th streets, north side of West 129th Street between Convent Avenue and St. Nicholas Terrace, and south side of West 130th Street between Convent Avenue and St. Nicholas Terrace (LPC-eligible Convent Garden historic district).

A review of photographic images of the structures along those facades indicates that none of them contain sunlight-dependent features, such as stained glass windows, design elements that are part of a recognized architectural style that depends on the contrast between light and dark design elements, elaborate, highly carved ornamentation that depend on sunlight for visual character, exterior materials and color that depend on direct sunlight for visual character, or features where the effect of direct sunlight is described as playing a significant role in the structure's significance as an historic landmark.

While some of the buildings within the historic districts, particularly the rowhouses, include architectural details and ornamentation, those details are not considered sunlight sensitive features, as they do not depend on direct sunlight for them to be seen and enjoyed by the public. In addition, although the historic districts in the area include a number of churches with stained glass windows, those churches fall outside of the Proposed Action's maximum shadow radius, and would therefore not be affected by the Proposed Action. For example, three churches are located at the corner of Convent Avenue and West 145th Street, but none of them fall within the maximum shadow radius of projected and potential development sites. Therefore the historic districts listed in Table 6-1b above are screened out from further shadow assessment.

Summary

Therefore, for most of the historic resources that fall within the defined shadow radius identified in Table 6-1b and Figure 6-1, the details of the resources' features are not dependent on sunlight during the day to the extent that shadows would obscure their significance. Therefore, while the Proposed Action could potentially cast shadows on the above listed structures, in most cases, such shadow effects do not require further assessment of these historic resources. However, as shown in the table, five of the resources were identified as having features that are considered sunlight-sensitive per the guidelines of the *CEQR Technical Manual*, and they therefore warrant further shadow assessment. It should be noted that one of those historic resources is also being assessed as an open space resource in the shadows analysis.

F. DETAILED SHADOWS ANALYSIS

An adverse shadow impact is considered to occur when the incremental shadow from a development 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. The uses and vegetation in an open space establish its sensitivity to shadows. This sensitivity is assessed for both (1) warm-weather- dependent features like wading pools and sand boxes, 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. 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 (defined as March to October), is often a minimum requirement.

The Future Without the Proposed Action (No-Action)

In the future without the Proposed Action, there would be no height limits in the areas where residential use is currently allowed as-of-right, although sites with frontages of less than 45 feet in width are subject to the sliver regulations pursuant to ZR Section 23-692, which restrict the maximum building height to the width of the street on which the building fronts, unless the building is built using the Quality Housing option. As discussed in Chapter 1, "Project Description," the RWCDS projects that sites currently zoned to permit residential use would develop pursuant to current zoning in the No-Action condition, while existing conditions would remain for sites zoned M1-1, given the limited amount of density allowed. As such, the RWCDS identifies 13 projected development sites and 14 potential development sites on which new construction could occur pursuant to existing zoning in the future without the Proposed Action, and 6 projected development sites and 1 potential development site that would experience conversion/enlargement (see Chapter 1, "Project Description"). As shown in Tables 1-3 and 1-4 in

Chapter 1, development expected to occur on projected and potential development sites under No-Action conditions would range in height from 15 to 243 feet.

In addition, as discussed in Chapter 2, "Land Use, Zoning, and Public Policy," a rezoning application was approved in 2010 for a site within the proposed rezoning area (at 414 West 155th Street), known as the Sugar Hill Rezoning project, and a building is currently under construction on that site. According to the Final EIS for that project (December 2010) the 13-story building planned for that site would have a height of approximately 120 feet, and would cast incremental shadows on a number of resources in the area.

The Future With the Proposed Action (With-Action)

The shadow analysis considers the times when the projected and potential developments would increase shadows falling on identified resources of concern. As the sun travels across the sky during the day, shadows fall in a curve on the ground opposite the sun. When the sun rises, shadows fall to the west. As the sun travels across the southern part of the sky throughout the day, shadows move in a clockwise direction until they stretch east when the sun sets in the west. Midday shadows are always shorter than those at other times of the day because the sun is highest in the sky at that time. Further, because of the tilt of the earth's axis, the angle at which the sun's rays strike the earth varies throughout the year, so that during the summer, the sun is higher in the sky and shadows are shorter than during the winter. Winter shadows, although longest, move the most quickly along their paths (because of the earth's tilt) and do not affect the growing season of outdoor trees and plants.

In consideration of the reasonable worst cast development scenario, 19 of the projected and 15 of the potential development sites would result in new development. These new buildings are expected to maximize FAR, while complying with the height and setback regulations of the proposed zoning districts being mapped as part of the Proposed Action. As shown in Tables 1-3 and 1-4 in Chapter 1, projected and potential developments resulting from the Proposed Action would range in building heights from 30 to 175 feet. As directed by the *CEQR Technical Manual*, shadow analyses were performed for the open space and historic resources of concern identified in Table 6-1 above, 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 (March through October) and one month between November and February (usually December) representing a cold-weather month. 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 usually included to demonstrate conditions during cold-weather when people who do use open spaces rely most heavily on available sunlight for warmth. As representative of the full range of possible shadows, these months and days are also used for assessing shadows on historic or natural 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 results of the shadow analysis on the open space resources of concern are summarized in Table 6-2 and discussed below. Table 6-2 provides the starting and ending times of incremental new shadows that would be cast by the projected/potential development on the resources of concern on the analysis days discussed above, and shows the estimated duration of those new incremental shadows (compared to shadows cast in the No-Action condition). The start times shown in the table represent the time that the shadows first hit any part of the element being considered, and the end time represents the time that the shadows leave that element completely. As shown in Table 6-2, a resource can be affected by more than one site, yielding multiple entries and exits. Figures 6-2 through 6-9 at the end of this chapter show the new incremental shadows cast on resources of concern by the projected/potential development resulting from the Proposed Action. As shown in the figures, the portions of new incremental shadows from projected/potential development cast on a resource

of concern are represented in red. All times referenced in this section are Eastern Standard Time (EST); daylight savings time is not considered.[2]

TABLE 6-2
Shadow Duration on Resources of Concern

Site No.	Resource	ANALYSIS DAY			
		March 21/September 21 Timeframe Window – 7:36 AM – 4:29 PM	**May 6/August 6** Timeframe Window – 6:27 AM – 5:18 PM	**June 21** Timeframe Window – 5:57 AM – 6:01 PM	**December 21** Timeframe Window – 8:51 AM – 2:53 PM
Open Space Resources					
1	**Jackie Robinson Park**				
	Shadow enter-exit time	1:26 – 4:29 PM	2:21 – 5:18 PM	3:04 – 6:01 PM	No New Shadow
	Incremental shadow duration	3 hrs. 3 mins.	2 hrs. 57 mins.	2 hrs. 57 mins.	No New Shadow
2	**Greenstreet / Maher Circle**				
	Shadow enter-exit time	12:15 – 16:28 PM	2:42 – 5:18 PM	4:34 – 6:01 PM	10:41 – 11:17 AM 12:11 – 12:53 PM 1:32 – 1:49 PM
	Incremental shadow duration	4 hrs. 13 mins.	2 hrs. 36 mins.	1 hrs. 27 mins.	1 hrs. 35 mins.
3	**Highbridge Park – western area**				
	Shadow enter-exit time	No New Shadow	No New Shadow	No New Shadow	10:00 AM – 1:04 PM
	Incremental shadow duration	No New Shadow	No New Shadow	No New Shadow	3 hrs. 04 mins.
3	**Highbridge Park – central area**				
	Shadow enter-exit time	No New Shadow	No New Shadow	No New Shadow	1:10 – 2:53 PM
	Incremental shadow duration	No New Shadow	No New Shadow	No New Shadow	1 hrs. 43 mins.
3	**Highbridge Park – eastern area**				
	Shadow enter-exit time	4:00 – 4:29 PM	No New Shadow	No New Shadow	12:34 – 1:52 PM 2:08 – 2:53 PM
	Incremental shadow duration	0 hrs. 29 mins.	No New Shadow	No New Shadow	2 hrs. 03 mins.
4	**Riverside Park North**				
	Shadow enter-exit time	7:36 – 8:03 AM	6:27 – 6:47 AM	No New Shadow	8:51 – 9:48 AM
	Incremental shadow duration	0 hrs. 27 mins.	0 hrs. 20 mins.	No New Shadow	0 hrs. 57 mins.
5	**Broadway Malls**				
	Shadow enter-exit time	10:03 – 11:58 AM 2:30 – 4:29 PM	6:27 – 7:19 AM 8:41 – 10:58 AM 2:14 – 4:36 PM	6:00 – 7:01 AM 7:41 – 10:38 AM 2:34 – 4:04 PM	9:43 AM – 1:05 PM 2:28 – 2:53 PM
	Incremental shadow duration	3 hrs. 54 mins	5 hrs. 31 mins	5 hrs. 28 mins	3 hrs. 47 mins
6	**Serenity Gardens**				
	Shadow enter-exit time	1:26 – 2:36 PM	12:53 – 2:20 PM	12:46 – 1:20 PM 1:45 – 2:12 PM	11:47 AM – 12:03 PM 1:20 – 2:20 PM
	Incremental shadow duration	1 hrs. 10 mins.	1 hrs. 27 mins.	1 hrs. 1 mins.	1 hrs. 16 mins.
7	**Sheltering Arms Park**				
	Shadow enter-exit time	No New Shadow	No New Shadow	No New Shadow	8:51 AM – 12:14 PM
	Incremental shadow duration	No New Shadow	No New Shadow	No New Shadow	3 hrs. 23 mins.
8	**General Grant Houses I**				
	Shadow enter-exit time	7:36 – 7:51 AM	6:27 – 6:50 AM	5:57 – 6:36 AM	No New Shadow
	Incremental shadow duration	0 hrs. 15 mins.	0 hrs. 23 mins.	0 hrs. 39 mins.	No New Shadow
9	**Manhattanville Houses Open Space**	No New Shadow	No New Shadow	No New Shadow	No New Shadow
10	**St. Nicholas Park**	No New Shadow	No New Shadow	No New Shadow	No New Shadow
11	**Alexander Hamilton Playground**	No New Shadow	No New Shadow	No New Shadow	No New Shadow

[2] It should be noted that the 3D model for the detailed analysis was produced using flat topography although the existing topography is varied. A model that incorporates topography data would result in a different study, but result in similar conclusions.

12	**Mo' Pals Community Garden**	No New Shadow	No New Shadow	No New Shadow	No New Shadow
13	**Carmansville Playground**	No New Shadow	No New Shadow	No New Shadow	No New Shadow
Historic Resources					
H	**George Bruce Branch NYPL**				
	Shadow enter-exit time	No New Shadow	6:27 – 6:37 AM	5:57 – 6:40 AM	No New Shadow
	Incremental shadow duration	No New Shadow	0 hrs. 10 mins.	0 hrs. 43 mins.	No New Shadow
I	**St. Mary's Church**				
	Shadow enter-exit time	No New Shadow	No New Shadow	No New Shadow	8:51 – 10:24 AM
	Incremental shadow duration	No New Shadow	No New Shadow	No New Shadow	1 hrs. 33 mins
M	**RC Church of the Annunciation**	No New Shadow	No New Shadow	No New Shadow	No New Shadow
S	**St. Joseph's RC Church**				
	Shadow enter-exit time	No New Shadow	No New Shadow	5:21 – 6:01 PM	No New Shadow
	Incremental shadow duration	No New Shadow	No New Shadow	0 hrs. 40 minutes	No New Shadow

Times shown are Eastern Standard Time (EST)

March 21/September 21

On the equinoxes, the projected/potential development sites would cast incremental shadows on seven of the open space resources of concern (refer to Table 6-2). None of the historic resources of concern would experience incremental shadows on this analysis day.

As illustrated in Figure 6-2, new incremental shadows from projected development sites 1 and 2 would be cast on the northern portion of Jackie Robinson Park, while incremental shadows from potential development sites 28 and 29 would be cast on a small area at the southwestern corner of the park. As shown in Table 6-2, the incremental shadows on Jackie Robinson Park would occur in the afternoon, first entering the park at 1:26 PM, and exiting the park entirely by 4:29 PM. As also illustrated in Figure 6-2, new incremental shadows from projected development sites 1 and 2 would also be cast on the Maher Circle greenstreet, with shadows first entering this resource at 12:15 PM, and exiting it entirely by 4:28 PM.

As shown in Figure 6-3, incremental shadows would also be cast on the southwestern corner of the eastern area of Highbridge Park (4 PM to 4:29 PM), for a duration of approximately 29 minutes. As shown in Figure 6-4, incremental shadows would be cast on a small sliver of Riverside Park North, between West 144th and West 145th Streets. On this analysis day, shadows would first enter the park at 7:36 AM, and exit at 8:03 AM, for a duration of 27 minutes (refer to Table 6-2).

As illustrated in Figure 6-5, the segment of Broadway Malls between approximately West 145th and West 146th streets would experience intermittent incremental shadows on this analysis day. As shown in Table 6-2, incremental shadows would be cast in the morning, primarily by projected development site 7 and potential development site 23, first entering the Broadway Malls at 10:03 AM and exiting at 11:58 AM (for a duration of 1 hour and 55 minutes). Incremental shadows would be cast on the Broadway Malls again in the afternoon, from projected development site 5 and potential development site 25, entering at 2:30 PM and exiting the malls entirely at 4:29 PM, for a duration of 2 hours and 9 minutes.

As shown in Figure 6-6 and Table 6-2, incremental shadows would be cast on parts of Serenity Gardens in the afternoon, first entering at 1:26 PM, and exiting at 2:36 PM, for a duration of approximately 1 hour and 10 minutes. Finally, as shown in Figure 6-8, incremental shadows would also be cast briefly on the southeastern edge of the General Grant Houses I open space in the early morning hours, for a duration of approximately 15 minutes (from 7:36 AM to 7:51 AM).

May 6/August 6

On May 6 (or August 6), which is halfway between the solstice and equinox, the projected/potential development sites would cast incremental shadows on six of the open space resources of concern, as well as one historic resource (refer to Table 6-2).

As illustrated in Figure 6-2, new incremental shadows from projected development sites 1 and 2 would be cast on the northern portion of Jackie Robinson Park in the afternoon, while incremental shadows from potential development sites 28 and 29 would be cast on a small area at the southern edge of the park. As shown in Table 6-2, the incremental shadows on Jackie Robinson Park would first enter the park at 2:21 PM, and exit the park entirely by 5:18 PM. As also illustrated in Figure 6-2, new incremental shadows from projected development sites 1 and 2 would also be cast on the Maher Circle greenstreet, with shadows first entering this resource at 2:42 PM, and exiting it entirely by 5:18 PM.

As shown in Figure 6-4, incremental shadows would be cast on a small area of Riverside Park North, between West 143rd and West 144th Streets. On this analysis day, shadows would first enter the park in the early morning, at 6:27 AM, and exit at 6:47 AM, for a duration of 20 minutes (refer to Table 6-2).

As illustrated in Figure 6-5, the segment of Broadway Malls between approximately West 145th and West 146th streets would experience intermittent incremental shadows on this analysis day. As shown in Table 6-2, incremental shadows would be cast in the morning, primarily by projected development site 7 and potential development site 23, first entering the Broadway Malls at 6:27 AM and exiting at 7:19 AM (duration of 52 minutes), then entering again at 8:41 AM and exiting at 10:58 AM (for a duration of 1 hour and 17 minutes). Incremental shadows would be cast on the Broadway Malls again in the afternoon, from projected development site 5 and potential development site 25, entering at 2:14 PM and exiting the malls entirely at 4:36 PM, for a duration of 2 hours and 22 minutes.

As shown in Figure 6-6 and Table 6-2, incremental shadows would be cast on parts of Serenity Gardens in the early afternoon, first entering at 12:53 PM, and exiting at 2:20 PM, for a duration of approximately 1 hour and 27 minutes. As shown in Figure 6-8, incremental shadows would also be cast briefly on a small area at the northeastern edge of the General Grant Houses I open space in the early morning hours, for a duration of approximately 23 minutes (from 6:27 AM to 6:50 AM).

As shown in Table 6-2, incremental shadows would be cast briefly on the façade of the George Bruce Branch of the NYPL on this analysis day, for a duration of approximately 10 minutes (from 6:27 to 6:37 AM).

June 21

On the summer solstice, June 21, the sun is most directly overhead and shadows are shortest for most of the day. On this analysis day, the projected/potential development sites would cast incremental shadows on five of the open space resources of concern, as well as two historic resource (refer to Table 6-2).

As illustrated in Figure 6-2, new incremental shadows from projected development sites 1 and 2 would be cast on the northern portion of Jackie Robinson Park in the afternoon, while no incremental shadows would be cast on the southern area of the park. As shown in Table 6-2, the incremental shadows on Jackie Robinson Park would first enter the park at 3:04 PM, and exit the park entirely by 6:01 PM (the end of the analysis period). As also illustrated in Figure 6-2, new incremental shadows from projected development sites 1 and 2 would also be cast on the Maher Circle greenstreet in the late afternoon, with shadows first entering this resource at 4:34 PM, and exiting it entirely by 6:01 PM.

As illustrated in Figure 6-5, the segment of Broadway Malls between approximately West 144th and West 146th streets would experience intermittent incremental shadows on this analysis day. As shown in Table 6-2, incremental shadows would be cast in the morning, primarily by projected development site 7 and potential development site 23, first entering the Broadway Malls at 6:00 AM and exiting at 7:01 AM (duration of 1 hour and 1 minute), then entering again at 7:41 AM and exiting at 10:38 AM (for a duration of 1 hour and 57 minutes). Incremental shadows would be cast on the Broadway Malls again in the afternoon, from projected development site 5 and potential development site 25, entering at 2:34 PM and exiting the malls entirely at 4:04 PM, for a duration of 1 hour and 30 minutes.

As shown in Figure 6-6 and Table 6-2, incremental shadows would also be cast on parts of Serenity Gardens in the early afternoon, first entering at 12:46 PM, and exiting at 1:20 PM, then entering again at 1:45 PM and exiting at 2:12 PM, for a total duration of approximately 1 hour and 1 minute. As shown in Figure 6-8, incremental shadows would be cast briefly on part of the eastern area of the General Grant Houses I open space in the early morning hours, for a duration of approximately 39 minutes (from 5:57 AM to 6:36 AM).

As also shown in Table 6-2, incremental shadows would be cast on the façade of the George Bruce Branch of the NYPL in the early morning, for a duration of approximately 43 minutes (from 5:57 AM to 6:40 AM). In addition, as shown in Figure 6-9, incremental shadows would be cast on a small area of the western façade of St. Joseph's Roman Catholic Church in the evening, for a duration of approximately 40 minutes (from 5:21 PM to 6:01 PM).

December 21

On the shortest day of the year (winter solstice) when the sun is low in the sky, shadows are the longest they will be all year, although they travel quickly. As shown in Table 6-2, on this analysis day, the projected/potential development sites would cast incremental shadows on six of the open space resources of concern, as well as one historic resource.

As illustrated in Figure 6-2, new incremental shadows from projected development sites 1 and 2 would be cast intermittently on the Maher Circle greenstreet. As shown in Table 6-2, incremental shadows would first be cast in the morning, from 10:41 AM to 11:17 AM (duration of 36 minutes), then would enter again at 12:11 PM and exit at 12:53 PM (for a duration of 42 minutes). Incremental shadows would be cast on the Maher Circle greenstreet again in the afternoon, entering at 1:32 PM and exiting entirely at 1:49 PM, for a duration of 17 minutes.

As shown in Figure 6-3, incremental shadows would also be cast on all three areas of Highbridge Park on this analysis day. As shown in Table 6-2, incremental shadows would be cast on the southern edge of the western area of the park, from 10:00 AM to 1:04 PM (a duration of 3 hours and 4 minutes). The central area of Highbridge Park would experience incremental shadows from 1:10 PM to 2:53 PM, for a duration of 1 hour and 43 minutes. Incremental shadows would also be cast on the eastern area of Highbridge Park on this analysis day, first entering at 12:34 PM and exiting at 1:52 PM, then entering again at 2:08 PM and exiting at 2:53 PM, for a total duration of 2 hours and 3 minutes on this analysis day.

As shown in Figure 6-4, incremental shadows would be cast on an area of Riverside Park North, between West 145th and West 146th Streets. On this analysis day, shadows would enter the park in the morning, at 8:51 AM, and exit at 9:48 AM, for a duration of 57 minutes (refer to Table 6-2).

As illustrated in Figure 6-5, the segment of Broadway Malls between approximately West 145th and West 147th streets would experience intermittent incremental shadows on this analysis day. As shown in Table 6-2, incremental shadows would be cast in the morning, primarily by projected development site 7 and

potential development site 23, first entering the Broadway Malls at 9:43 AM and exiting at 1:05 PM (for a duration of 3 hours and 22 minutes). Incremental shadows would be cast on the Broadway Malls again in the afternoon, from projected development site 5 and potential development site 25, entering at 2:28 PM and exiting the malls entirely at 2:53 PM, for a duration of 25 minutes.

As shown in Figure 6-6 and Table 6-2, incremental shadows would be cast on small parts of Serenity Gardens in early to mid afternoon, first entering at 11:47 AM, and exiting at 12:03 PM, then entering again at 1:20 PM and exiting at 2:20 PM, for a total duration of approximately 1 hour and 16 minutes for this analysis day. As shown in Figure 6-7, incremental shadows would also be cast on parts of Sheltering Arms Park on this analysis day, first entering the park at 8:51 AM, and exiting it entirely by 12:14 PM, for a duration of approximately 3 hours and 23 minutes.

As also shown in Table 6-2 and Figure 6-9, incremental shadows would be cast on the eastern façade of St. Mary's Church on this analysis day, first entering at 8:51 AM and exiting entirely by 10:24 AM, for a duration of 1 hour and 33 minutes.

Assessment

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 open spaces, 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; however, their effects on other uses and activities should be assessed. Therefore, this sensitivity is assessed for both (1) warm-weather-dependent features like wading pools and sand boxes, 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. 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 often a minimum requirement. Consequently, the assessment of an open space's sensitivity to increased shadow focuses on identifying the existing conditions of its facilities, plantings, and uses, and the sunlight requirements for each.

For historic resources, the shadow sensitivity of the sunlight-sensitive features of a historic structure depends on its design and setting. If any of the characteristics or elements that make the resource historically significant depend on sunlight, it is necessary to inventory those features to determine their sensitivity to a reduction in sunlight. As noted above, according to the *CEQR Technical Manual*, sunlight-dependent features of historic resources include: stained glass windows; historic landscapes; design elements that are part of a recognized architectural style that depends on contrast between light and dark design features; exterior materials and color that depend on direct sunlight for visual character; elaborate, highly carved ornamentation; or features in structures where the effect of direct sunlight is described as playing a significant role in the structure's significance as a historic landmark.

As indicated in Table 6-2 and discussed below, the projected and potential developments resulting from the Proposed Action would cast incremental shadows on several resources in one or more of the analysis periods. No incremental shadows would be cast on the Manhattanville Houses Open Space, St. Nicholas

Park, Alexander Hamilton Playground, Mo' Pals Community Garden, Carmansville Playground, or RC Church of the Annunciation on any of the analysis days.

Jackie Robinson Park

Given its location relative to the projected and potential development sites, the incremental shadows resulting from the Proposed Action would reach small areas at the northern and southern edges of Jackie Robinson Park on three of the four analysis days (no incremental shadows would be cast on December 21). As illustrated in the aerial image in Figures 6-10a and 6-10b, the areas of Jackie Robinson Park that would experience incremental shadows consist mostly of vegetated areas with paths and benches, and do not include any of the park's most notable recreational facilities (pool, playground, etc.). As illustrated in Figure 6-2, while the incremental shadows cast on the southern area of Jackie Robinson Park would be longest on March 21 (at about 4:20 PM), they would not be long enough to reach the pool (it should also be noted that public pools are only open between Memorial and Labor Days).

The incremental shadows cast on the planted areas at the northern edge of the park on May 6 and June 21 would only be cast beginning in the late afternoon, at the end of the analysis period (starting at 2:21 on May 6 and 3:04 on June 21), and therefore those planted areas are expected to receive more than the minimum of 4 to 6 hours of sunlight required for plant growth. Similarly, on March 21, shadows would be cast in the mid to late afternoon, beginning at 1:26 PM, which would allow for at least 5 hours of sunlight for plant growth. Moreover, as illustrated in the aerial view in Figure 6-10a, this affected area of the park does not contain any playgrounds or other recreational activities that may be adversely affected by a reduction in sunlight during these analysis periods. Therefore, new incremental shadows cast by the Proposed Action would not create significant adverse impacts on Jackie Robinson Park.

Greenstreet – Maher Circle

Given its location relative to projected and potential development sites, the incremental shadows resulting from the Proposed Action would reach a portion of the Maher Circle greenstreet on all four analysis days, with durations ranging from 1 hour and 35 minutes (December 21) to 4 hours and 13 minutes (March 21/September 21). As noted above, Maher Circle is a traffic island containing the Hooper Fountain, and is mostly paved except for a small fenced planted area, with one tree. The Circle does not include any benches nor does it host any recreational activity. The incremental shadows cast on May 6 and June 21 would only be cast beginning in the late afternoon, at the end of the analysis period, and therefore the planted area is expected to receive more than the minimum of 4 to 6 hours of sunlight required for plant growth on those two analysis days. Similarly, on March 21, shadows would be cast in the mid to late afternoon, beginning at 12:15 PM, which would allow for at least 4 hours of sunlight for plant growth. The incremental shadows cast in December would not be within the plant growing season and, as this resource does not host any recreational activity, would also not affect this resource's utilization. Therefore, new incremental shadows cast by the Proposed Action would not create significant adverse impacts on the Maher Circle greenstreet.

Highbridge Park

The three areas of Highbridge Park, given their location relative to the projected and potential development sites, would each experience some incremental shadows on one or two of the analysis days.

Western Area

The western area of the park would experience incremental shadows only on December 21, for approximately 3 hours and 4 minutes at the end of the analysis period (from 10 AM to 1:04 PM). As

shown in Figure 6-3, only the very southern edge of this park area would experience incremental shadows. As December falls outside of the growing period between March and October, new incremental shadows cast by the Proposed Action in winter would not create significant adverse impacts on the trees and vegetation that are located in this western area of the park. Moreover, this area of Highbridge Park does not contain any benches, playgrounds or other active recreation areas that require winter sunlight. Therefore, the new incremental shadows cast by the Proposed Action on this analysis day would not adversely affect the utilization or enjoyment of this western area of Highbridge Park, as it does not contain features that could be affected by the loss of winter sunlight.

Central Area

The central area of Highbridge Park would experience incremental shadows only on December 21, for approximately 1 hour and 43 minutes. As shown in Figure 6-3, only the very southern tip of this park area would experience incremental shadows. As December falls outside of the growing period between March and October, new incremental shadows cast by the Proposed Action in winter would not create significant adverse impacts on the trees and vegetation that are located in this central area of Highbridge Park. Moreover, this area of the park does not contain any benches, playgrounds or other active recreation areas that require winter sunlight. Therefore, new incremental shadows cast by the Proposed Action on this analysis day are not expected to create significant adverse impacts on the trees and vegetation that are located in this central area of Highbridge Park, nor would they adversely affect this area's utilization, as it does not contain features that could be affected by the loss of winter sunlight.

Eastern Area

The eastern area of Highbridge Park would experience incremental shadows on the March 21 and December 21 analysis days, with a duration of 29 minutes on March 21 and 2 hours and 3 minutes on December 21. Although March 21 falls within the plant growing season, the incremental shadows cast on this day would only be cast beginning in the late afternoon (at 4:00 PM), allowing this park area to receive more than 8 hours of sunlight before the incremental shadows first enter. Moreover, as shown in Figure 6-10a, the eastern area of Highbridge Park consists mostly of vegetated areas, and does not contain any playgrounds or other recreational activities that may be adversely affected by a reduction in sunlight during these periods. As December falls outside of the growing period between March and October, new incremental shadows cast by the Proposed Action in winter would not create significant adverse impacts on the trees and vegetation that are located in this eastern area of Highbridge Park. Moreover, this area of the park does not contain any benches, playgrounds or other active recreation areas that require winter sunlight. Therefore, new incremental shadows cast by the Proposed Action are not expected to create significant adverse impacts on the trees and vegetation that are located in the eastern area of Highbridge Park, nor would they adversely affect the utilization of this area of the park.

Riverside Park North

The projected and potential development sites would cast incremental shadows on a portion of Riverside Park North on three of the four analysis periods during the early to mid morning hours. However, as shown in Figure 6-4, only small areas of this large open space resource would be cast in incremental shadows in the early morning. As shown in the photos in Figure 6-10, these small areas that would be cast in shadow, which are generally located between West 144th and West 146th streets, contain trees, paved paths, and planted areas (shrubs, trees, grass). This area of the park also has benches for seating, but does not host any recreational activities.

As shadows cast by the projected and potential development sites would exit this resource completely by 8:03 AM on March 21/September 21, by 6:47 AM on May 6/August 6, and by 9:48 AM on December 21,

this portion of Riverside Park North would continue to experience sunlight for most of the day, from mid-morning to the evening, throughout the year. Thus, it is expected that this open space would obtain more than adequate sunlight for its vegetation during the plant growing season (more than the 4 to 6 hour minimum specified in the *CEQR Technical Manual*), and there would not be significant adverse shadow impacts. Furthermore, with a maximum incremental shadow duration of 57 minutes over a relatively small area, which would occur in the early morning hours, the incremental shadows created by the projected and potential development sites are not expected to substantially reduce the usability of this open space, which would continue to be used for both active and passive recreation.

Broadway Malls

The segment of Broadway Malls located between approximately West 144th and West 148th streets would experience intermittent incremental shadows on all four of the analysis days. It should be noted however that the affected segments of the Broadway Malls are not entirely planted. As described above, the Malls between West 146th and West 148th streets are mostly paved, with plant beds, bushes and trees lining the edges along Broadway, and benches located throughout the malls facing inward. The section of the malls that is located between West 144th and West 146th streets is mostly planted (although the central area is clear of vegetation and occupied by subway grates), with grassy areas, many rosebushes and flower beds, trees and other vegetation, and benches located only at the street intersections, facing out.

While the total shadow duration would range from 4 to 5.5 hours, as illustrated in Figure 6-5, no given section of the malls would be cast in shadow for the entire shadow duration. For example, on the June 21 analysis day, the area just to the south of West 145th Street would experience incremental shadow at 6:30 AM; by 8 AM, incremental shadows would have shifted to a small area at the western edge of the malls just north of West 144th Street; and by 9 AM incremental shadows would be cast on two different areas between West 144th and West 145th streets; by 10 AM, incremental shadows would again be cast on the area just to the south of West 145th Street, before exiting this section entirely by 10:38 AM. In the afternoon on June 21, by 3 PM incremental shadows would be cast on a small area of the malls just to the south of West 145th Street as well as an area midway between West 145th and West 146th streets, but by 4 PM incremental shadows would cover only a negligible area at the eastern edge of the malls south of West 146th Street, before exiting entirely at 4:04 PM. Between this intermittent shadowing, it is expected that each planted area of the Broadway Malls would, in the aggregate, be able to receive at least 4 to 6 hours of sunlight during the plant growing season. Similarly, because no given section of the Malls would be cast in shadow for the entire shadow duration, the utilization of the benches located throughout this planted median would also not be adversely affected.

Therefore, new incremental shadows cast by the Proposed Action are not expected to create significant adverse impacts on the trees and vegetation that are located in Broadway Malls, nor would they adversely affect the utilization of this resource.

Serenity Gardens

This community garden would experience incremental shadows on all four of the analysis days. However, as illustrated in Figure 6-6, those incremental shadows would affect only small areas of the garden, with the largest shadow (cast on March 21) covering an area at the northeast quadrangle of the community garden. Shadows occurring during the plant growing season (March 21, May 6, and June 21 analysis days) would cover only small areas of the garden, and would occur in the early afternoon, generally entering just before 1 PM, and lasting for 1 to 1.5 hours, which would allow the plants in this community garden to obtain more than adequate sunlight for its vegetation during the plant growing season (more than the 4 to 6 hour minimum specified in the *CEQR Technical Manual*). Shadows cast on the December 21 analysis day, which falls outside of the plant growing season, would not create significant adverse impacts on the plants that are located in this community garden. Therefore, new incremental shadows cast

by the Proposed Action are not expected to create significant adverse impacts on Serenity Gardens, nor would they adversely affect its utilization.

Sheltering Arms Park

This open space resource would experience incremental shadows only on the December 21 analysis day, for approximately 3 hours and 23 minutes in the morning to midday period (from 8:51 AM to 12:14 PM). As December falls outside of the growing period between March and October, new incremental shadows cast by the Proposed Action in winter would not create significant adverse impacts on the trees and vegetation that are located in this park. In addition, as shown in Figure 6-7, the incremental shadows that would be cast as a result of the Proposed Action would move quickly, so that no single area of the park would be cast in shadow for extended periods of time. Moreover, as shown in Figure 6-10c, the extent of the incremental shadows would not be long enough to reach the playground, and this active play area would therefore not experience a loss of winter sunlight. Finally, while a small area at the southwest corner of the park that is used for a water sprinkler and a small area of the wading pool in the eastern section of the park may be cast briefly in shadow, these incremental shadows would occur only on the December 21 analysis day, when wading pools and sprinklers are typically not in use. Therefore, new incremental shadows cast by the Proposed Action are not expected to create significant adverse impacts on the trees and vegetation that are located in Sheltering Arms Park, nor would they adversely affect the utilization of this open space resource on this analysis day.

General Grant Houses I

The projected and potential development sites would cast incremental shadows on the General Grant Houses I open space during the early morning on the March 21/September 21, May 6/August 6, and June 21 analysis periods. However, as shown in Figure 6-8, only very small portions of this open space resource would be cast in incremental shadows in the early morning. These small areas that are cast in shadow contain mostly parking areas, as well as some walking paths, grassy areas and trees along the street edges, and do not contain any playgrounds or other recreational activities that may be adversely affected by a reduction in sunlight during these periods. As shadows cast by the projected and potential development sites would exit this resource completely by 7:51 AM on March 21/September 21, by 6:50 AM on May 6/August6, and by 6:36 AM on June 21, the affected areas of this open would continue to experience sunlight for most of the day, throughout the year. With a maximum incremental shadow duration of 36 minutes over a relatively small area, it is expected that this open space would obtain more than adequate sunlight for its vegetation (more than the 4 to 6 hour minimum specified in the *CEQR Technical Manual*), and there would not be significant adverse shadow impacts. Furthermore, the incremental shadows created by the projected and potential development sites, which would occur in the early morning hours (before 8 AM on March 21 and before 7 AM on May 6 and June 21), are not expected to substantially reduce the usability of this open space, which would continue to be used for both active and passive recreation. Therefore, the new incremental shadows cast by the Proposed Action on the General Grant Houses I open space would not adversely affect the utilization or enjoyment of this resource.

George Bruce Branch, NYPL

As shown in Table 6-2, the projected and potential development sites would cast incremental shadows on the façade of the George Bruce Branch of the NYPL on two of the four analysis days, with durations ranging from 10 minutes to 43 minutes in the early morning hours. While this resource includes large windows on the front facade, which are noted in the designation report as providing light into the library, the incremental shadows would exit this resource completely by 6:37 AM on May 6/August 6, and by 6:40 AM on June 21, which is well before the operating hours of this facility. As such, the brief

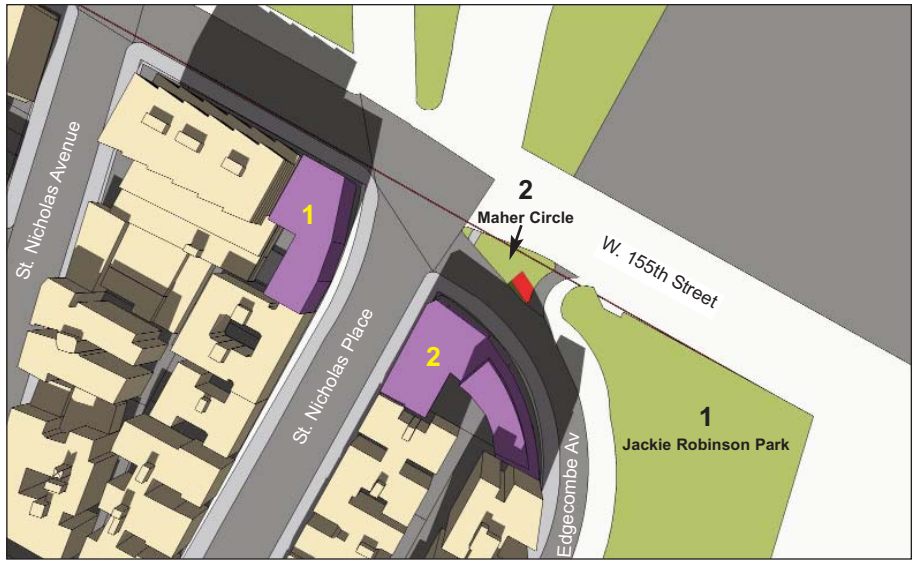
incremental shadows cast on this resource in the early morning hours would not adversely affect the library's functions or architectural character, nor hamper public enjoyment of its key architectural features.

St. Mary's Protestant Episcopal Church

Table 6-2 shows that the projected and potential development sites would cast incremental shadows on this resource only on the December 21 analysis day, for a duration of 1 hour and 33 minutes in the mid-morning. As illustrated in Figure 6-9, the incremental shadows would be cast on the eastern façade of the church, which contains large stained and leaded glass windows (see photos in Figure 6-11), beginning at 8:51 AM. These incremental shadows would move quickly, and by 10 AM, they would cover only the back (northern) half of that façade, before exiting entirely by 10:24 AM. As the incremental shadows would be cast on only one of the three facades that contain stained and leaded glass windows, and only on one of the four analysis days, it is not anticipated that the incremental shadows cast by the Proposed Action would result in the complete elimination of all direct sunlight on the sunlight-sensitive feature of this historic resource. However, as these incremental shadows may have the potential to affect the public's enjoyment of this feature, albeit for a brief duration of approximately 1.5 hours, this is being considered a significant adverse shadow impact. As discussed in Chapter 18, "Mitigation," there are measures that may mitigate this impact (e.g. special lighting features). This and other feasible and practicable mitigation measures for this potential significant adverse impact will be explored between the Draft and Final EIS. Absent the identification and implementation of feasible and practicable measures, the Proposed Action could have an unmitigated significant adverse shadows impact on St. Mary's Protestant Episcopal Church.

St. Joseph's RC Church

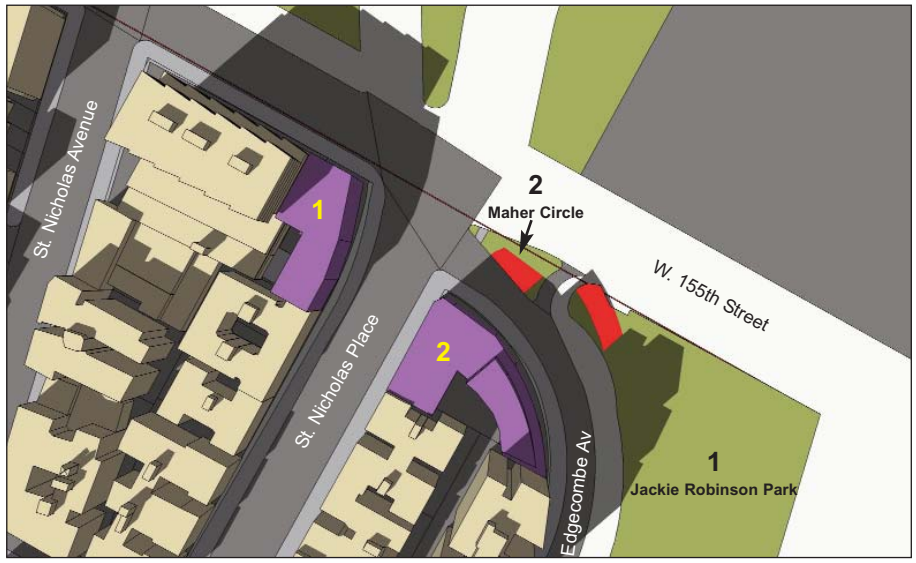
As shown in Table 6-2, the projected and potential development sites would cast incremental shadows on this resource only on the June 21 analysis day, for a duration of 40 minutes in the late afternoon. As illustrated in Figure 6-9, the incremental shadows would be cast on a small corner of the church's western façade. While the church includes stained glass windows on the eastern, southern and western facades of the building, based on the bird's eye view in Figure 6-11, the southwest corner of the church that would be affected by incremental shadows, which is not visually accessible from the street, does not appear to contain any stained glass windows or other sunlight sensitive features. As the incremental shadows cast by the Proposed Action would not affect any of the sunlight-sensitive features of this historic resource, no significant adverse shadow impact would be expected to occur on St. Joseph's Roman Catholic Church.



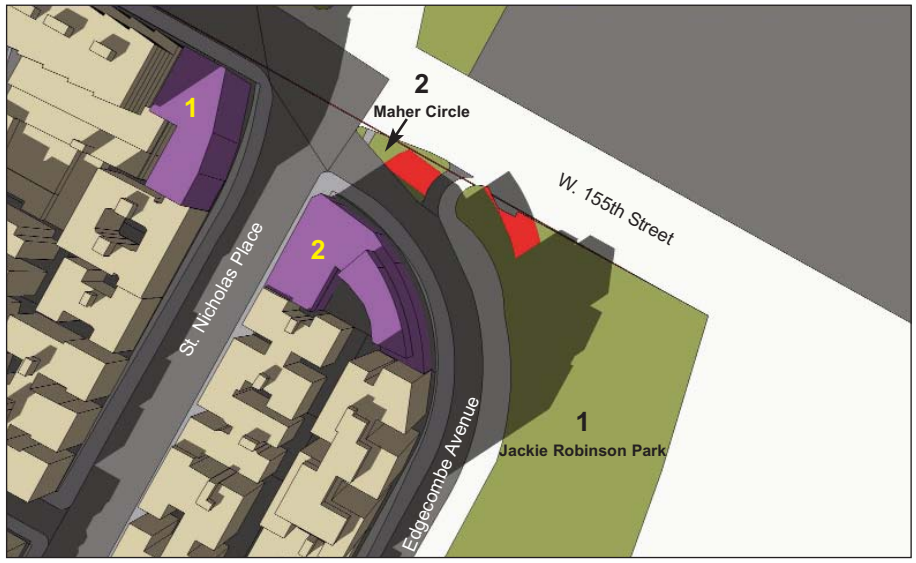
March 21 - 1:00 PM



March 21 - 1:45 PM



March 21 - 2:30 PM (northern area)



March 21 - 3:00 PM

2 **Projected Development Site**

2 **Potential Development Site**

Incremental Shadow

1 **Open Space** (keyed to Table 6-1a)

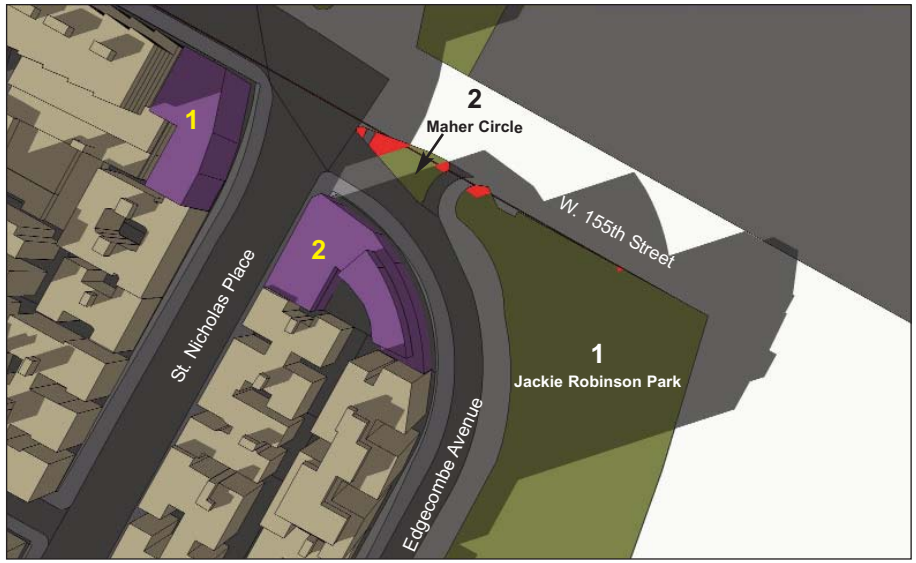
West Harlem Rezoning EIS

Figure 6-2a

Shadows on Open Spaces - Jackie Robinson Park and Greenstreet/Maher Circle



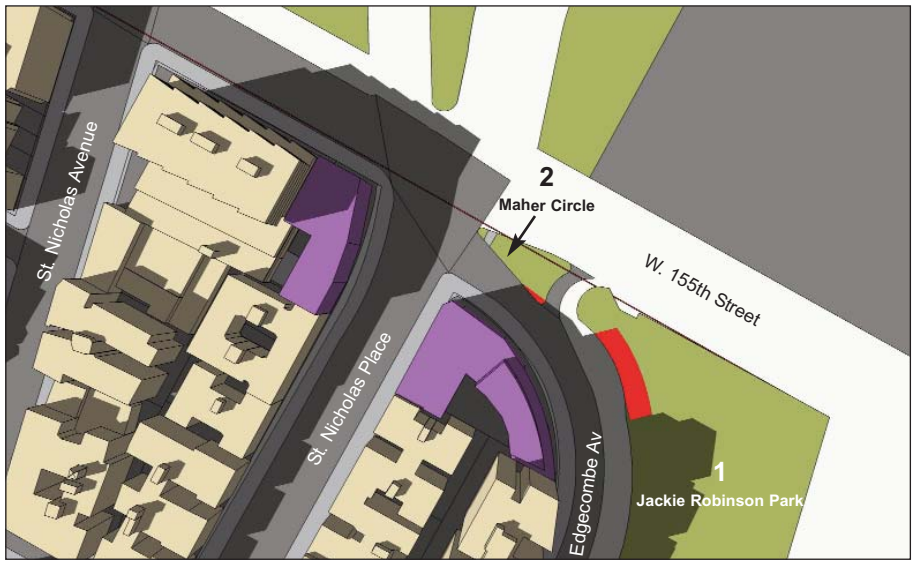
March 21 - 3:30 PM (southern area of Jackie Robinson Park)



March 21 - 4:15 PM



March 21 - 4:20 PM (southern area of Jackie Robinson Park)



May 6 - 3:15 PM (northern area)

2 **Projected Development Site**

2 **Potential Development Site**

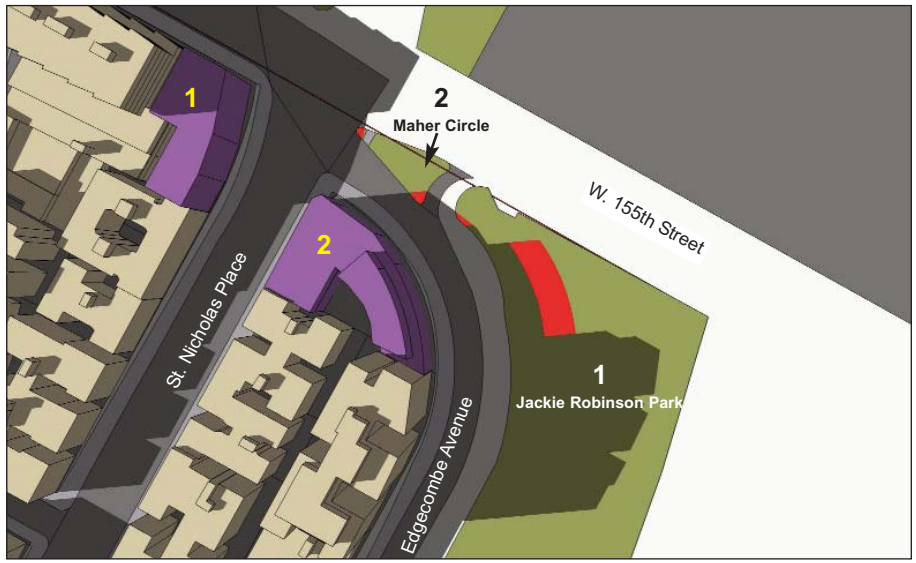
Incremental Shadow

1 **Open Space** (keyed to Table 6-1a)

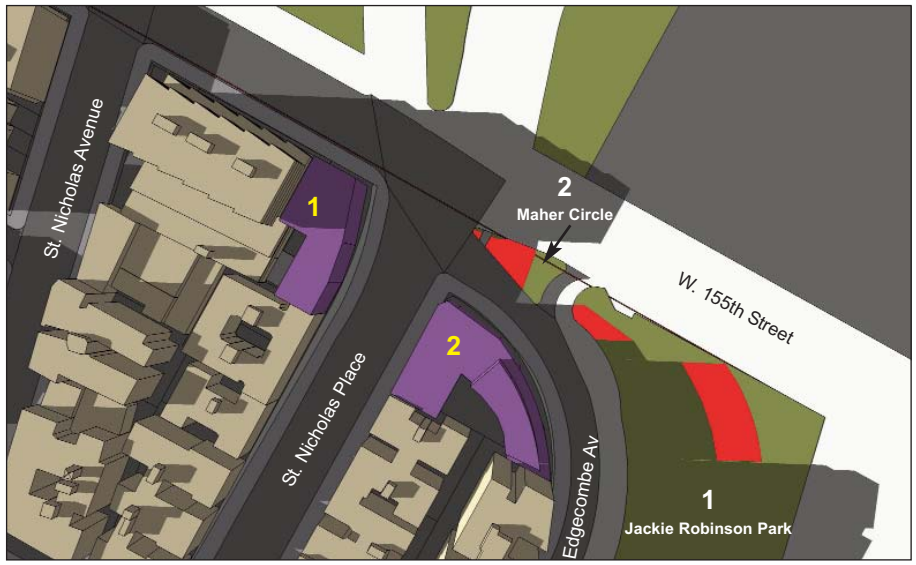
West Harlem Rezoning EIS

Figure 6-2b

Shadows on Open Spaces - Jackie Robinson Park and Greenstreet/Maher Circle



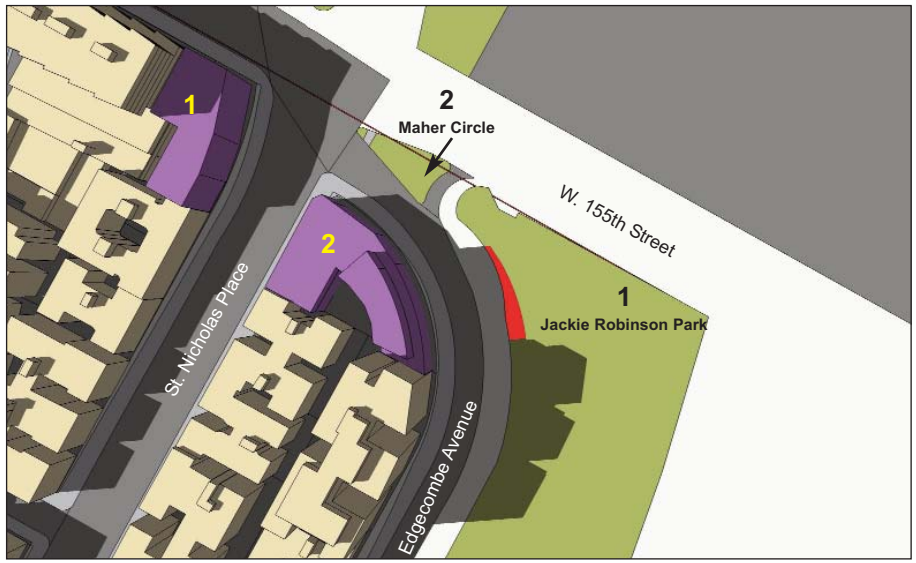
May 6 - 4:00 PM



May 6 - 4:45 PM



May 6 - 5:15 PM (northern area)



June 21 - 3:30 PM (northern area)

2 **Projected Development Site**

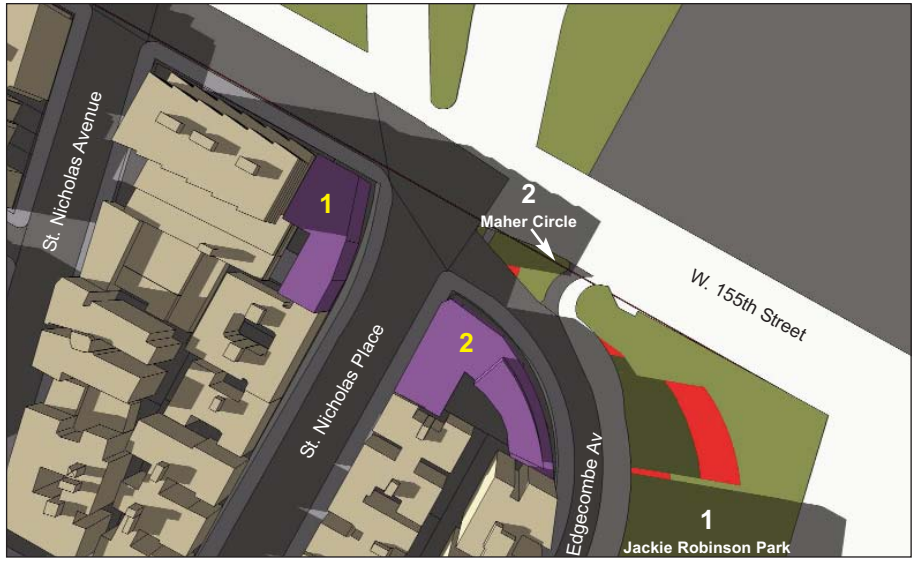
2 **Potential Development Site**

Incremental Shadow

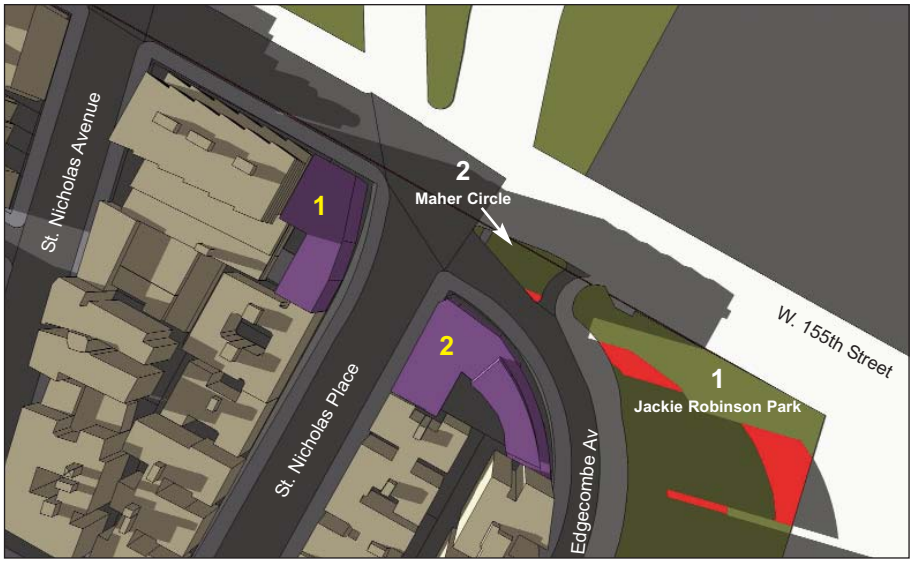
1 **Open Space** (keyed to Table 6-1a)



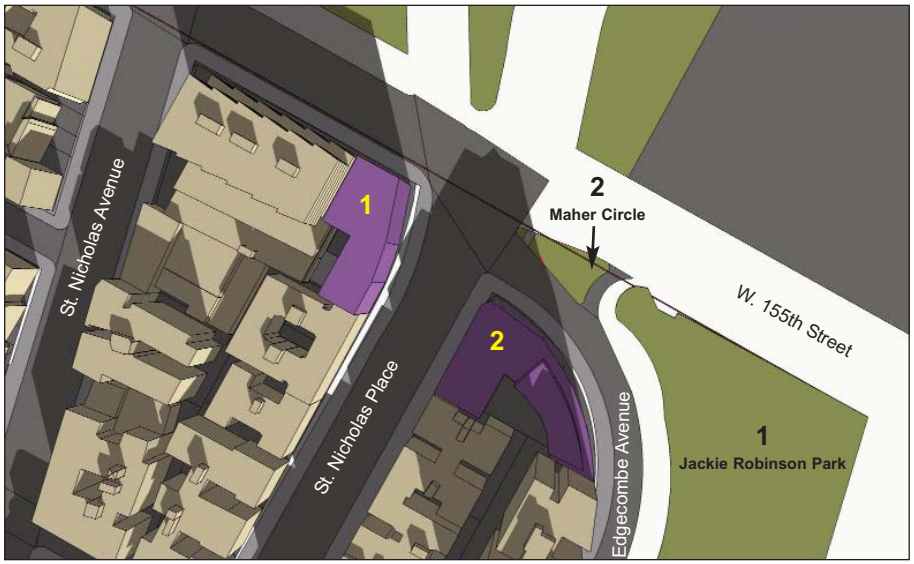
June 21 - 4:30 PM



June 21 - 5:00 PM



June 21 - 5:45 PM



December 21 - 11:00 AM

2 **Projected Development Site** 2 **Potential Development Site** **Incremental Shadow** 1 **Open Space** (keyed to Table 6-1a)

West Harlem Rezoning EIS

Figure 6-2d

Shadows on Open Spaces - Jackie Robinson Park and Greenstreet/Maher Circle



December 21 - 12:25 PM



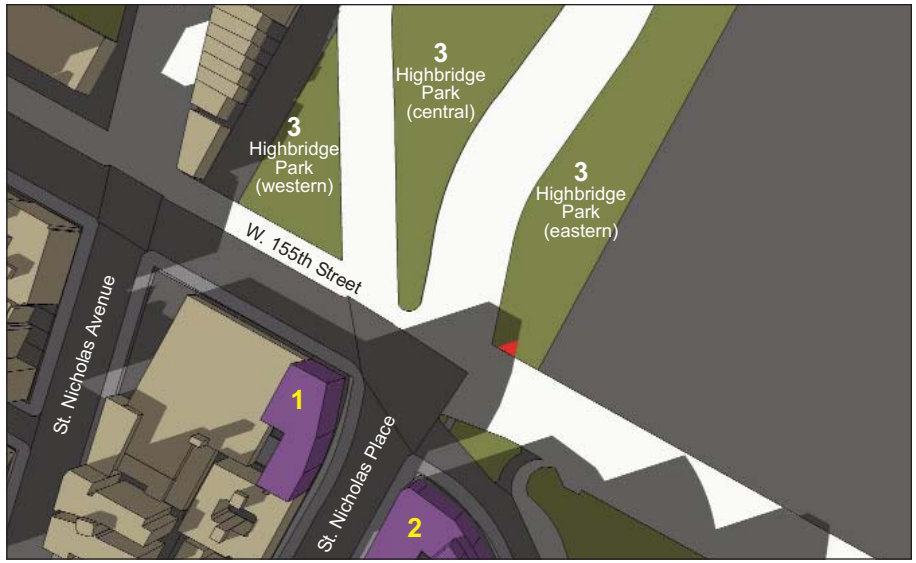
December 21 - 1:40 PM

2 **Projected Development Site**

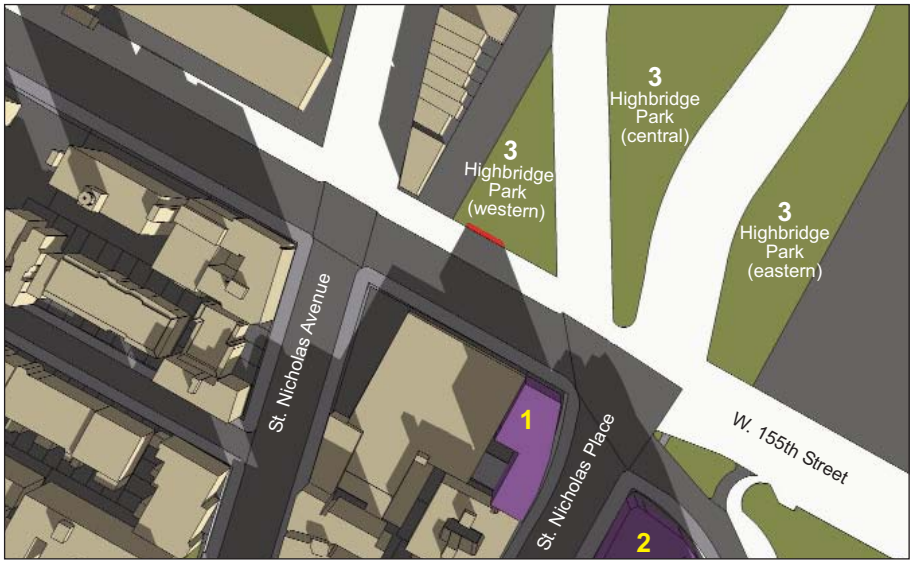
2 **Potential Development Site**

Incremental Shadow

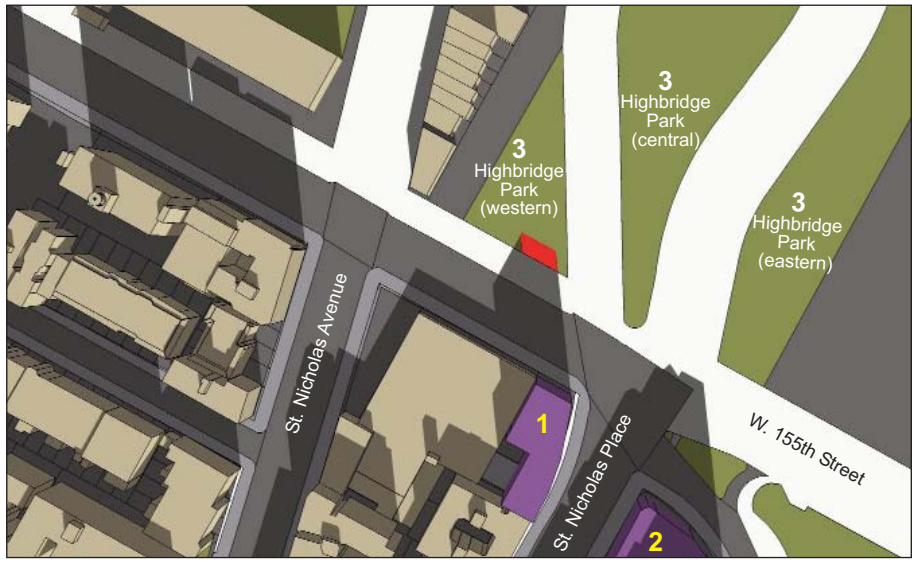
2 **Open Space** (keyed to Table 6-1a)



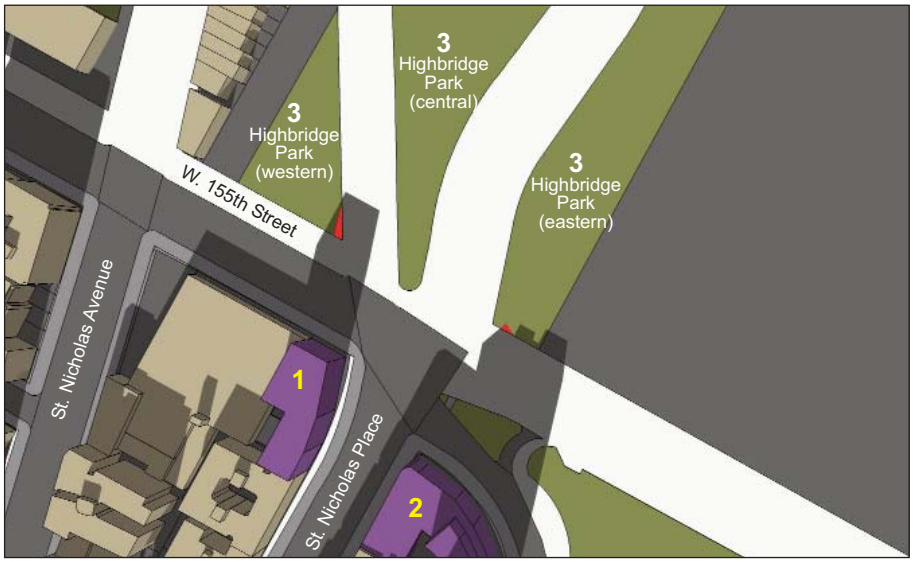
March 21 - 4:15 PM



December 21 - 10:30 AM



December 21 -11:30 AM (Western Area)



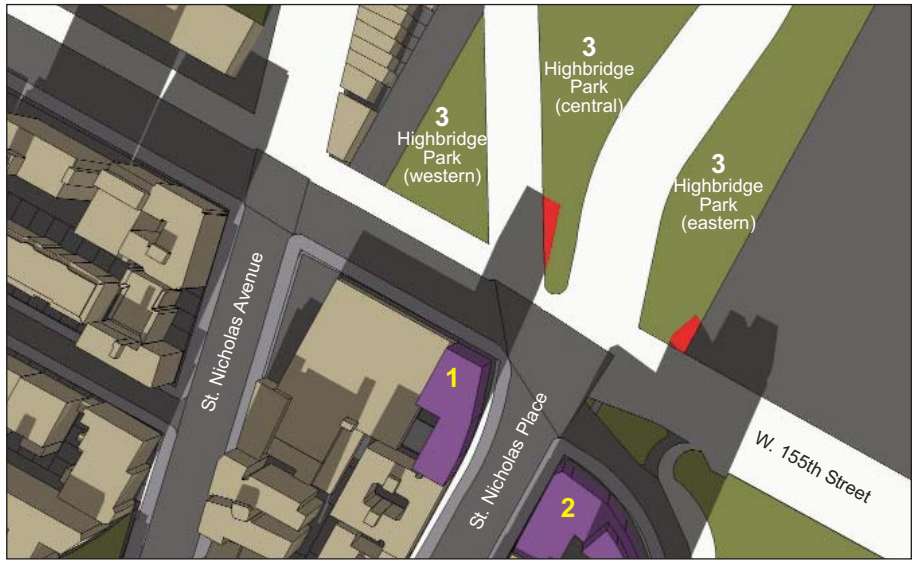
December 21 - 12:45 PM (Western Area)

2 **Projected Development Site** 2 **Potential Development Site** **Incremental Shadow** 3 **Open Space** (keyed to Table 6-1a)

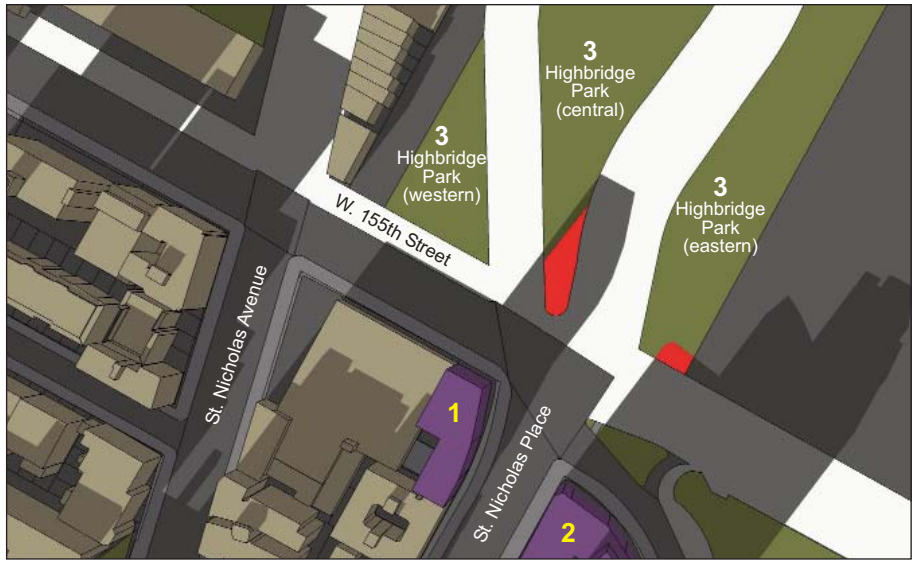
West Harlem Rezoning EIS

Figure 6-3a

Shadows on Open Spaces - Highbridge Park



December 21 - 1:30 PM (Central Area)



December 21 - 2:30 PM (Central Area)

2 **Projected Development Site**

2 **Potential Development Site**

Incremental Shadow

3 **Open Space** (keyed to Table 6-1a)



March 21 - 7:45 AM



June 6 - 6:30 AM



December 21 - 9:15 AM

2 **Projected Development Site**

2 **Potential Development Site**

Incremental Shadow

4 **Open Space** (keyed to Table 6-1a)



March 21 - 10:30 AM



March 21 - 11:45 AM



March 21 -3:00 PM



March 21- 4:00 PM

2 **Projected Development Site**

2 **Potential Development Site**

Incremental Shadow

5 **Open Space** (keyed to Table 6-1a)

West Harlem Rezoning EIS

Figure 6-5a

Shadows on Open Spaces - Broadway Malls



May 6 - 6:45 AM



May 6 - 9:00 AM



May 6 - 10:15 AM



May 6 - 2:45 PM

2 **Projected Development Site**

2 **Potential Development Site**

Incremental Shadow

5 **Open Space** (keyed to Table 6-1a)

West Harlem Rezoning EIS

Figure 6-5b

Shadows on Open Spaces - Broadway Malls



May 6- 4:15 PM



June 21 - 6:30 AM



June 21 - 8:00 AM



June 21 - 9:00 AM

2 **Projected Development Site**

2 **Potential Development Site**

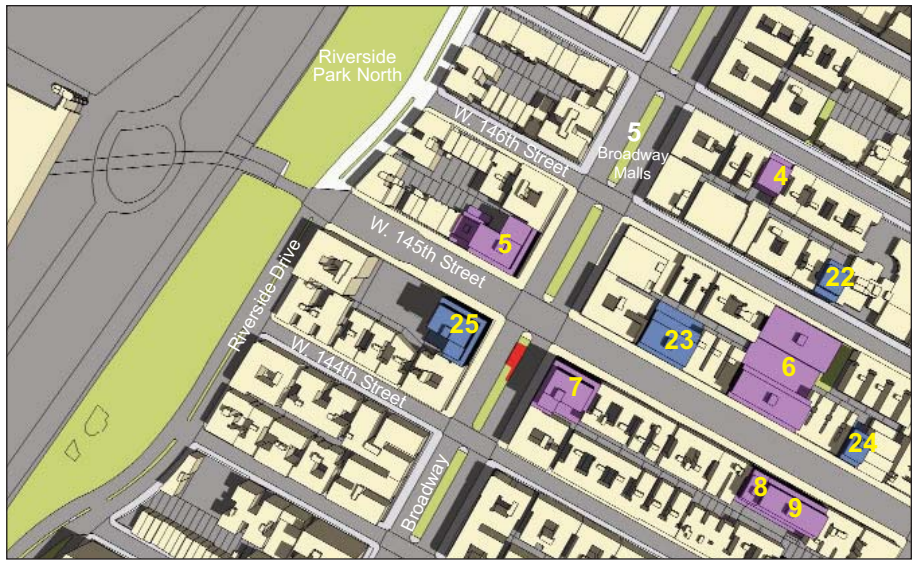
Incremental Shadow

5 **Open Space** (keyed to Table 6-1a)

West Harlem Rezoning EIS

Figure 6-5c

Shadows on Open Spaces - Broadway Malls



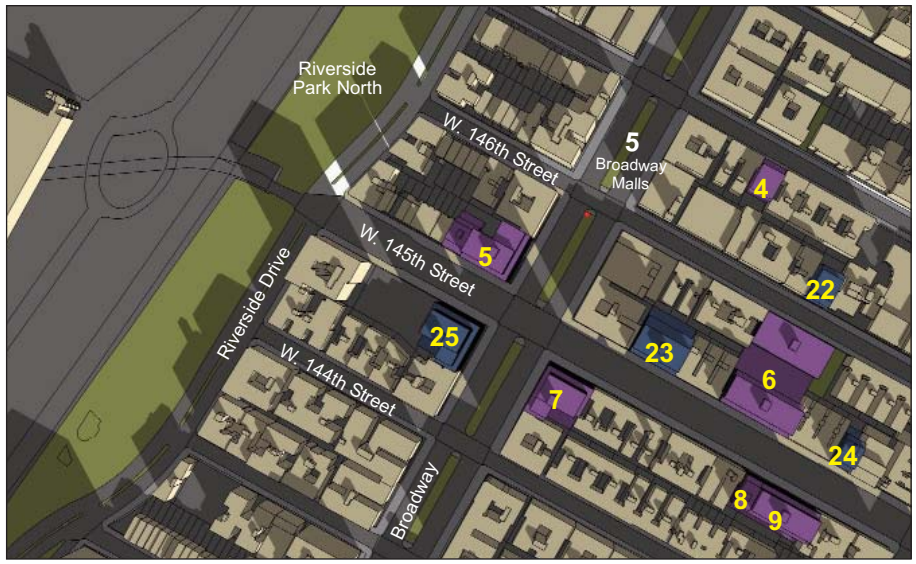
June 21 - 10:00 AM



June 21 - 3:00 PM



June 21 - 4:00 PM



December 21 - 10:00 AM

2 **Projected Development Site**

2 **Potential Development Site**

Incremental Shadow

5 **Open Space** (keyed to Table 6-1a)

West harlem Rezoning EIS

Figure 6-5d

Shadows on Open Spaces - Broadway Malls



December 21 - 11:30 AM



December 21 - 12:45 PM



December 21 - 2:45 PM

2 **Projected Development Site**

2 **Potential Development Site**

Incremental Shadow

5 **Open Space** (keyed to Table 6-1a)



March 21 - 1:45 PM



March 21 - 2:15 PM



May 6 - 1:00 PM



May 6 - 2:00 PM

2 **Projected Development Site** **2** **Potential Development Site** **Incremental Shadow** **6** **Open Space** (keyed to Table 6-1a)



June 21 - 1:00 PM



June 21 - 2:00 PM



December 21 - 1:30 PM

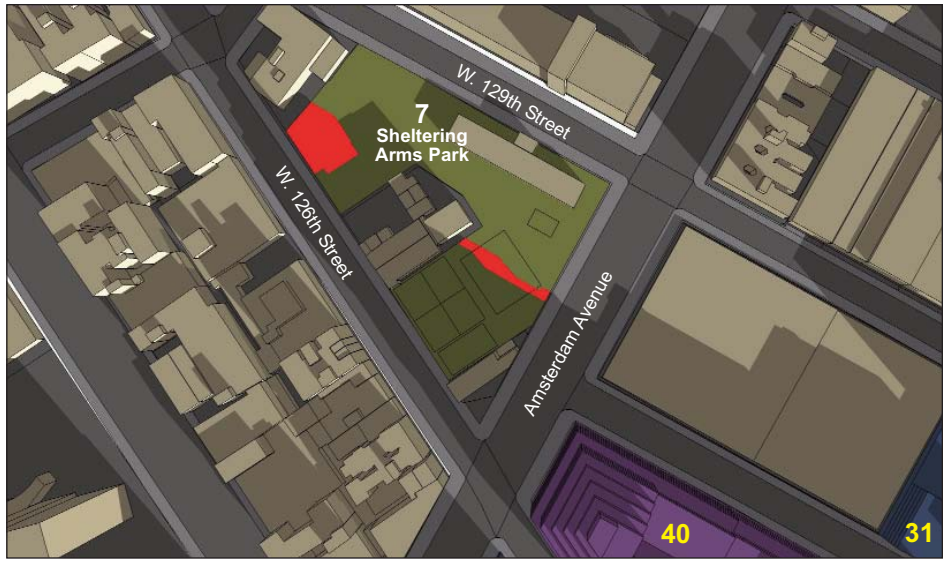


December 21 - 2:00 PM

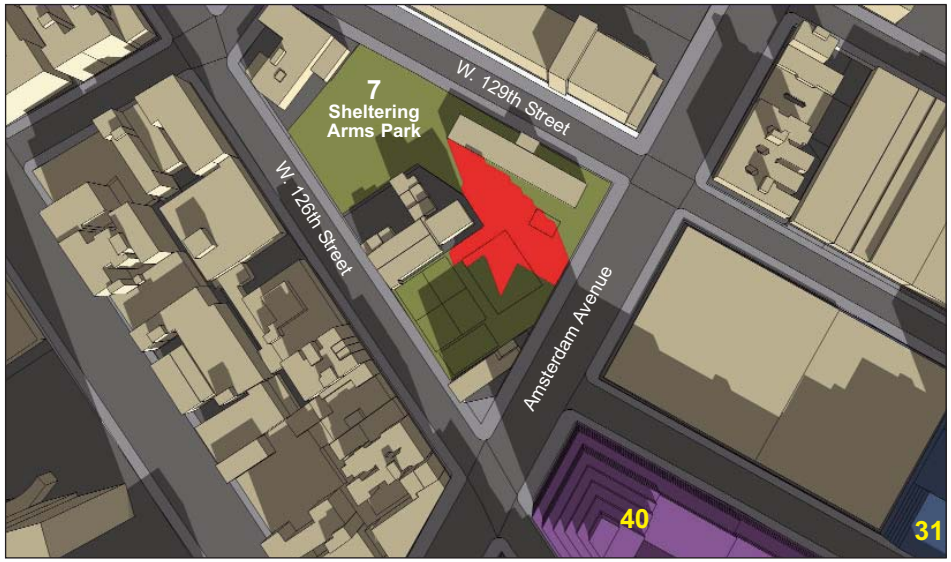
2 **Projected Development Site** 2 **Potential Development Site** **Incremental Shadow** 6 **Open Space** (keyed to Table 6-1a)

West Harlem Rezoning EIS

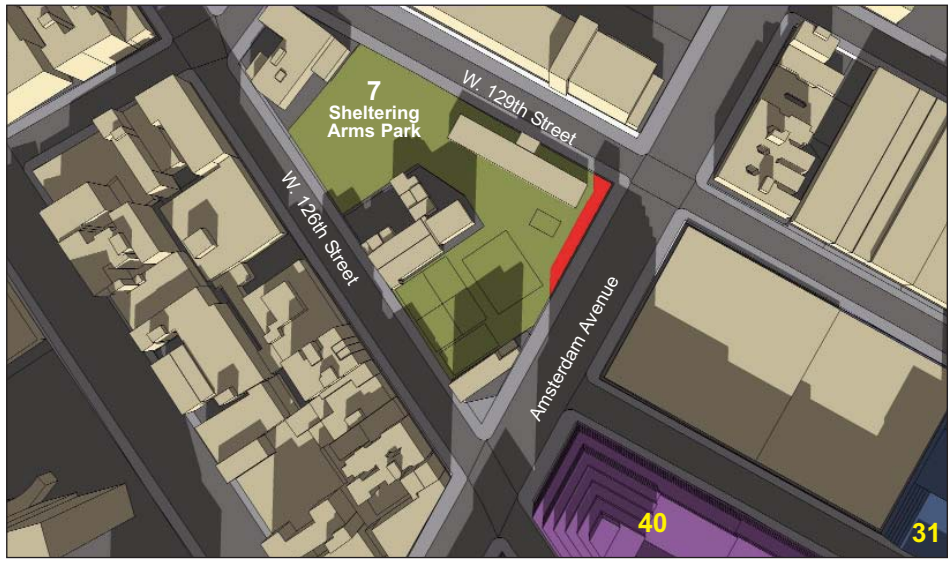
Figure 6-6b
Shadows on Open Spaces - Serenity Gardens



December 21 - 9:00 AM



December 21 - 10:30 AM



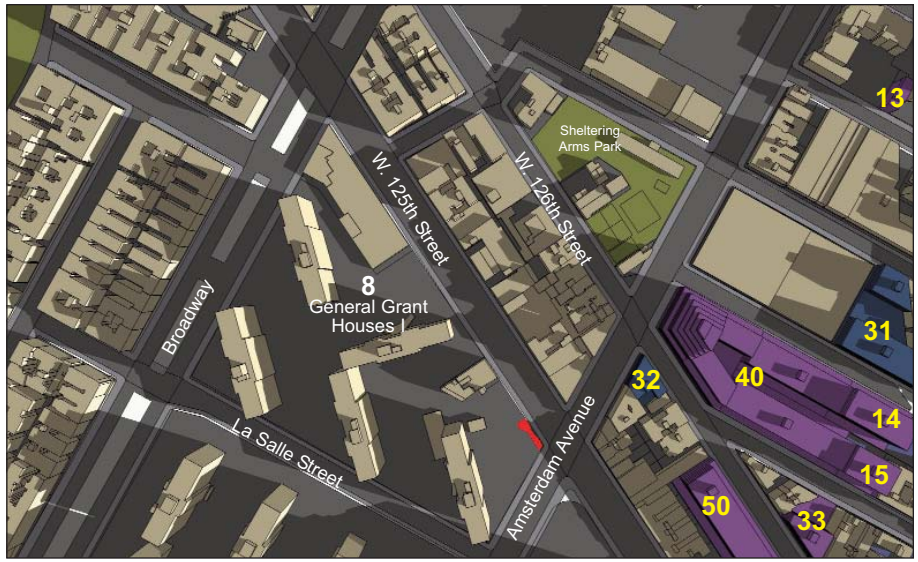
December 21 - 12:00 PM

2 **Projected Development Site**

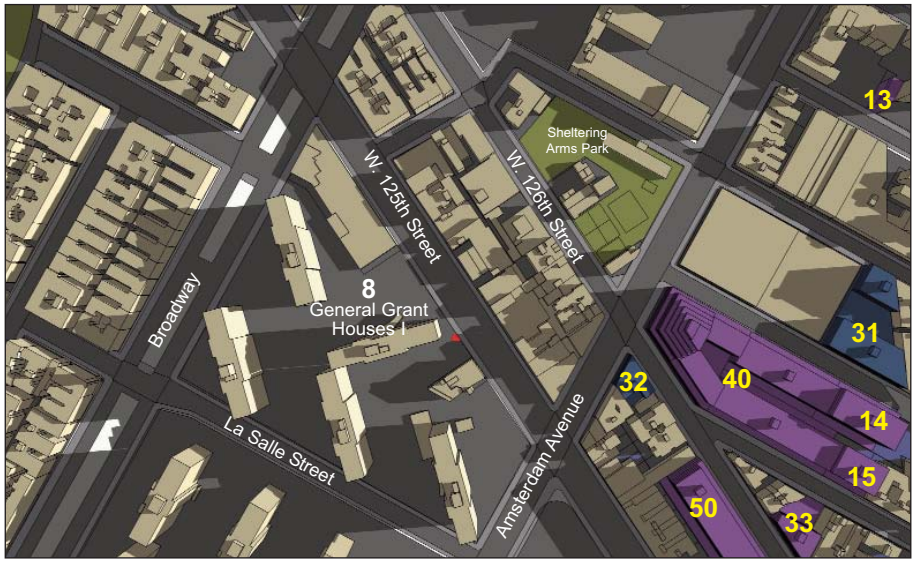
2 **Potential Development Site**

Incremental Shadow

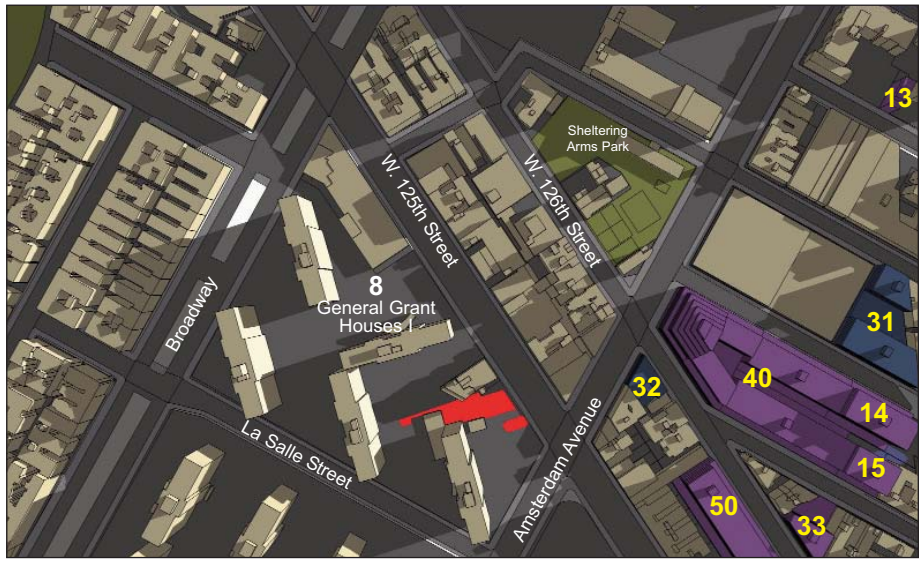
7 **Open Space** (keyed to Table 6-1a)



March 21 - 7:45 AM



May 6 - 6:45 AM



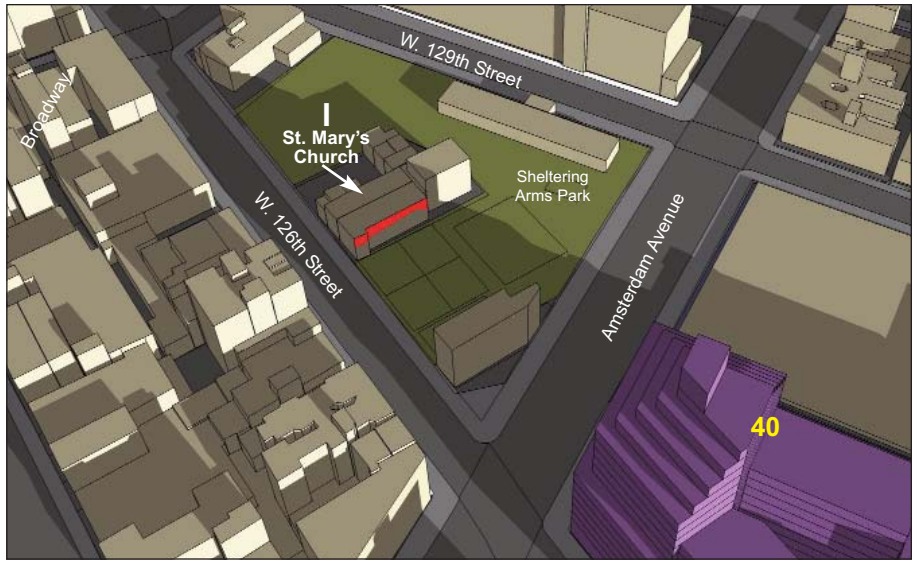
June 21 - 6:00 AM

2 **Projected Development Site**

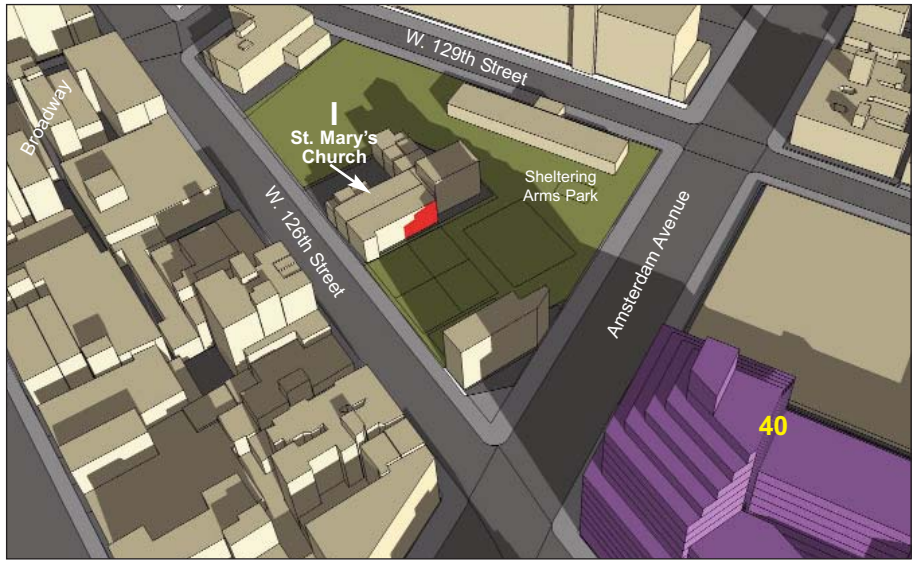
2 **Potential Development Site**

Incremental Shadow

8 **Open Space** (keyed to Table 6-1a)



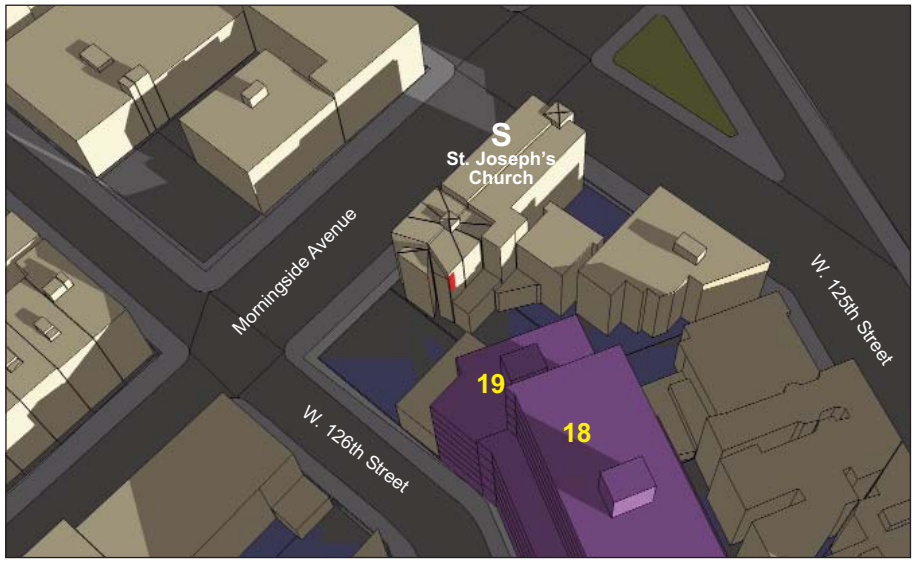
St. Mary's Church: December 21 - 9:00 AM



St. Mary's Church: December 21 - 10:00 AM



St. Joseph's RC Church: June 21 - 5:30 PM



St. Joseph's RC Church: June 21 - 6:00 PM

2 **Projected Development Site**

2 **Potential Development Site**

Incremental Shadow

S **Historic Resource** (keyed to Table 6-1b)

Figure 6-10a

Aerial Photo of Open Space Resources Affected by Incremental Shadows



Figure 6-10b

Aerial Photo of Open Space Resources Affected by Incremental Shadows



Aerial Photo of Open Space Resources Affected by Incremental Shadows



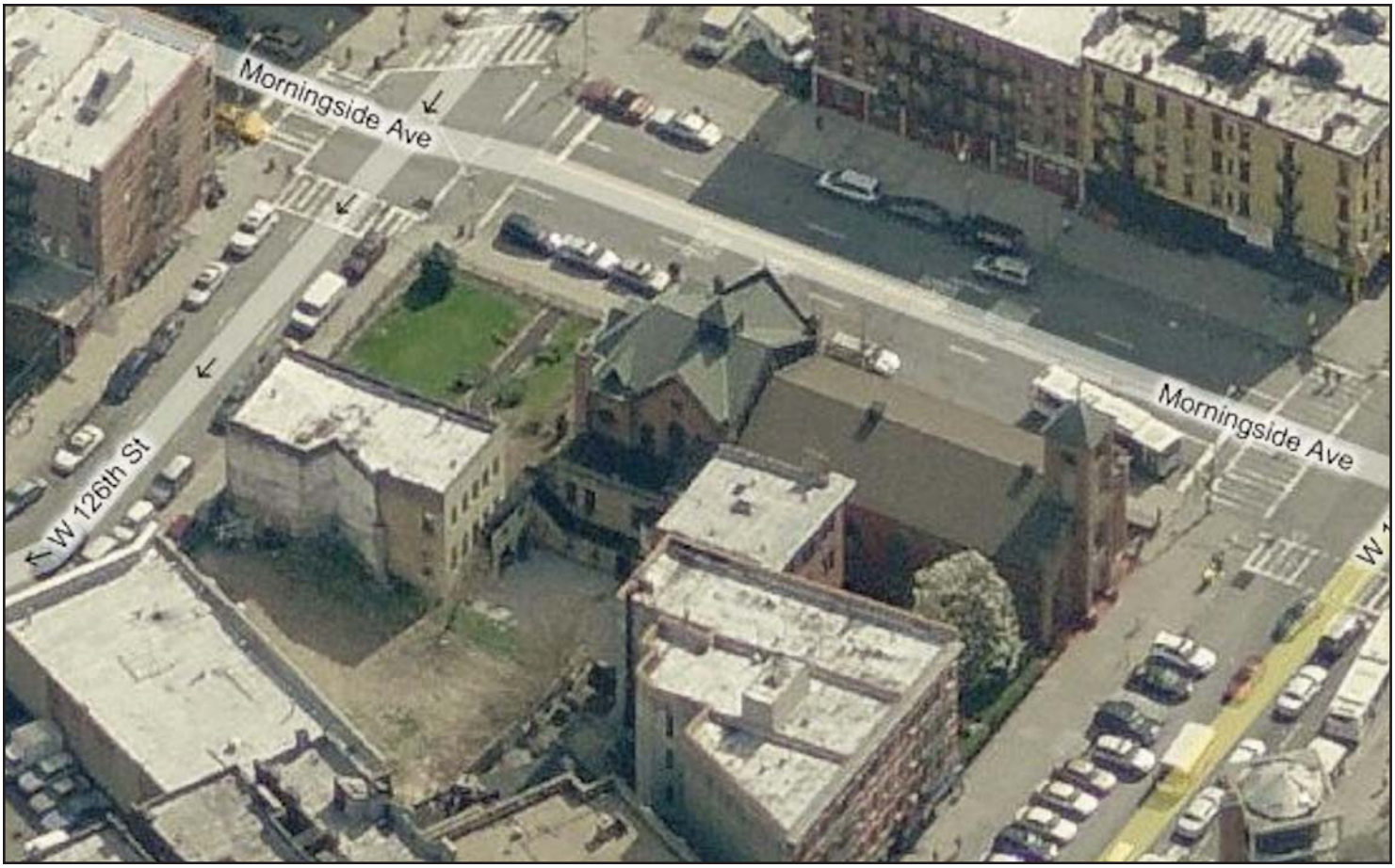
Aerial Photo of Open Space Resources Affected by Incremental Shadows



Views of Open Historic Resources Affected by Incremental Shadows



St. Mary's Protestant Episcopal Church - view of eastern facade (through fencing surrounding adjacent Sheltering Arms Park wading pool)



St. Joseph's RC Church - bird's eye view of western facade