Chapter 6: Shadows

A. INTRODUCTION

This chapter examines the reasonable worst-case development scenario (RWCDS) as described in Chapter 1, "Project Description," on a site-specific basis (both projected and potential developments), for potential shadow effects on sunlight-sensitive historic resources and open spaces, and examines the range of incremental shadow coverage that would occur under the proposed actions, with respect to those resources and the potential for adverse impacts.

The primary study (rezoning) area covers approximately 111 blocks in the East Village and Lower East Side neighborhoods of Manhattan. According to the *City Environmental Quality Review (CEQR) Technical Manual*, the longest shadow a structure will cast is 4.3 times the building's height. Projected and potential developments under the RWCDS range in height up to 120 feet and would therefore cast maximum shadows of up to 516 feet. The guidelines of the *CEQR Technical Manual* require the preparation of a shadow assessment if a proposed action includes new structures tall enough (generally 50 feet high or taller) to cast new shadows on a publicly accessible open space or historic resource with sunlight-sensitive features. A preliminary assessment of the projected and potential development sites and the shadows they could cast found that 39 of the projected development sites and 22 of the potential development sites could potentially cast shadows over open spaces and historic architectural resources with sunlight-dependent features. Therefore, a detailed shadow modeling was undertaken for these sites to determine whether the proposed actions have the potential to result in significant shadow impacts.

Development as a result of the proposed actions would cast new shadows at times throughout the year on some of the existing open spaces in the primary study area. However, the East Village and Lower East Side neighborhoods of Manhattan are already developed and the incremental shadows from the RWCDS would have significant adverse impacts on only one publicly accessible open space: the Orchard Alley Garden between East 3rd and 4th Streets and Avenues C and D. Although the extent of these new shadows would generally be small, several hours of new shadows throughout the year would cause a significant adverse impact to this resource. The remaining open spaces and sun-sensitive historic resources would be subject to varying amounts of incremental shadows as well, although these increments would be not be significant due to their limited extent and other site specific factors. As shown below, the detailed analysis concluded that 26 of the projected development sites and 18 of the potential development sites would cast some duration of incremental shadow on a sun-sensitive resource on at least one of the analysis days.

B. METHODOLOGY

Computer-generated simulations of the incremental shadows resulting from the RWCDS were prepared for representative times on four analysis days: March 21/September 21 (the equinoxes); May 6/August 6 (the midpoints between the equinoxes and the summer solstice); June 21 (the

summer solstice); and December 21 (the winter solstice). Since the CEQR methodology does not consider shadows and incremental increases in shadows within 1½ hours of sunrise or sunset, the analysis period on each analysis day begins 1½ hours after sunrise and ends 1½ hours before sunset. In general, shadows on city streets and sidewalks or on other buildings are not considered under *CEQR Technical Manual* guidelines.

The uses and vegetation in an open space determine its sensitivity to shadows. Uses that rely on sunlight include passive uses, such as sitting or sunbathing, and such activities as gardening or wading in fountains or pools. Vegetation requiring sunlight includes the tree canopy and flowering plants. In open spaces where lawns are actively used, the grass also requires extensive sunlight. Four to six hours a day of sunlight is generally a minimum requirement, particularly in the growing season. Sun-sensitive features of historic resources may include large windows admitting light into interior spaces, stained glass windows in churches, deeply sculpted façade ornamentation, and historic landscapes.

Following the guidelines of the *CEQR Technical Manual*, the analysis focuses on the incremental or additional shadows cast by the proposed actions beyond the shadows from structures which could be built under the No Build scenario. The analysis examines the potential impact of these incremental shadows and takes into account uses and users of open space, landscaping and vegetation of open space, as well as the characteristics of any significant natural features or historic resources with qualities or details that are sunlight-dependent and make such resources significant. The *CEQR Technical Manual* identifies the following conditions when a proposed development program may result in a significant shadow impact:

- Substantial reduction in sunlight where a sensitive use is already subject to substandard sunlight (i.e., less than the minimum time necessary for plant survival);
- Reduction in sunlight available to a sensitive use from more to less than the minimum time necessary for plant survival;
- Substantial reduction in sunlight to a sun-sensitive use or feature; and
- Substantial reduction in the usability of the open space.

There may be situations where a very small loss of sunlight is important (for example, in areas where people sit or in a historic church with stained glass windows) or where a comparatively large loss is not significant (for example, where vegetative species are shade-tolerant). Although these situations represent a general guideline for determining significant adverse impacts, each case is reviewed on its own merits. Potential impacts were considered based on the coverage and duration of shadows on each sensitive receptor, as well as the presence or lack of sun-sensitive uses, the amount of use in general, and the availability of alternative space within each sensitive receptor.

Building envelope and topographical information representing existing conditions were provided by Fugro EarthData, Inc. and augmented by AKRF. Building forms for the RWCDS were supplied by the New York City Department of City Planning (DCP). Shadows were modeled using the solar rendering capabilities of MicroStation V8 software.

C. SCREENING ANALYSIS

A preliminary screening analysis was performed in an effort to reduce the number of projected and potential development sites that required detailed modeling for potential shadow impacts. Projected and potential development sites with an increase in building height in the future

conditions—with and without the proposed actions—of less than 50 feet and sites not adjacent to natural features, publicly accessible open spaces, or sunlight-dependent historic features were eliminated from further analysis (sites with building height increments less than 50 feet but adjacent to the sun-sensitive resources were not eliminated from further consideration). Enlargements were not considered for detailed analysis, as the height increment would be less than 50 feet. It was assumed the East Houston Street and Delancey Street Greenstreets do not contain any sensitive receptors and are therefore not subject to shadow impacts. Based on this preliminary screening, the number of projected and potential development sites requiring additional analysis was reduced to 39 and 22, respectively.

D. RESOURCES OF CONCERN

As discussed in Chapter 10, "Natural Resources," there are no significant natural features in the study area. As discussed in Chapter 5, "Open Space," and Chapter 7, "Historic Resources," there are publicly accessible open spaces and architectural resources throughout the primary study area. These resources were assessed for their potential to be sunlight sensitive. Only the sunlight sensitive resources within the shadow radius (discussed above) of a projected or potential development were included in the detailed analysis. These resources are described below.

HISTORIC RESOURCES

NEW YORK CITY MARBLE CEMETERY

The New York City Marble Cemetery was begun in 1831 and was the second non-sectarian burial ground in the city opened to the public. Located at 52-74 East 2nd Street, it is listed on the State/National Register of Historic Places (S/NR) and is a designated New York City Landmark (NYCL). The cemetery grounds occupy a large area in the central portion of the block bounded by First and Second Avenues and East 2nd and 3rd Streets, and are considered a sun-sensitive resource.

FORMER P.S. 64 – 9TH STREET COURTYARD

The former Public School (P.S.) 64 building, a NYCL and eligible for S/NR listing, is located at 605 East 9th Street. The French Renaissance Revival-style building was designed by noted New York City school architect Charles B.J. Snyder and completed in 1906. Its H-plan design features courtyards on East 9th Street and East 10th Street. The courtyards can be considered sun-sensitive features, though the north-facing East 10th Street courtyard is shaded for much of the year by the P.S. 64 building itself.

The detailed three dimensional analysis determined that a number of the known and potential historic resources included in the study would not receive any incremental shadows at any time of year from the RWCDS, and are therefore not described in further detail. These resources include the Middle Collegiate Church at 112 Second Avenue, St. Marks-in-the-Bowery Church and Graveyard at East 10th Street and Second Avenue, the Congregation Adas Yisroel Anshe Mezeritz at 415 East Sixth Street, the Church of the Most Holy Redeemer at 173 East 3rd Street, and the Cathedral of the Holy Virgin Protection at 59 East 2nd Street. The analysis showed that the portions of these resources that could have been reached by shadows as a result of the proposed actions are already cast in existing shadows by adjacent intervening structures.

OPEN SPACE RESOURCES

According to the *CEQR Technical Manual*, open spaces can contain facilities that are both sensitive and not sensitive to sunlight. Features that are not sensitive include recreational areas (such as handball or basketball courts) where there are no sitting areas, no sunlight-dependent vegetation, no historic plantings, or plantings that are shade tolerant. Facilities such as children's playgrounds and sprinklers, swimming pools, sitting or sunning areas, ball fields, and other play areas that are covered with turf do require direct sunlight for some part of the day, or at certain times of the year. These features are therefore sunlight sensitive.

SARA D. ROOSEVELT PARK

Located between Forsyth Street and Chrystie Street and running several blocks from East Houston Street down to Canal Street, this park comprises nearly eight acres of largely active recreation space, including playgrounds, basketball courts, wading pools, and walkways, and also features benches and shade trees.

FIRST PARK

This playground, named for its location on East First Street and First Avenue, opened in 1935. Bounded by East Houston and East First Streets and First and Second Avenues, the park was renovated in 1997. The playground now contains benches, play equipment with safety surfacing, a drinking fountain, swings, a spray shower with fish ornamentation, a flagpole with a yardarm, and a kiosk selling snacks with a separate seating area. London planetrees (*Platanus x acerifolia*) and honey locust trees (*Gleditsia triacanthos*) line the perimeter of the park.

PERETZ SQUARE

This small (0.2 acre) triangle-shaped park is bounded by Houston Street, First Street, and First Avenue. It contains landscaping and a few benches.

ALBERT'S GARDEN

This community garden is located at 16 East 2nd Street between Bowery and Second Avenue.

ABC PLAYGROUND

ABC Playground is located on the south side of East Houston Street between Essex Street and Norfolk Street, next to P.S. 20, the Anna Silver School. The playground was renovated in 1998 and consists of modern play units, animal art, painted line games, a spray shower area, basketball courts, and new safety surfacing.

P.S. 20 PLAYGROUND (STANTON STREET)

This strip of playground is located on the south side of P.S. 20 along Stanton Street. It contains play equipment and shade trees.

P.S. 142 PLAYGROUNDS

The P.S. 142 Amalia Castro School is a circular building located on the block bounded by Delancey and Rivington Streets, and Attorney and Ridge Streets. It has a paved area featuring ball courts to the south and a smaller area with playground equipment to the north.

GOMPERS HOUSES PLAYGROUND

This playground is located at Pitt Street and Rivington Street. It is part of the New York City Housing Authority (NYCHA) Samuel Gompers Houses complex, and contains paved ballcourts, play equipment, landscaping, and benches.

HAMILTON FISH PARK

Completed in 1900, this 4.3-acre park is located on Pitt Street between East Houston and Stanton Streets. The Beaux-Arts style gymnasium is a NYCL. The park also features a pool, paved ball courts, and playground equipment.

GUSTAVE HARTMAN TRIANGLE

This small triangular mall, located at Second Street and Avenue C, is lined with London plane trees and contains no other amenities.

LE PETIT VERSAILLES COMMUNITY GARDEN

Le Petit Versailles, created in 1996 as a GreenThumb garden, is a public space located at 346 East Houston Street between Avenues B and C. Public hours are Saturday and Sunday from 2 PM to 7 PM.

PEACHTREE COMMUNITY GARDEN

This garden is located at 236-238 East 2nd Street between Avenues B and C.

WALD HOUSES PLAYGROUNDS

The Lillian Wald Houses complex is located between East Houston Street and East 6th Street from FDR Drive to Avenue D. There are playgrounds along Avenue D, at East 3rd, East 4th, and East 6th Streets, and a walkthrough and seating area at East 8th Street.

ORCHARD ALLEY GARDEN

This community garden occupies the full width of the block between East 3rd and East 4th Streets between Avenues C and D.

PARQUE DE TRANQUILIDAD GARDEN

This community garden is located at 314-318 East 4th Street, between Avenues C and D.

EL JARDIN DEL PARAISO

This GreenThumb community garden is located at 706-718 East 5th Street between Avenues C and D. It occupies the full width of the block between East 4th and 5th Streets.

P.S. 15 SCHOOL PLAYGROUND

The P.S. 15 Roberto Clemente School is located on East 4th Street between Avenues C and D. Its paved playground and ball courts are behind the school, facing East 5th Street. The playground is separated from El Jardin del Paraiso by a wall.

GREEN OASIS COMMUNITY GARDEN

The Green Oasis Community Garden, established in 1981, spans five lots located on East 8th Street between Avenues C and D.

NINTH STREET COMMUNITY GARDEN

Established in 1978, this community garden is located at the corner of East 9th Street and Avenue C.

TOMPKINS SQUARE PARK

The 10.5-acre Tompkins Square Park, bounded on the north by East 10th Street, on the east by Avenue B, on the south by East 7th Street, and on the west by Avenue A, is devoted to both active and passive uses. Amenities include playgrounds with swings, slides, play structures, basketball courts, and handball courts. In addition, paved walkways, benches, trees, and planters are part of the passive open space. The park is home to several monuments, including the Temperance Memorial Fountain (1888), the Samuel S. Cox monument (1891), the Slocum Memorial Fountain (1906), several memorial plaques, and the Ukrainian-American Flagstaff (1942).

OTHER STUDY AREA OPEN SPACES NOT REQUIRING ANALYSIS

The three-dimensional solar study determined that a number of the sunlight-sensitive, publicly accessible open space resources included in the primary study area would not receive any incremental shadows at any time of year as a result of the proposed actions, and are therefore not described in further detail. These resources include the Allen Malls, the Nathan Straus Playground at P.S. 140, the All Peoples' Garden, the Firemen's Community Garden, the Dry Dock Playground, La Plaza Cultural (also a NYCL), El Sol Brillante and El Sol Brillante Jr. Gardens, Vamos Sembrar/Avenue B Community Garden, the Emmanuel Care Center Playground, the Wald Houses seating area at Avenue D and East 8th Street, and the Relaxation Garden. The analysis showed that the portions of these resources that could have been reached by shadows as a result of the proposed actions are already cast in existing shadows by adjacent intervening structures.

The Children's Magical Garden is a community garden located on the corner of Norfolk and Stanton Streets. It is a privately-owned space, and in both the future with the proposed actions and the future without the proposed actions it is anticipated that a building will be developed on this site. The garden will not exist in either condition and is therefore not included in this analysis.

E. THE FUTURE WITHOUT THE PROPOSED ACTIONS

As defined in the RWCDS, it is expected that the buildings on a number of projected and potential development sites will be developed to the maximum height permitted under the current zoning in the future without the proposed actions (see Chapter 1, "Project Description"). No additional open spaces are expected in the future without the proposed actions.

In the future without the proposed actions, the RWCDS assumes that a new building would be constructed on Projected Development Site 81, which is currently occupied by the eastern half of

Children's Magical Garden. No other substantive changes to existing open spaces would occur in the future without the proposed actions.

F. PROBABLE IMPACTS OF THE PROPOSED ACTIONS

PROJECTED AND POTENTIAL DEVELOPMENTS AND METHODOLOGY

Table 6-1 compares the heights of the buildings on the projected and potential development sites under the future with and without the proposed actions and are the heights used for the shadow analysis presented below. Incremental shadows are the additional shadow coverage created by the developments as a result of the proposed actions beyond the shadows that would occur in the future without the proposed actions.

Table 6-1
No Action and Proposed Actions Development Heights

Resource	Projected and Potential Site Source	No Action Development Maximum Height (in feet)	Proposed Actions Development Maximum Height (in feet)	Net Increase in Height Under the Proposed Actions (in feet)
Sara D. Roosevelt Park	28, 188, 192	60	80	20
	44-54, 198-204, 213	60	120	60
First Park	42, 199, 200	60	120	60
Peretz Square	42, 194	60	120	60
Albert's Garden	209, 212	60	120	60
NYC Marble Cemetery	205	60	120	60
ABC Playground (P.S. 20)	194, 291	60	120	60
P.S. 20 Playground (Stanton Street)	81	50	80	30
P.S. 142 Playground (Delancey Street)	155, 160	60	120	60
Gompers Houses Playground	155	60	120	60
Hamilton Fish Park	155, 166, 167	60	120	60
	233	50	80	30
Gustave Hartman Triangle	166, 167, 180	60	120	60
Le Petit Versailles Community Garden	157, 180	60	120	60
Peachtree Community Garden	157, 180	60	120	60
Wald Houses Playgrounds (at East 3rd and 4th Streets)	165, 167, 169	60	120	60
Orchard Alley Garden	165, 167, 169	60	120	60
Parque de Tranquilidad Garden	84	60	80	20
El Jardin del Paraiso	84	60	80	20
	170	60	120	60
P.S. 15 Roberto Clemente School Playground	170, 301	60	120	60
Wald Houses Playground (at East 6th Street)	173	60	120	60
Green Oasis Community Garden	177	60	120	60
Ninth Street Community Garden	177	60	120	60
	223	60	80	20
P.S. 64 9th Street Courtyard	92	60	80	20
Tompkins Square Park	92	60	80	20

Source: DCP, January 2008.

In accordance with the *CEQR Technical Manual*, this shadow analysis provides data on the time of day when the projected and potential developments would create incremental shadows on open spaces or historic resources. As the sun travels across the sky, shadows move in a curve 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 clockwise until they stretch east, as the sun sets in the west. Midday shadows are always shorter than those at other times of the day

because that is when the sun is highest in the sky. In addition, because of the tilt of the earth's axis, the angle at which the sun's rays strike the earth varies throughout the year. For example, winter shadows, although the longest, move more quickly along their paths (because of the earth's tilt) and do not affect the growing season of outdoor trees and plants.

As directed by the *CEQR Technical Manual*, shadow analyses were performed for four days of the year: June 21, May 6, March 21, and December 21. Table 6-2 provides the start and end time of the incremental shadows cast by the projected and potential developments on the resources of concern and shows the estimated duration of those new incremental shadows. For this analysis, the maximum building heights of the proposed actions developments was compared to the maximum building heights of the RWCDS. The "entering" times shown in the table are the times that the shadows first hit any part of the resource being evaluated, and the "exit" time represents the time that the incremental shadows leave the resource. As shown in Table 6-2, a resource can be affected by more than one site, yielding multiple entries and exits. Figures 6-1 through 6-18 show the extent of incremental shadows cast on the resources of concern at various times. The extent and duration of incremental shadows is described in detail below for each resource, and the effects of any such shadows are assessed.

OPEN SPACE RESOURCES

Sara D. Roosevelt Park

In the future without the proposed actions, Sara D. Roosevelt Park would experience shadows along the eastern edge of the park in the morning hours and along the western edge of the park in the late afternoon hours on all four analysis days. Generally, the existing shadows would exit the park by mid-morning (late morning in December) and would not enter again until the late afternoon hours, allowing the park to experience full sun for the majority of the day. Morning incremental shadows with the proposed actions would be due to projected and potential development sites along Forsyth Street, and late afternoon incremental shadows would come from projected and potential development sites along Chrystie Street.

During the morning hours of the March/September analysis day, projected and potential development sites along Forsyth Street (Projected Development Site 28, and Potential Development Sites 188, 192, 198, 199, and 200) would cast incremental shadows from the start of the analysis day at 8:36 AM until about 10:15 AM (see Figure 6-1). Sites 199 and 200, located on the south side of East Houston Street just east of Forsyth Street, would continue to cast shadows until 11 AM. Shadows cast by Sites 199 and 200 would fall primarily across portions of the paved area with planters and steps next to East Houston Street for two and a half hours total. New shadows cast by the other sites along Forsyth Street would be relatively small in extent.

Projected and potential sites west of the park along Chrystie Street (Projected Development Sites 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, and Potential Development Sites 201, 202, 204, and 213) would cast incremental shadows during the final hour and fifteen minutes of the March/September analysis day (4:15 PM to 5:29 PM). After 5 PM these shadows would grow relatively large and stretch across much of the width of the park (see Figure 6-2).

Table 6-2
Incremental Shadow Durations

Resource	Source of Shadows (Sites and Heights in feet)	March 21 8:36 AM-5:29 PM EDT	May 6 7:27 AM-6:18 PM EDT	June 21 6:57 AM-7:01 PM EDT	December 21 8:51 AM-2:53 PM EST
Sara D. Roosevelt Park	Sites 28, 188, 192—80 ft; Sites 44-54, 198-204, 213—120 ft	8:36 AM–11:00 AM 4:15 PM–5:29 PM Total: 3h 38m	7:27 AM–10:00 AM 4:15 PM–6:18 PM Total: 4h 36m	6:57 AM–9:45 AM 4:30 PM–7:01 PM Total: 5h 19m	9:00 AM–11:45 AM 2:30 PM–2:53 PM Total: 3h 8m
First Park	Sites 42, 199, 200—120 ft	3:45 PM–5:29 PM Total: 1h 44m	—	—	9:30 AM–2:30 PM Total: 5h
Peretz Square	Sites 42, 194—120 ft	4:45 PM–5:29 PM Total: 44m	—	—	8:51 AM–9:15 AM Total: 24m
Albert's Garden	Sites 209, 212—120 ft	9:30 AM–11:30 AM Total: 2h	9:15 AM–10:30 AM Total: 1h 15m	7:15 AM–7:45 AM 9:45 AM–10:00 AM Total: 45m	—
NYC Marble Cemetery	Site 205—120 ft	4:45 PM–5:29 PM Total: 44m	4:00 PM–6:18 PM Total: 2h 18m	5:30 PM–6:45 PM Total: 1h 15m	—
ABC Playground (P.S. 20)	Sites 194, 291—120 ft	8:36 AM–11:00 AM 5:15 PM–5:29 PM Total: 2h 39m	7:27 AM–10:30 AM 4:45 PM–6:18 PM Total: 4h 36m	7:30 AM–10:15 AM 4:30 PM–7:01 PM Total: 5h 16m	—
P.S. 20 Playground (Stanton Street)	Site 81—80 ft	2:30 PM–4:00 PM Total: 1h 30m	—	—	9:45 AM–11:45 AM Total: 2h
P.S. 142 Playground (Delancey Street)	Sites 155, 160—120 ft	8:36 AM–10:15 AM 3:45 PM–5:29 PM Total: 3h 23m	7:45 AM–9:00 AM 3:30 PM–6:18 PM Total: 4h 15m	8:00 AM–8:30 AM 3:30 PM–7:01 PM Total: 4h 1m	—
Gompers Houses Playground	Site 155—120 ft	—	—	—	2:45 AM–2:53 PM Total: 8m
Hamilton Fish Park	Sites 155, 166, 167—120 ft; Site 233—80 ft	4:30 PM–5:29 PM Total: 59m	7:30 AM–7:45 AM Total: 15m	6:57 AM–7:45 AM Total: 48m	2:45 AM–2:53 PM Total: 8m
Gustave Hartman Triangle	Sites 166, 167, 180—120 ft	8:36 AM–8:45 AM Total: 9m	—	5:00 PM–7:01 PM Total: 2h 16m	—
Le Petit Versailles Community Garden	Sites 157, 180—120 ft	4:30 PM–5:29 PM Total: 59m	10:45 AM–11:00 AM Total: 15m	11:00 AM–11:30 AM Total: 30m	—
Peachtree Community Garden	Sites 157, 180—120 ft	2:30 PM–5:00 PM Total: 2h 30m	3:15 PM–5:30 PM Total: 2h 15m	—	9:30 AM–10:00 AM Total: 30m
Wald Houses Playgrounds (at East 3rd and 4th Streets)	Sites 165, 167, 169—120 ft	5:00 PM–5:29 PM Total: 29m	5:15 PM–6:18 PM Total: 1h 3m	5:45 PM–7:01 PM Total: 1h 16m	—
Orchard Alley Garden	Sites 165, 167, 169—120 ft	9:15 AM–2:00 PM Total: 4h 45m	8:30 AM–12:45 PM Total: 4h 15m	8:00 AM–12:30 PM Total: 4h 30m	10:15 AM–2:15 PM Total: 4h
Parque de Tranquilidad Garden	Site 84—80 ft	—	—	5:00 PM–6:00 PM Total: 1h	—
El Jardin del Paraiso	Site 84—80 ft; Site 170—120 ft	4:00 PM–5:29 PM Total: 1h 29m	5:45 PM–6:18 PM Total: 33m	—	8:51 AM–9:00 AM Total: 9m
P.S. 15 Roberto Clemente School Playground	Sites 170, 301—120 ft	8:45 AM–9:45 AM Total: 1h	—	—	9:00 AM–9:15 AM Total: 15m
Wald Houses Playground (at East 6th Street)	Site 173—120 ft	—	—	5:00 PM–6:00 PM Total: 1h	—
Green Oasis Community Garden	Site 177—120 ft	8:36 AM–8:45 AM Total: 9m	7:27 AM–8:45 AM Total: 1h 18m	6:57 AM–7:45 AM Total: 48m	—
Ninth Street Community Garden	Site 177—120 ft; Site 223—80 ft	—	5:00 PM–6:00 PM Total: 1h	5:15 PM–6:15 PM Total: 1h	8:51 AM–9:15 AM Total: 24m
P.S. 64 9th Street Courtyard	Site 92—80 ft	—	5:45 PM–6:18 PM Total: 33m	4:45 PM–5:00 PM Total: 15m	—
Tompkins Square Park	Site 92—80 ft	8:36 AM–12:00 PM Total: 3h 24m	7:27 AM–10:45 AM Total: 3h 18m	6:57 AM–10:15 AM Total: 4h 12m	8:51 AM–12:15 PM Total: 3h 24m

Notes:

EST—Eastern Standard Time
EDT—Eastern Daylight Time
March 21 is the equivalent of September 21.
May 6 is the equivalent of August 6.

On the May/August analysis day, shadows are shorter but reach further south at the beginning and end of the day. All the sites along Forsyth Street east of the park would cast new shadows on the park from the start of the analysis period at 7:27 AM until 9:15 AM; Sites 199 and 200 on East Houston Street and Site 198 at the southwest corner of Delancey and Forsyth Streets would continue to cast areas of new shadows until 10 AM (see Figure 6-3). The paved area with planters near East Houston Street and the adjacent basketball courts, and the landscaped area just south of Delancey Street would receive most of the new shadows during the two and a half hour period.

Beginning at 4:15 PM on May 6 and August 6, the projected and potential sites along Chrystie Street would cast shadows on the western edge of the park. These shadows would move eastward and grow; at 5 PM they would reach across half the width of the park (see Figure 6-4). At 6 PM, they would reach across the full width of the park, but would affect only the eastern half of the park because shadows in the future without the proposed actions cover the western portion of this park by this time. The new shadows would last until 6:18 PM, the end of the analysis day.

On the June 21 analysis day, incremental shadows would follow essentially the same pattern as on May 6 and August 6, but would exit the eastern side of the park fifteen minutes earlier in the morning (9:45 AM for Sites 198, 199, and 200) and would enter the west side 15 minutes later, at 4:30 PM. However, the analysis day starts earlier and ends later then in May and August, so the total duration of incremental shadows would be slightly longer overall. Extents would generally be slightly smaller than in May and August, due to the higher angle of the sun.

On December 21, shadows are longest, but move relatively quickly across a more limited range during the day, falling to the northwest in the morning and to the northeast in the afternoon. Existing and No Build shadows are long as well. Incremental shadows fall on small portions of the park between 9:00 AM and 11:45 AM on December 21 (see Figure 6-5). The landscaped area just north of Delancey Street experiences an area of new shadows, cast by Site 198, for most of the two hour forty-five minute period, and other areas receive smaller extents of shadows for more limited times.

In the afternoon of December 21, shadows that would be cast by projected and potential sites begin to enter certain areas on the west side of the park at 2:30 PM and remain for the final 23 minutes of the analysis day.

Overall, while the proposed actions would add incremental shadows to Sara D. Roosevelt Park, most of the park would remain in sun for the majority of the day on each of the four analysis days. During the late spring and summer, between four and a half and five and a half hours of new shadows would fall on the park. However, these hours of new shadow fall at the beginning and end of the day, and the park would remain without new shadows from 10:00 AM to 4:15 PM or later during these seasons. The incremental shadows are due to a number of development sites on the east and west sides of the park. Given the relatively large area of the park and the small increments in additional height as a result of the proposed actions, the extent of new shadows is generally quite small. Therefore, there would not be a substantial reduction in the amount of sunlight on the park. Sun-sensitive plantings would continue to receive adequate sunlight during the growing seasons, and the overall usability of the park would not be diminished. Consequently, significant adverse shadow impacts to Sara D. Roosevelt Park are not anticipated with the proposed actions.

First Park

With the proposed actions, shadows cast by Projected Development Site 42, and Potential Development Sites 199 and 200—located on the south side of East Houston Street across from First Park—are not long enough to reach this open space on the May/August and June analysis days.

On the March/September analysis day, incremental shadows from Sites 199 and 200 would fall on the park during the final hour and 45 minutes of the day (3:45 PM to 5:29 PM). These new shadows would start small and grow to cover about half the space by 5:29 PM (see Figure 6-6, which depicts 5:00 PM). No other site would cast shadows on First Park in March and September.

On December 21, incremental shadows cast by project Site 42 would enter the park at 9:30 AM, move across the middle of the park and exit at 2:15 PM when No Build shadows cover the eastern side of the park. Additionally, incremental shadows cast by Sites 199 and 200 would enter the park at 12:15 PM and exit at 2:30 PM. These new shadows would be relatively small, as the No Build shadows stretch across most of the area that would have been affected during this time. Extents of incremental shadow would be greatest at about 1:00 PM (see Figure 6-7).

Five hours of new shadows on December 21 might somewhat reduce the attractiveness of this park for its users at this time of year; however, the space is entirely devoted to active recreation uses, and even in December would continue to experience areas of sunlight throughout the day (see Figure 6-7). During the spring, summer and fall little or no new shadows would fall on the park. The proposed actions would therefore not cause a significant adverse impact.

Peretz Square

With the proposed actions, shadows cast by Projected Development Site 42 and Potential Development Site 198—located on the south side of East Houston Street across from Peretz Square—are not long enough to reach this open space on the May/August and June analysis days.

On the March and September analysis day, incremental shadows cast by Site 42 moves onto the western side of the space at 4:45 PM and remains for the final 45 minutes of the analysis day (see Figure 6-6). On the morning of December 21, a very small extent of new shadows cast by Site 198 falls on the eastern edge of the space for the first 24 minutes of the analysis day.

Due to the limited duration and extent of new shadows, the proposed actions would not cause a significant adverse shadow impact on Peretz Square.

Albert's Garden

With the proposed actions, shadows cast by Potential Development Site 212—located several lots east of the garden on the same block—would fall on portions of the garden in the late mornings during the spring, summer, and fall. Shadows cast by Potential Development Site 209, located northeast of the garden on the north side of the block, briefly reach the garden for 30 minutes on early June mornings.

On the March and September day, shadows cast by the top of the potential development at Site 212 would fall on the garden between 9:30 AM and 11:30 AM (see Figure 6-8). The new area of shadows would be relatively small, and sunlight would continue to reach other areas of the garden during this time. On the May/August day, shadows from Site 212 would fall on the garden for a shorter period—9:15 AM to 10:30 AM (see Figure 6-9)—and on June 21 the

shadows would only reach the garden for 15 minutes. Also on June 21, Site 209 would cast incremental shadows on the garden from 7:15 AM to 7:45 AM.

The garden would continue to receive ample sunlight throughout the middle of the day during the growing season (April to October) under the proposed actions, and there would not be a significant adverse shadow impact.

ABC Playground

Potential Development Site 291, located on the south side of East Houston Street one block east of ABC Playground, would cast incremental shadows on this space from early to late morning during the spring summer and fall seasons. The extent of these new shadows would be largest in the early morning, and shrinking towards the eastern edge of the space behind existing and No Build shadows as the morning progresses (see Figures 6-10 and 6-11). On the March and September day they would exit completely at about 11 AM; on the May/August day they would exit 30 minutes earlier, and on the June day they would exit at 10:15 AM.

In the late afternoons on the spring, summer, and fall analysis days, incremental shadows from Potential Development Site 194, located on the south side of East Houston Street just across Allen Street from the playground, would enter the northwest corner of the playground and remain until the end of the analysis periods. On March 21 and September 21, the new shadows would only occur from 5:00 PM to 5:29 PM. In the late spring and summer, the analysis days last longer into the evening, and the duration of incremental shadows would be longer (4:45 PM to 6:18 PM in May/August, 4:30 PM to 7:01 PM in June). However, the area covered by new shadows on these days would be very small until around 6:00 PM on both of those analysis days (see Figure 6-12).

No incremental shadows would fall on the ABC Playground on December 21.

Despite incremental shadow durations of up to five hours and fifteen minutes, only small areas of the space would experience new shadows during most of the affected periods. The greatest extent of incremental shadows would occur early in the morning. This playground, devoted entirely to active recreation uses, would not experience a substantial reduction in sunlight and the usability of the park would not be diminished. Therefore, a significant adverse shadow impact would not occur.

P.S. 20 Playground (Stanton Street)

Projected Development Site 81 is located just south of the P.S. 20 Playground and Stanton Street. At a projected height of 80 feet, it would not cast long enough shadows in May/August and June to reach the playground. In March and September, however, it would be long enough to pass through a portion of the eastern side of this space between 2:30 PM and 4:00 PM (see Figure 6-13). The extent would not be large, and the playground would continue to get a good deal of sun during this period and throughout the analysis day. On December 21, shadows in the future without the proposed actions would cover much of the playground during the late morning and incremental shadows would cover an additional small area from 9:45 AM to 11:45 AM (see Figure 6-14).

Given the limited extent and duration of incremental shadows on this active recreation space over the course of the year, the proposed actions would not result in any significant adverse shadow impacts.

P.S. 142 Playground (Delancey Street)

Projected Development Site 155, located a block east of the playground, would cast incremental shadows in the mornings of the spring, summer and fall analysis days, and Projected Development Site 160, just west of the playground across Attorney Street, would cast incremental shadows in the late afternoons of the spring, summer, and fall days. No incremental shadows would fall on the playground on December 21.

On March 21 and September 21, incremental shadows from Site 155 would fall on this paved active recreation space from 8:36 AM to 10:15 AM, covering a substantial area on the eastern side for much of this period (see Figure 6-15). On the May/August morning, a smaller area on the eastern side would be affected from 7:30 AM to 9:00 AM (see Figure 6-16); and on June 21, only 30 minutes of incremental shadows would occur from 8:00 AM to 8:30 AM.

Incremental shadows from Site 160 would enter the northwest portion of the space at 3:45 PM on the March and September analysis day and remain until the end of the period. The extent of these incremental shadows would remain very small, as shadows from a building constructed in the future without the proposed actions would occupy most of this playground's northwest area (see Figure 6-17). On the May/August and June days, incremental shadows would enter at 3:30 PM and remain until the end of these analysis days, growing to cover substantial areas of the playground after 5:00 PM on these days (see Figure 6-18).

The extent of incremental shadows would remain quite small throughout the spring, summer, and fall seasons, with the exception of the period after 5:00 PM in the late spring and summer and before 9:30 AM in March and September. The playground would continue to receive sunlight for most of the analysis period throughout the year. The entire space is paved and devoted to active recreational uses, and therefore the incremental shadows would not substantially affect the use of the resource, and no significant impacts would occur.

Gompers Houses Playground

The Gompers Houses Playground would receive eight minutes of incremental shadows from Projected Development Site 155 at the end of the December 21 analysis period (2:45 PM to 2:53 PM). New shadows would not occur on any other analysis day, and this limited duration of incremental shadows would not cause a significant adverse impact.

Hamilton Fish Park

Hamilton Fish Park would receive short durations of incremental shadows early in the mornings of the May/August and June analysis days (7:30 AM to 7:45 AM and 6:57 AM to 7:45 AM, respectively) from Projected Development Sites 166 and 167, located northeast of the park. In March and September, incremental shadows cast by Potential Development Site 233, located southwest of the park, would fall on a section in the southwest area of the park for the final hour of the analysis period (see Figure 6-19). On December 21 Projected Development Site 155, two blocks to the southwest, would cast incremental shadows from 2:45 PM to 2:53 PM.

Hamilton Fish Park would continue to receive ample sunlight throughout the year, and the limited durations and extent of incremental shadows as a result of the proposed actions would not cause a significant adverse impact.

Gustave Hartman Triangle

This space would receive nine minutes of incremental shadows at the start of the March/September analysis day from Projected Development Sites 166 and 167, and two hours of incremental shadows at the end of the June analysis day (5:00 PM to 7:01 PM) from Projected Development Site 180 (see Figure 6-20). No incremental shadows would fall on this triangle on the other two analysis days. The triangle would continue to receive ample sunlight throughout the year and the limited durations and extent of incremental shadows as a result of the proposed actions would not cause a significant adverse impact.

Le Petit Versailles Community Garden

Le Petit Versailles is a small garden located in the middle of a block on a lot between two buildings of several stories, and consequently only receives substantial sunlight for a few hours in the early afternoons, even in summer. Projected Development Site 157, located across East Houston Street southwest of the site, would cast long enough shadows to reach a small area in the southeast corner the garden for the final hour of the March/September analysis day (see Figure 6-19). Site 157 would not affect the garden on any other analysis day.

A very small area of the garden would be shaded by Projected Development Site 180, located several lots east of the garden, in the late mornings of the May/August and June analysis days, for 15 and 30 minutes, respectively. The very limited duration and extent of incremental shadows on this garden would not cause a significant adverse impact.

Peachtree Community Garden

In March and September the Peachtree Garden would receive incremental shadows from 2:30 PM to 5:00 PM from Projected Development Site 157 just southwest across East 2nd Street. Between 3:00 PM and 4:30 PM the extent of incremental shadows would be relatively large (see Figure 6-19). In May and August, the shadows from the projected development of Site 157 would be shorter and only a small area in the southeast section of the garden would affected from 3:15 PM to 5:30 PM. On June 21, the shadows would be too short to reach the garden. On December 21, only a very small area of incremental shadows would fall on the garden from 9:30 AM to 10:00 AM.

The incremental shadows in the late afternoons during the early spring and the fall might reduce the attractiveness of the garden for its users during the affected period. However, March and September do not represent the primary growing season for vegetation, and it is unlikely that the plants would be adversely affected, particularly given the late afternoon time period of new shadows. In the late spring and summer analysis periods, small extents of new shadows in the late afternoons would not be likely to affect the health of the garden's vegetation. Therefore, the proposed actions would likely not cause a significant adverse impact to this open space.

Wald Houses Playgrounds (at East 3rd and 4th Streets)

Projected Development Sites 165, 167, and 169, located along or just west of Avenue D between East 2nd and East 4th Streets, would cast incremental shadows on portions of these two playgrounds during the final 30 minutes of the March/September analysis day and the final hour of the May/August and June analysis days (see Figure 6-21, which depicts May 6/August 6 at 5:30 PM). No incremental shadows would fall on these playgrounds on December 21. Given the limited duration of incremental shadows over the course of the year, the proposed actions would not cause a significant adverse impact.

Orchard Alley Garden

Projected Development Site 169 is located adjacent to the garden to the east, and would cast incremental shadows on portions of the garden in the mornings and early afternoons throughout the year. Orchard Alley Garden contains a number of trees, planted areas, winding pathways, benches, and picnic tables; entrances are located along both East 3rd and East 4th Streets (see Figure 6-22). A playground is located along the western edge of the garden closer to East 4th Streets. Storage areas are located along the eastern edge of this community garden and directly adjacent to Projected Development Site 169. While the extent of incremental shadows would be relatively small for much of the May/August and June periods, mornings during the growing season are most important for the survival and health of vegetation, particularly considering the diverse plants likely to be found in a community garden.

In March and September, incremental shadows would fall on the garden from 9:30 AM to 2:00 PM from Site 169, and from 12:30 PM to 2:00 PM from Projected Development Site 165. The incremental shadow would initially fall on the playground at 9:30 AM and would gradually increase in extent until about 11:00 AM, when much of the western half would be in new shadow (see Figure 6-23). The playground, a picnic table, some benches and flower beds and other planted areas would be affected at this time. The incremental shadow would then move east, covering the central area where the circle of benches and other planted areas are located around 12:00 PM. By 1:00 PM more than half the garden would be in sun and only a small section on the eastern side of the garden would be in new shadow. Additionally, between 12:30 PM and 2:00 PM a small area at the south (East 4th Street) end of the garden would be shaded by Site 165 to the south.

Incremental shadows from Site 169 would fall on portions of the park in May and August from 8:30 AM to 12:45 PM, and in June from 8:00 AM to 12:30 PM. The extent of new shadows during these affected periods would generally be small, especially in the early morning when shadows in the future without the proposed actions cover much of the space, and in the early afternoon when shadows are shortest. Nevertheless, the long duration of new shadows at the most sensitive time of day and year for the health of vegetation would likely adversely impact the garden. In both seasons, incremental shadow would move across the central area of the garden, rather than affected the north or south ends, over the course of the morning. It would fall on the western side from 8:00 AM to 10:00 AM, affecting the planted areas and part of the playground, and then would move east, falling across a large area in the center of the garden at 11:00 AM (see Figure 6-24), and would finally shade a small section on the east side of the garden at noon before exiting between 12:30 PM or 12:45 PM.

On December 21, areas of incremental shadows from Projected Development Sites 165, 167, and 169 fall on the garden from 10:15 AM to 2:15 PM, covering relatively large areas at times, and very small areas at other times.

Overall, with the proposed actions, more than four hours of incremental shadows would fall on the garden throughout the year during the mornings and early afternoons. This would likely cause a significant adverse impact to the garden.

Parque de Tranquilidad Garden

Incremental shadows from Projected Development Site 84, located west of the garden, would cover a very small area of the space from 5 PM to 6 PM on June 21 (see Figure 6-25). Shadows in the existing condition and in the future without the proposed actions would cover much of the

garden late in the afternoon. The small extent and limited duration of new shadows would not cause a significant adverse impact.

El Jardin del Paraiso

Incremental shadows from Projected Development Site 84, located southwest of the garden, would cast incremental shadows on a portion of the space from 4:00 PM to 5:29 PM on the March and September analysis day (see Figure 6-26). On the May and August analysis day, when shadows are shorter, a small area of new shadows would reach the southern edge of the garden for the final 30 minutes of the analysis day. On June 21, Site 84's shadows would be too short to reach the garden. On December 21, a very small area of incremental shadows cast by Projected Development Site 170 to the east would fall on the garden for the first nine minutes of the analysis day only.

The extents of incremental shadows on the garden would be quite limited throughout the year, particularly during the growing season, and no significant adverse impacts would occur.

P.S. 15 Roberto Clemente School Playground

Projected Development Site 170 and Potential Development Site 301, located east of this playground, would add areas of new shadows in March and September from 8:45 AM to 9:45 AM (see Figure 6-27) and on December 21 from 9:00 AM to 9:15 AM. The extent of new shadows would be small relative to the size of the playground on both analysis days, and the limited duration over the course of the year would not result in a significant adverse impact.

Wald Houses Playground (at East 6th Street)

This playground would receive an hour of incremental shadows near the end of the June 21 analysis day (see Figure 6-28). The extent of new shadow would remain small throughout the one-hour period. The shadow would be cast by Projected Development Site 173, located west of Avenue D. No new shadows would occur on the other three analysis days, and this limited extent and duration of incremental shadows would not cause a significant adverse impact.

Green Oasis Community Garden

Projected Development Site 177, located to the northeast across East 8th Street from the garden, would cast incremental shadows on portions of the garden at the very start of the analysis day in the spring, summer, and fall. During the late spring and summer, the new shadows would last between 45 minutes and an hour and twenty minutes (Figure 6-29 depicts shadows on the garden on May 6 and August 6 at 8:30 AM). Earlier in the spring and in the fall, only nine minutes of new shadows would occur. The garden would continue to experience ample sunlight throughout the rest of the morning and afternoon in the late spring and summer. Given the limited duration of incremental shadows, no significant adverse impacts would occur as a result of the proposed actions.

Ninth Street Community Garden

This garden would not experience any incremental shadows during the March 21 / September 21 analysis day. On the May / August and June analysis days, the garden would experience one hour of incremental shadow in the very late afternoon from Potential Development Site 223. The height increment for Site 223 beyond the baseline No Build building is only 20 feet, and the corresponding area of shadow on the garden would also be very small during this one hour duration. The usability of the garden and the health of its vegetation would not be impacted by

incremental shadow from Site 223. Incremental shadows cast by Projected Development Site 177 would fall on a portion of the garden for 24 minutes at the start of the December analysis day, but this limited duration would not cause a significant adverse impact.

Tompkins Square Park

Site 92 is located on Avenue B east of Tompkins Square Park. The projected development on this site would cast incremental shadows on the eastern edge of the park during the mornings in all seasons. The extents of the incremental shadows are very small, even in December (see Figure 6-30[1]), and they would not cause a significant adverse impact.

HISTORIC RESOURCES

New York City Marble Cemetery

Potential Development Site 205 would add very small areas of new shadows on the cemetery grounds in the late afternoons of the spring, summer, and fall analysis days (see Figure 6-31). Durations of incremental shadows would range from 45 minutes to two hours and twenty minutes depending on the season, but because the extents of new shadows would be minimal and the cemetery receives ample sunlight throughout the day during these seasons, no significant adverse impacts would occur.

Former P.S. 64 – 9th Street Courtyard

Projected Development Site 92, located southwest of the former school, would cast a small area of incremental shadows from 5:45 PM to 6:18 PM on the May/August analysis day, and from 4:45 PM to 5:00 PM on the June analysis day. This brief period of incremental shadows would not cause a significant adverse impact to the courtyard.

G. CONCLUSION

As described in detail above, development as a result of the proposed actions would cast new shadows at times throughout the year on some of the existing open spaces in the primary study area. However, the East Village and Lower East Side neighborhoods of Manhattan are already developed and the incremental shadows from the RWCDS would have significant adverse impacts on only one publicly accessible open space: the Orchard Alley Garden between East 3rd and 4th Streets and Avenues C and D. The remaining open spaces and historic resources in the study area would not be significantly affected or affected at all. Proposed mitigation for the shadow impacts on Orchard Alley Garden is detailed in Chapter 22, "Mitigation." If mitigation measures cannot be implemented, then the significant adverse shadow impact to Orchard Alley Garden would be unavoidable.

Site 169 is adjacent to and east of this community garden, and Sites 165 and 167 are just south across East 3rd Street from the garden. Anticipated 120-foot-tall buildings on these sites would cast incremental shadow on Orchard Alley Garden in the mornings and midday hours throughout the year. The extent of new shadows would generally be small, especially in the early morning when shadows in the future without the proposed actions cover much of the space, and in the early afternoon when shadows are shortest. Nevertheless, several hours of new shadows throughout the year would cause significant adverse impacts to this resource.

[1] See notes in regards to Development Sites 90 and 123 in Table 1-3.

Although the remaining open spaces (including Sara D. Roosevelt Park and Tompkins Square Park) and sun-sensitive historic resources would be subject to varying amounts of incremental shadows as a result of the proposed actions, these increments would be not be significant due to their limited extent and other site specific factors. ✷

Projected or Potential Site

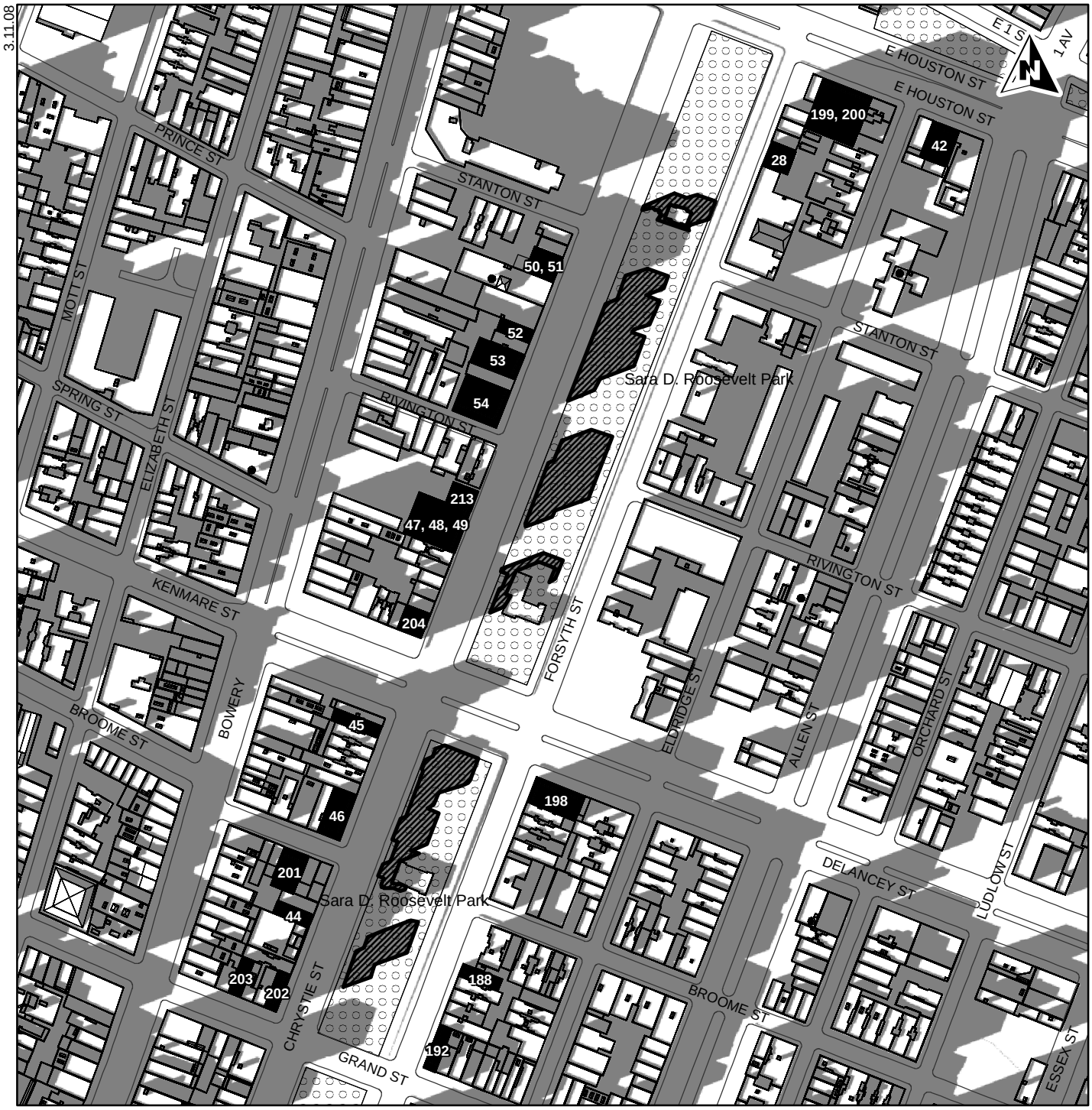
Publicly-Accessible Open Space

Historic Resource with Sun-Sensitive Feature

Incremental Shadow on Sun-Sensitive Resource

Shadow

Shadows
March 21 / Sept. 21 - 9:00 AM EDT
Figure 6-1

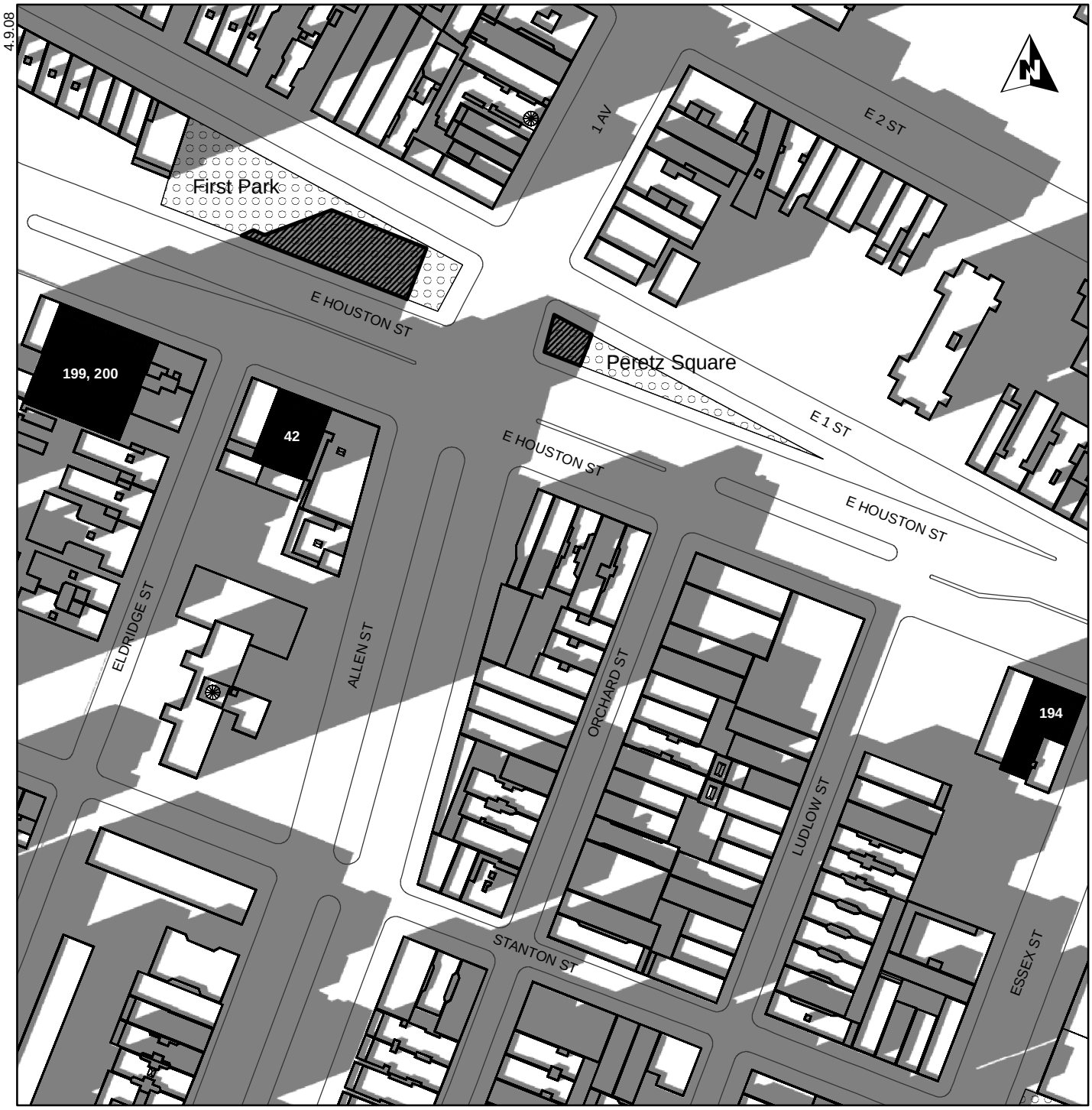


Shadows
March 21 / Sept. 21 - 5:00 PM EDT
Figure 6-2

Shadows
May 6 / August 6 - 9:00 AM EDT
Figure 6-3

Shadows
May 6 / August 6 - 5:00 PM EDT
Figure 6-4

Shadows
December 21 - 10:00 AM EST
Figure 6-5



Shadows
March 21 / Sept. 21 - 5:00 PM EDT
Figure 6-6

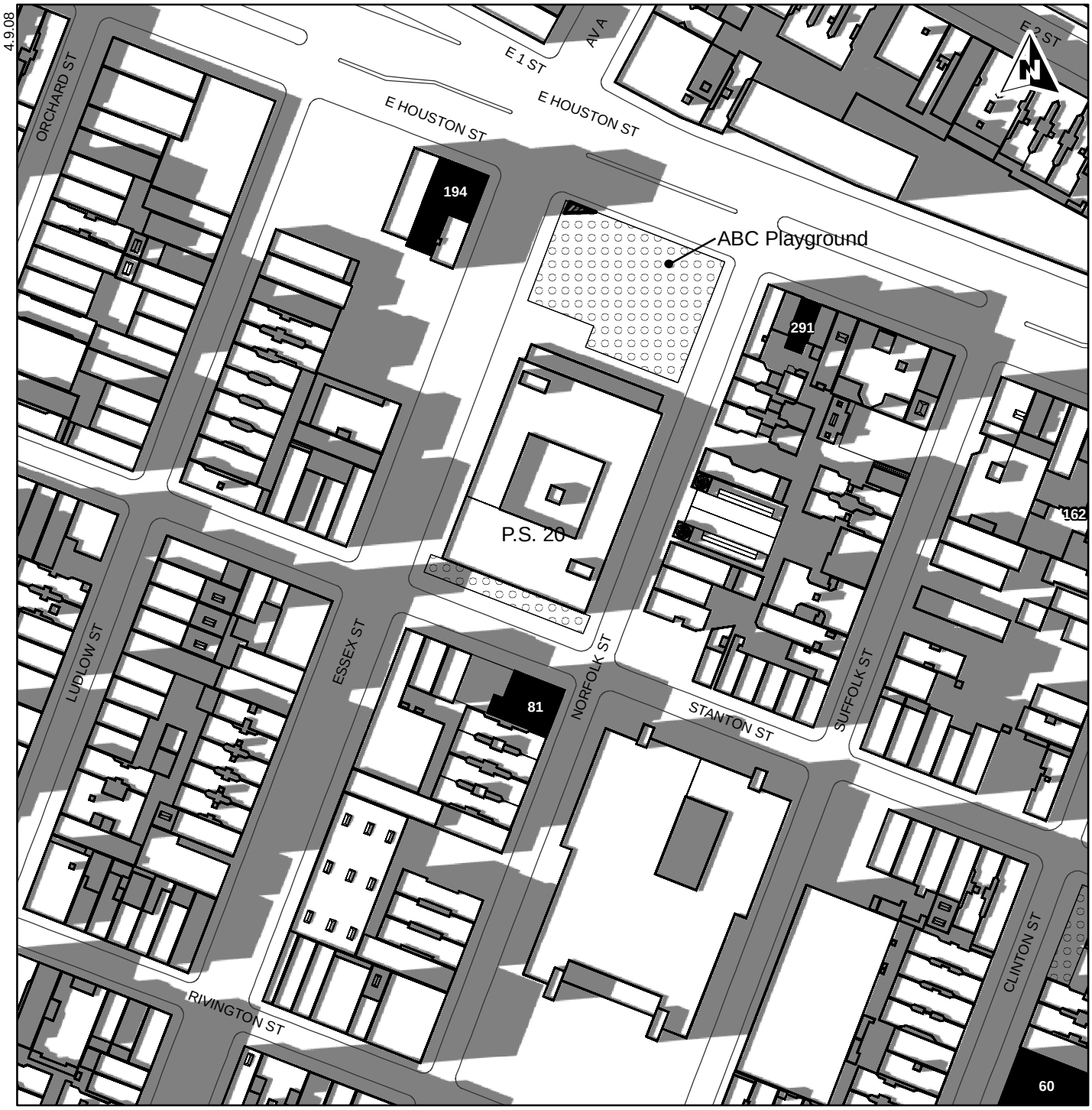
Shadows
December 21 - 1:00 PM EST
Figure 6-7

Shadows
March 21 / Sept. 21 - 10:00 AM EDT
Figure 6-8

Shadows
May 6 / August 6 - 10:00 AM EDT
Figure 6-9

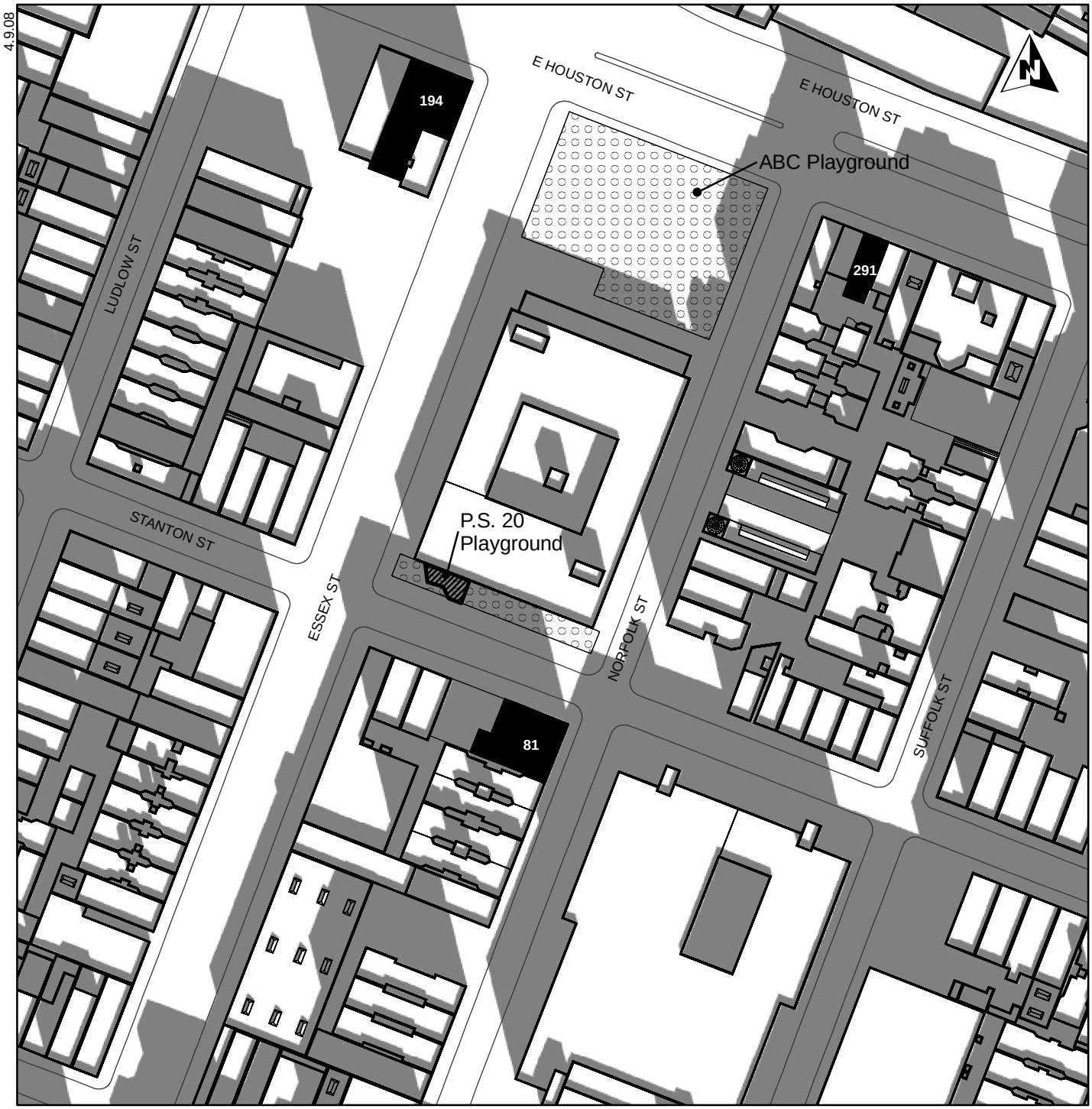
Shadows
March 21 / Sept. 21 - 9:00 AM EDT
Figure 6-10

Shadows
May 6 / August 6 - 9:00 AM EDT
Figure 6-11

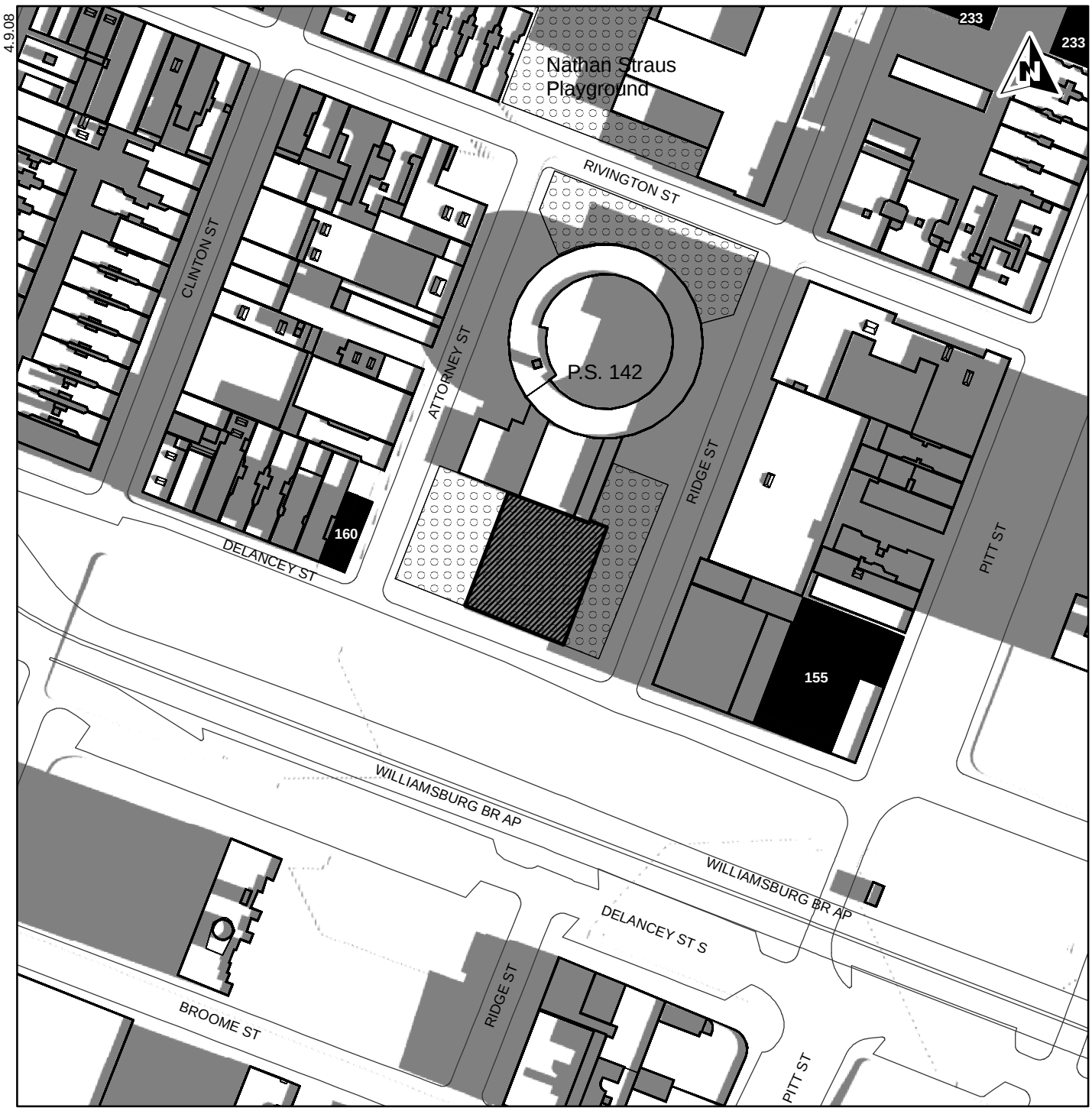


Shadows
May 6 / August 6 - 5:00 PM EDT
Figure 6-12

Shadows
March 21 / Sept. 21 - 3:00 PM EDT

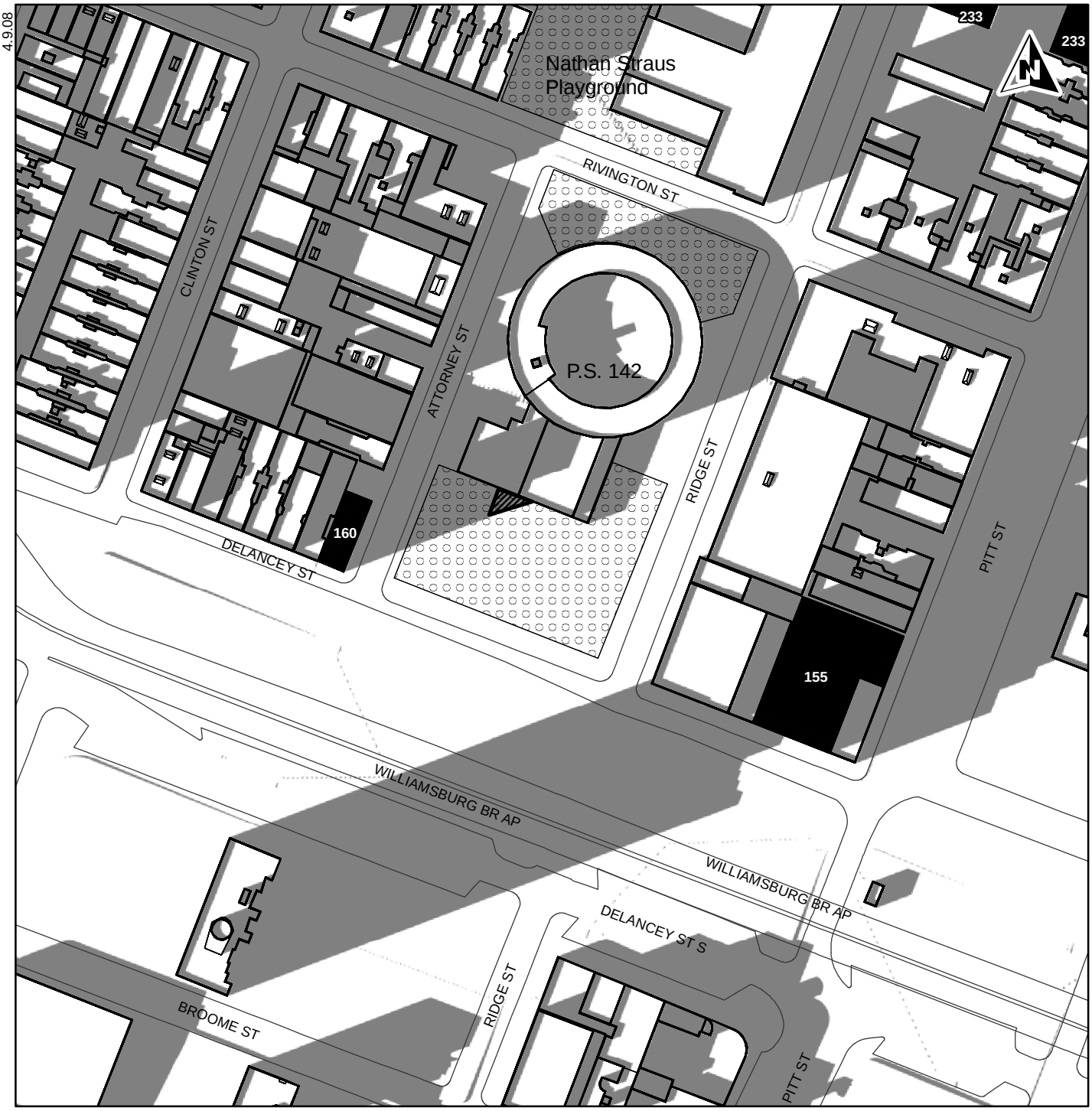


Shadows
December 21 - 11:00 AM EST
Figure 6-14

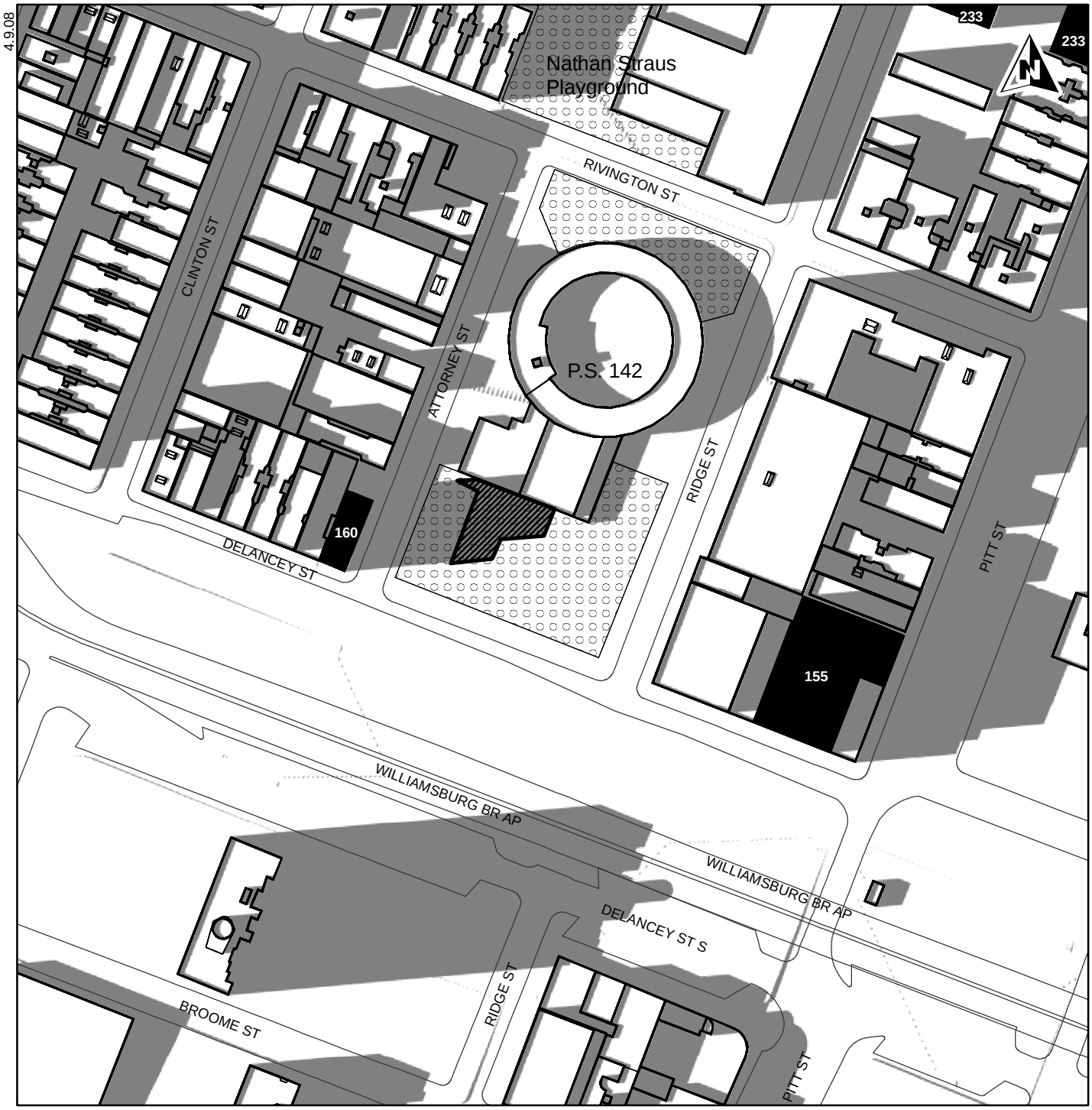


Shadows
March 21 / Sept. 21 - 9:00 AM EDT
Figure 6-15

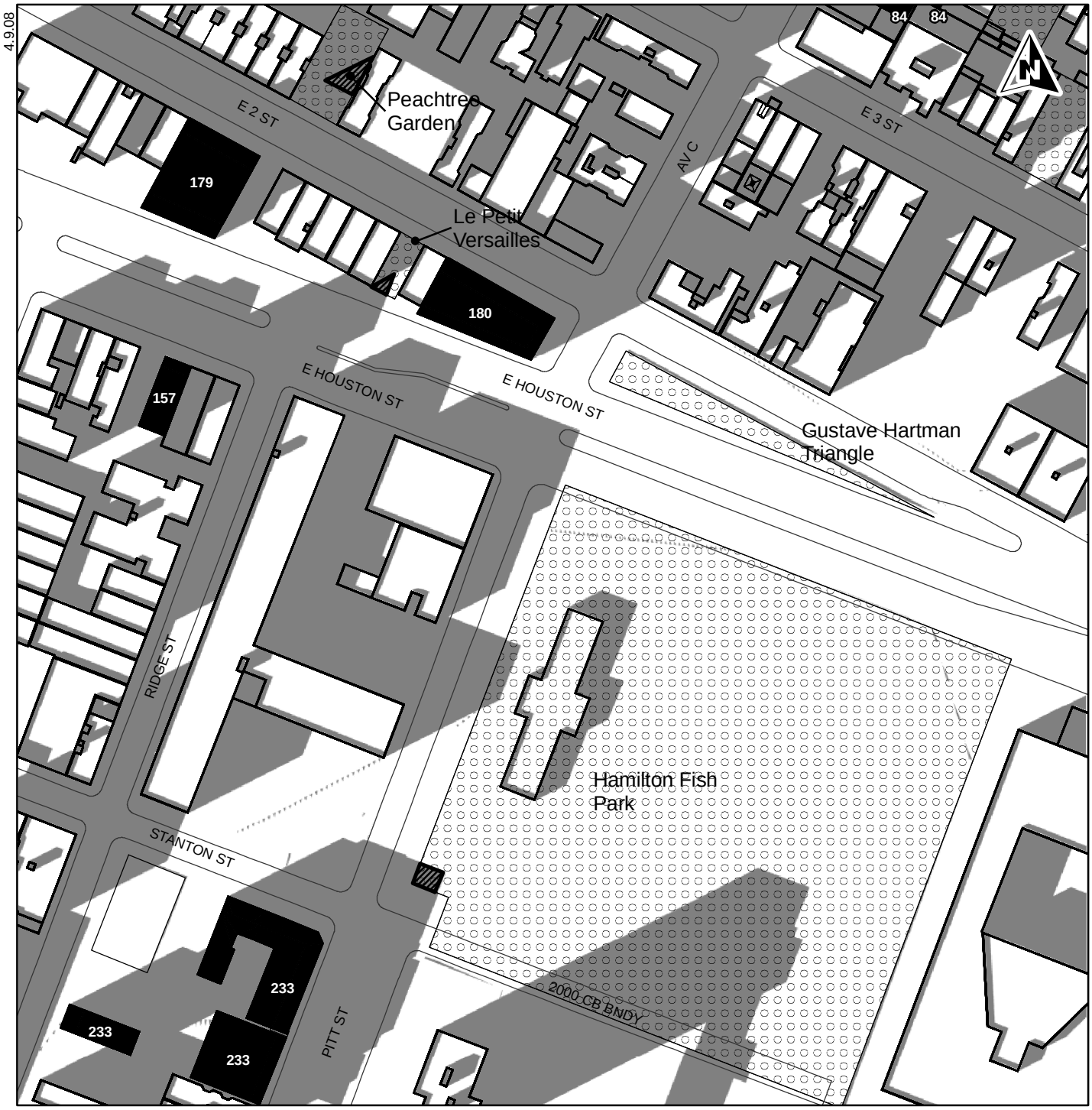
Shadows
May 6 / August 6 - 9:00 AM EDT
Figure 6-16



Shadows
March 21 / Sept. 21 - 5:00 PM EDT
Figure 6-17

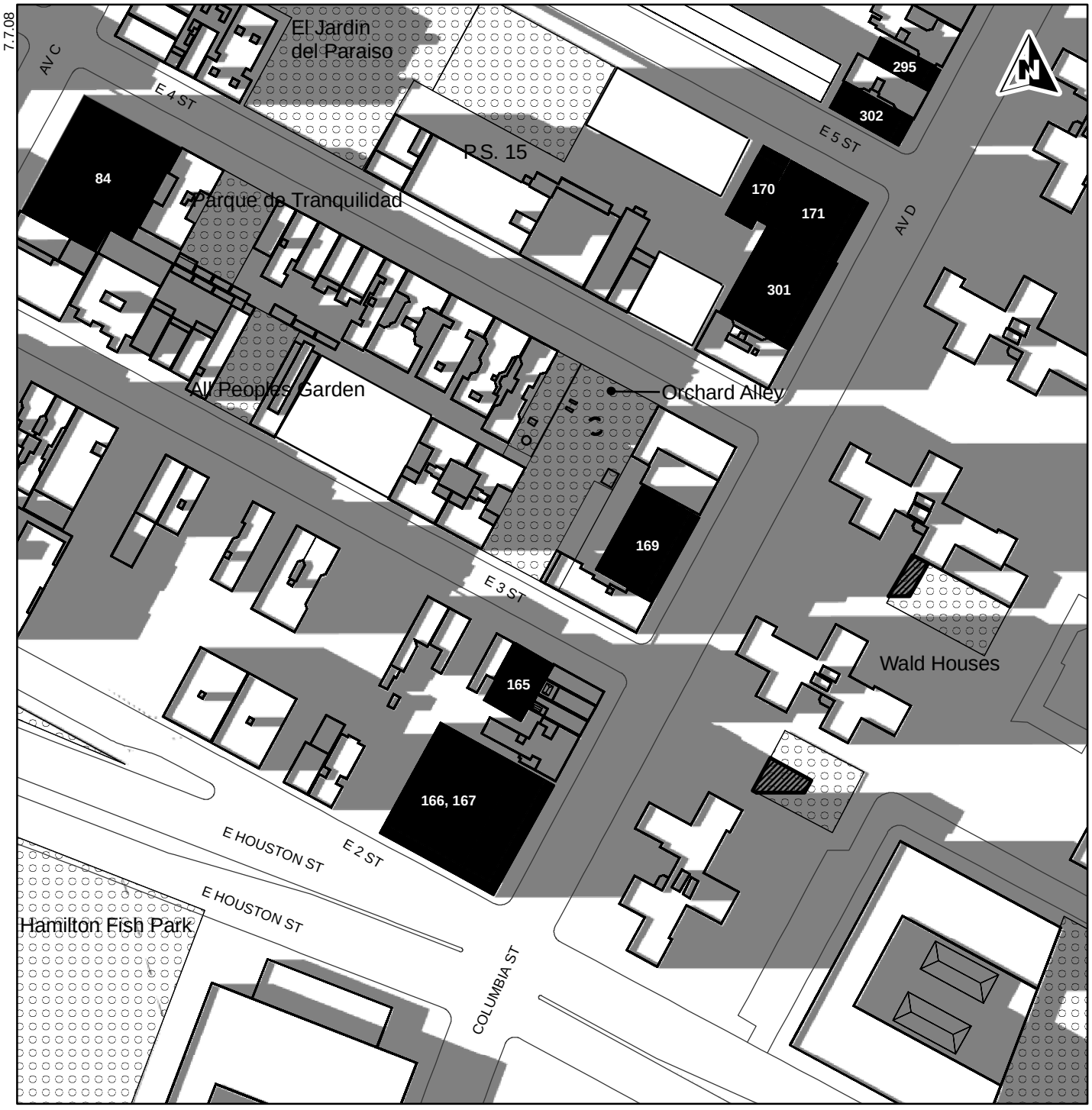


Shadows
May 6 / August 6 - 5:00 PM EDT
Figure 6-18

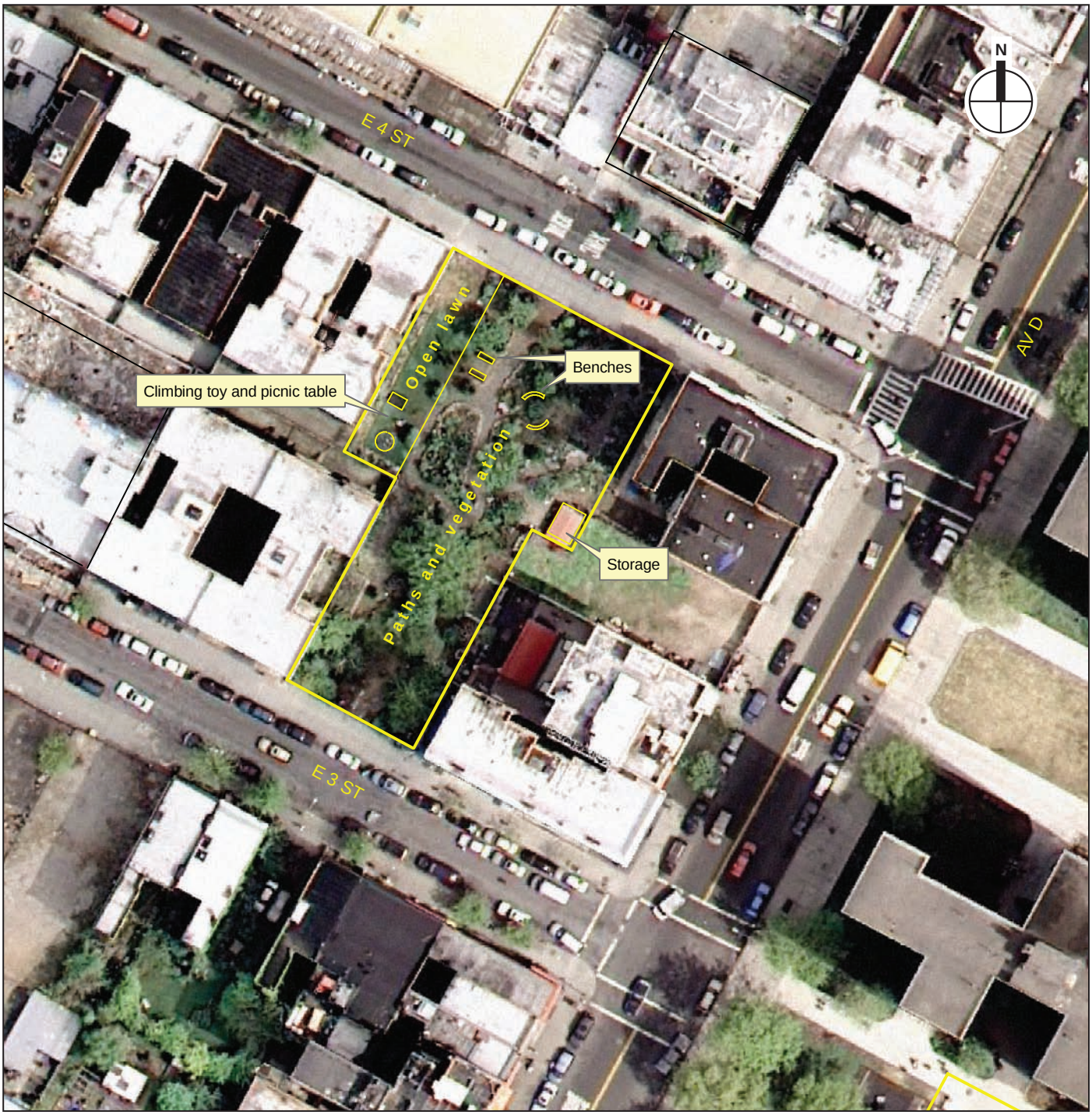


Shadows
March 21 / Sept. 21 - 4:30 PM EDT
Figure 6-19

Shadows
June 21 - 6:00 PM EDT
Figure 6-20



Shadows
May 6 / August 6 - 5:30 PM EDT



Orchard Alley Garden Site Plan

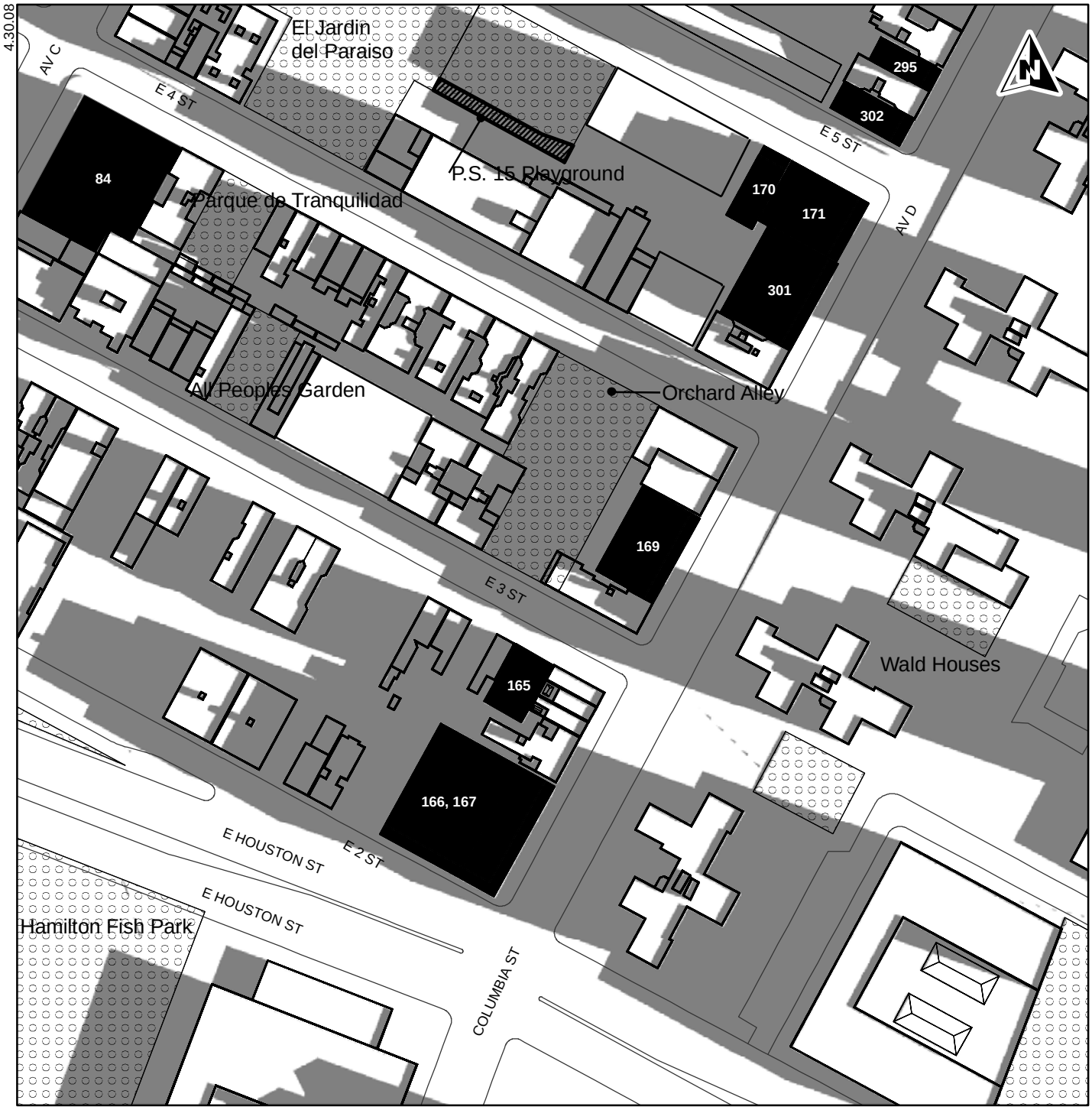
Figure 6-22

Shadows
March 21 / Sept. 21 - 11:00 AM EDT
Figure 6-23

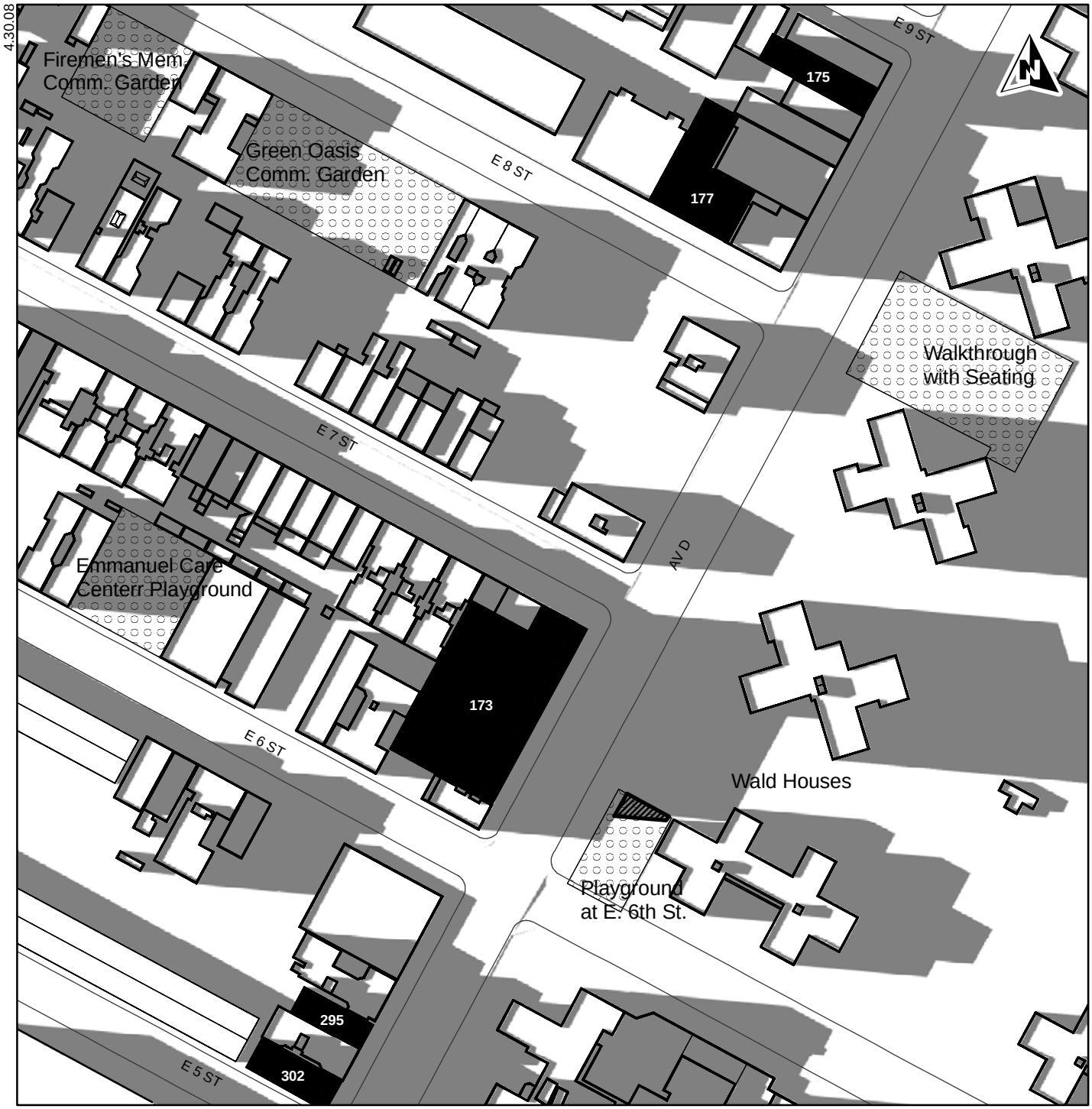
Shadows
May 6 / August 6 - 11:00 AM EDT

Shadows
June 21 - 5:30 PM EDT
Figure 6-25

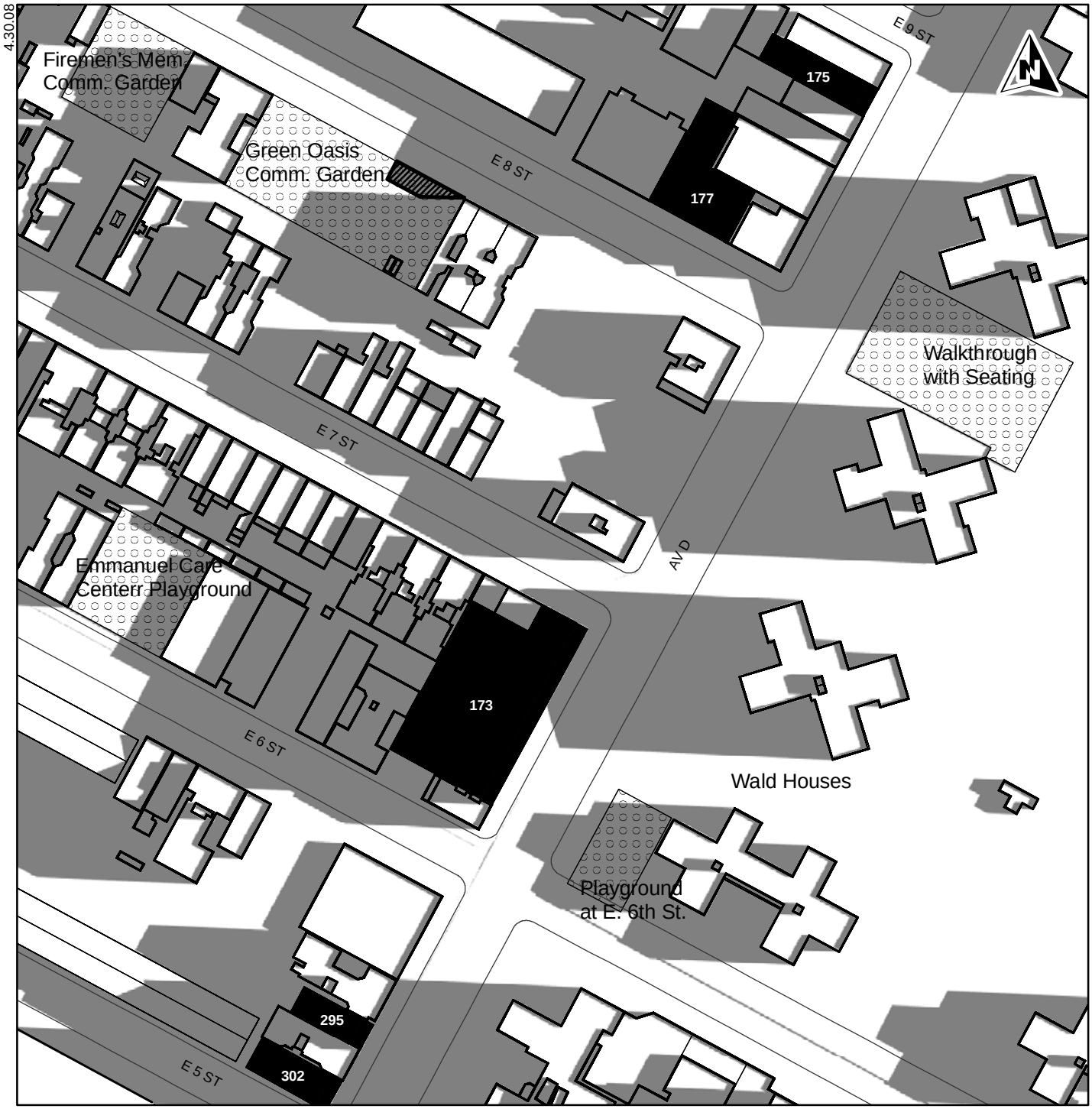
Shadows
March 21 / Sept. 21 - 5:00 PM EDT
Figure 6-26



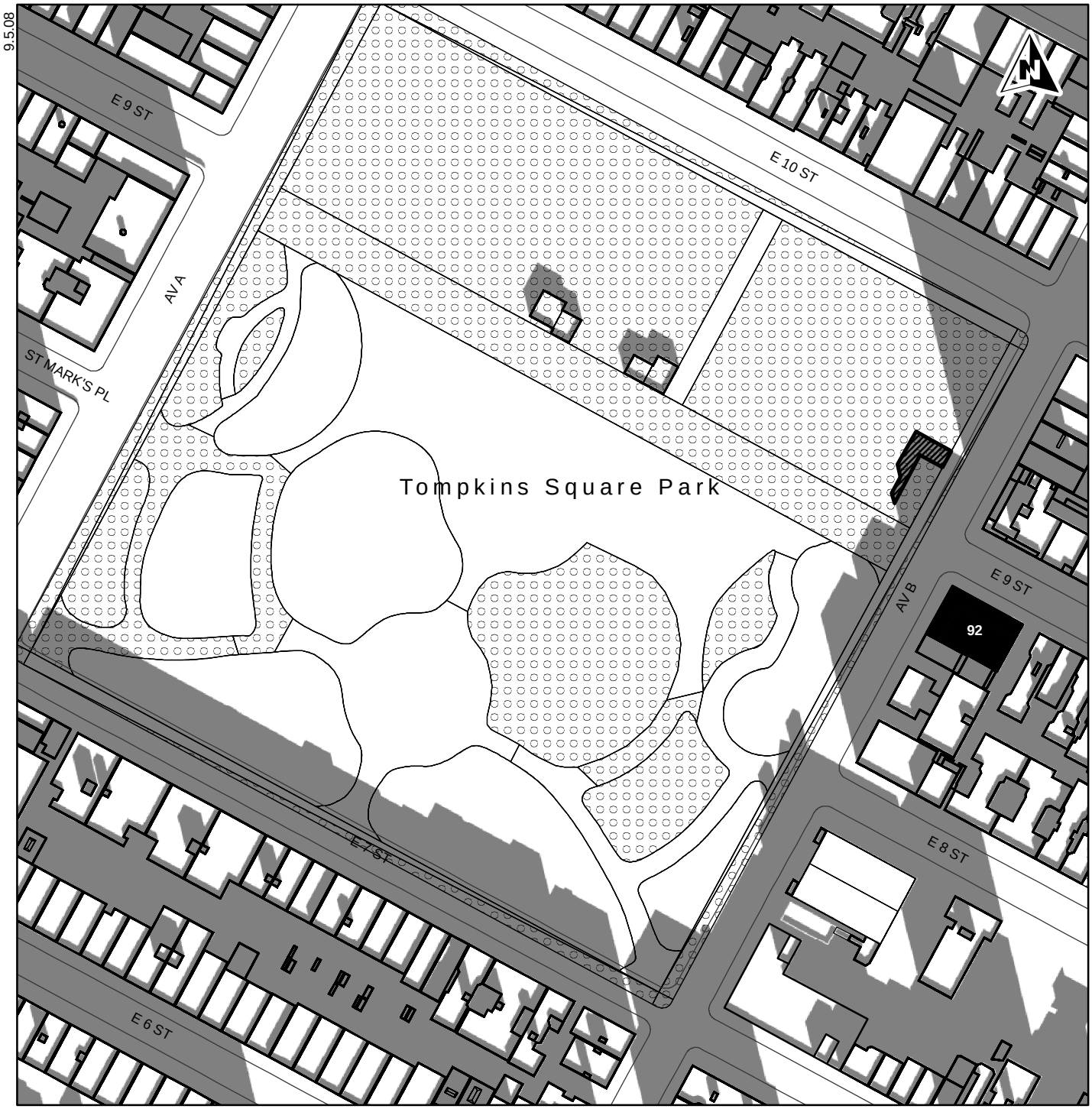
Shadows
March 21 / Sept. 21 - 9:00 AM EDT
Figure 6-27



Shadows
June 21 - 5:30 PM EDT
Figure 6-28



Shadows
May 6 / August 6 - 8:30 AM EDT



Shadows
December 21 - 11:00 AM EST
Figure 6-30

Shadows
May 6 / August 6 - 5:00 PM EDT
Figure 6-31