Chapter 6: Shadows

A. INTRODUCTION

The proposed actions would result in the construction of buildings in the rezoning area with maximum heights of 270 feet at certain locations, which would be taller than would otherwise be permitted absent the proposed actions. Following the guidelines of the *CEQR Technical Manual*, this chapter assesses whether the projected buildings of the reasonable worst-case development scenario (RWCDS) (which is described in Chapter 1, "Project Description") would result in new shadow impacts on nearby publicly accessible open spaces or other sun-sensitive resources.

B. DAILY AND SEASONAL VARIATIONS IN SHADOWS

The sun rises in the east, casting long shadows toward the west. Later in the morning, the sun rises higher in the sky, casting shorter shadows toward the northwest. At noon, the sun is at its highest point in the sky and casts the shortest shadows of the day directly north. (During Daylight Savings Time, this occurs at 1:00 PM rather than at noon.) In the afternoon, the sun continues to move west and begins to descend, casting longer shadows toward the northeast and east. At the end of the day, shadows stretch to the east as the sun sets in the west.

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

C. METHODOLOGY

The first step in the assessment of a project's shadow impacts is to determine whether project shadows would be long enough to reach any sunlight-sensitive open spaces, natural features, or architectural resources at any time of year. If this preliminary or screening analysis indicates they might, then a detailed shadow analysis is warranted. The detailed analysis determines the extent and duration of project-generated incremental shadows on any sun-sensitive uses and vegetation of open spaces, or sunlight-sensitive features of architectural resources, and assesses the effects of new shadows on such resources.

The detailed shadow analysis in this EIS compared shadows that would be cast by the RWCDS for the "Build" scenario, or future with the proposed actions, with those cast by the "No Build" scenario,

or future without the proposed actions. The analysis also took into account shadows cast by existing buildings, as well as those cast by additional developments in the study area expected to be completed by the 2019 analysis year.

The proposed rezoning would include the mapping of two new areas of public open space. According to City Environmental Quality Review (CEQR) methodology, shadows cast on open spaces that are part of a proposed project are not considered impacts of an action because without the action, the open space would not exist. However, a qualitative assessment of shadows on the two proposed open spaces is included in this analysis.

Following the guidelines of the *CEQR Technical Manual,* this analysis considers shadows on four representative days of the year: March 21 (equivalent to September 21, the equinoxes); June 21, the summer solstice; May 6 (equivalent to August 6, the midpoints between the equinoxes and summer solstice); and December 21, the winter solstice. The CEQR methodology does not consider shadows and incremental increases in shadows within 1½ hours of sunrise or sunset to be significant. Therefore, the analysis period on each of the four representative days is between 1½ hours after sunrise and 1½ hours before sunset. Additionally, CEQR does not consider shadows on City streets, sidewalks, and other buildings to be significant.

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 that 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.

For the detailed analysis, shadows were modeled using the solar rendering capabilities of MicroStation V8 software. A three-dimensional model containing the RWCDS for the Build condition and existing buildings and topography around the rezoning site was provided by the New York City Department of City Planning (DCP) and augmented by AKRF. Models of projected sites under the No Build condition were developed by AKRF using DCP data.

D. SCREENING ANALYSIS

A screening analysis was performed to determine which open spaces, sunlight-sensitive historic resources, or important natural features could be affected by project shadows at any time of year. To identify resources of concern, the maximum shadow length was calculated for the proposed actions on the four analysis days, taking into account time of day as well as season. For example, on the December 21 analysis day a building has a maximum shadow length factor equal to 4.3 times its height at the beginning and end of the analysis period when shadows are cast to the northwest and northeast, respectively. Toward midday, as the sun rises in the sky, the shadow length factor is reduced to 2.07 times the height of the building. Shadow length factors for the other analysis days throughout the calendar year are shorter than they are in December. However, the daylight hours are longer during the rest of the year, resulting in longer analysis periods and shadows that fall farther to the southwest and southeast at the beginning and end of the day. During the December analysis day, shadows are cast up to 43 degrees east and west of true north, but in June shadows are cast up to 108 degrees east and west. Open spaces in the southern portion of the rezoning area that could be reached by project shadow in June would not be affected in December.

Using the heights and forms of the RWCDS provided by DCP, the full extent of the area that could be reached by project shadow was calculated for each of the analysis days and delineated on a street map. In coordination with the open space and historic resource analyses presented in Chapter 5, "Open Space," and Chapter 7, "Historic Resources" of this EIS, open spaces and historic resources with sun-sensitive features were also shown on the map. All sun-sensitive resources that would fall fully or partially within the perimeter representing the maximum shadow length from the RWCDS on the four analysis days were included in the more detailed analysis below.

E. RESOURCES OF CONCERN

OPEN SPACES

Coney Island Beach and the adjacent **Riegelmann Boardwalk** extend along the rezoning area's entire southern boundary. During the summer months, the beach provides for a variety of passive and active recreation activities, including sunbathing and swimming; spray showers and volleyball nets are located on the upland portion of the beach, closest to the boardwalk. During the non-summer months the beach is less-used, but continues to provide opportunities for running or walking along the water's edge. Like the beach, the 80-foot-wide boardwalk is most fully utilized during the summer, but continues to be used during the remainder of the year for walking, running, and sitting. Amenities on the boardwalk include public restrooms, benches, and some small sun shelters.

Steeplechase Plaza is a planned public recreational space that would be created on existing parkland adjacent to the Parachute Jump between KeySpan Park and Riegelmann Boardwalk. The new Steeplechase Plaza would include trees and landscaping, seating, a carousel building, and walkways.

Luna Park Playground is located north of the Culver/Brighton subway viaduct between West 8th and West 12 Streets and is adjacent to the Luna Park Houses complex. This predominantly asphalt playground provides play equipment for young children, paved fields and courts, benches, and public bathrooms. It is in good condition and is moderately used.

Gerald J. Carey Gardens, a New York City Housing Authority (NYCHA) housing development, contains about 2 acres of publicly accessible open space on the block bounded by Mermaid Avenue, West 22nd Street, Surf Avenue, and West 23rd Street, and the block bounded by Neptune Avenue, West 23rd Street, Mermaid Avenue, and West 24th Street. This open space includes passive areas of paved walkways, trees, and benches, and active areas with play equipment, a spray fountain, and basketball courts.

The **Santos White community garden**, located on the south side of Mermaid Avenue between West 21st and 22nd Streets, features trees and plantings and provides a space for passive recreation.

Open spaces that fall outside the perimeter representing the maximum RWCDS shadow length include Asser Levy Park and Neptune Playground.

HISTORIC RESOURCES

As described in Chapter 7, "Historic Resources," **Our Lady of Solace Roman Catholic Church** is an architectural resource (which has been determined to appear eligible for listing on the State and National Registers of Historic Places) located on the north side of Mermaid Avenue between West 17th and 19th Streets. The front of the church faces West 17th Street and has a small rose window. The south façade facing Mermaid Avenue features large, arched stained glass windows at ground level and smaller, arched clerestory windows below the tiled roof (see Figure 7-18 in Chapter 7, "Historic Resources"). All the windows on the east and south façades are considered sunlight-sensitive architectural features.

The screening analysis indicated there were no other historic resources with sunlight-sensitive features within the perimeter representing the maximum RWCDS shadow length.

IMPORTANT NATURAL FEATURES

The Atlantic Ocean, Gravesend Bay and Coney Island Creek all fall outside the perimeter representing the maximum RWCDS shadow length.

F. ASSESSMENT OF INCREMENTAL SHADOWS

In the detailed analysis, computer software was used to compare the shadows cast by the RWCDS under the proposed actions with those cast by the RWCDS in the No Build condition on each of the four analysis days. **Table 6-1** shows the duration of incremental shadows on all sun-sensitive resources close enough to be affected by the RWCDS. The extent, duration, and effects of these incremental shadows are discussed below for each resource. **Figures 6-1** through **6-15** depict the extent of incremental shadows on the resources at certain times of each analysis day referenced in the text discussion.

The proposed rezoning would include the mapping of two new areas of public open space, both of which would be adjacent to the beach and boardwalk. A qualitative rather than quantitative assessment of project shadows on the two proposed open spaces is included at the end of this section.

Table 6-1
RWCDS Incremental Shadow Durations

Resource	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
OPEN SPACES				
Coney Island Beach and Riegelmann Boardwalk	—	7:27 AM–7:45 AM 4:30–6:18 PM Total: 2h 6m	6:57 AM–8:00 AM 4:15 PM–7:01 PM Total: 3h 49m	—
Steeplechase Plaza	4:00 PM–5:29 PM Total: 1h 29m	4:00 PM–6:18 PM Total: 2h 18m	4:00 PM–7:01 PM Total: 3h 1m	2:45 PM–2:53 PM Total: 8m
Luna Park Playground	—	—	—	8:51 AM–2:53 PM Total: 6h 2m
Gerald J. Carey Gardens (NYCHA housing development)	8:30 AM–11:45 AM Total: 3h 15m	8:15 AM–11:30 AM Total: 3h 15m	—	8:51 AM–10:30 AM Total: 1h 39m
Santos White Community Garden	8:36 AM–9:00 AM Total: 24m	—	—	—
HISTORIC RESOURCES				
Our Lady of Solace Roman Catholic Church – south façade windows	—	—	—	8:51 AM–10:10 AM 11:00 AM–2:20 PM 2:40 PM–2:53 PM Total: 4h 52m *
Our Lady of Solace Roman Catholic Church – east façade rose window	—	—	—	9:00 AM–10:15 AM Total: 1h 15m

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.
* A reduction in shadow would simultaneously occur on areas of the windows from 9:30 AM–10:30 AM, 11:00 AM–12:45 PM, and 1:30 PM–2:53 PM, for a total reduced shadow duration of 4 hours and 8 minutes. See below in "Our Lady of Solace R. C. Church" for detailed explanation.

Figures 6-1, 6-2, and **6-3** depict the study area on the March 21/September 21 analysis day at 9:30 AM, 10:30 AM and 5:00 PM, respectively; **Figures 6-4, 6-5,** and **6-6** show the same times of day on the May 6/August 6 analysis day; **Figures 6-7, 6-8,** and **6-9** show June 21 shadows at 7:45 AM, 5:00 PM and 6:15 PM; **Figures 6-10, 6-11,** and **6-12** show shadows on December 21 at 9:30 AM, 12:30 PM and 2:30 PM. **Figures 6-13** through **6-18** feature axonometric views of the south façade of Our Lady of Solace Roman Catholic Church showing shadows on December 21 at 9:00 AM, 10:00 AM, 11:00 AM, 12:00 PM, 1:00 PM and 2:00 PM.

CONEY ISLAND BEACH AND RIEGELMANN BOARDWALK

The boardwalk extends along the southern boundary of the rezoning area and is immediately adjacent to Projected Sites 1 and 2 and Potential Site A in the Coney West subdistrict and to the proposed amusement park in the Coney East subdistrict. New buildings on the projected and potential development sites in the Coney West subdistrict would cast small areas of new shadow on the boardwalk early in the morning and late in the afternoon during the late spring and summer. Incremental shadow would only be long enough to reach across the boardwalk to the beach during the last several minutes of the June 21 analysis day. There would be no incremental shadow on the boardwalk and beach on the March 21 and December 21 analysis days.

On the May 6/August 6 analysis day a small area of incremental shadow would fall on the boardwalk from 7:27 AM to 7:45 AM. Late in the afternoon, incremental shadow would move onto an immediately adjacent portion of the boardwalk at 4:30 PM and remain until the end of the analysis day at 6:18 PM (see **Figure 6-6** depicting 5:00 PM). On June 21, new shadow would fall on a very small area of the boardwalk from 6:57 AM until 8:00 AM (see **Figure 6-7**), and again late in the day from 4:15 PM to 7:01 PM (see **Figure 6-8** depicting 5:00 PM). The area affected by the late-afternoon incremental shadow would be minimal until nearly 7:00 PM when incremental shadows would reach across a portion of the boardwalk and onto a small section of the adjacent beach.

The boardwalk and beach do not contain vegetation, and the limited extent of incremental shadows on an immediately adjacent section of the boardwalk throughout the year would not cause a significant adverse impact to the use of these resources.

STEEPLECHASE PLAZA

As currently envisioned, this planned open space will feature the existing Parachute Jump on the western side and a landscaped area with seating and a carousel on the eastern side between the Parachute Jump and the amusement area that will be part of the proposed rezoning. Projected development in the Coney West subdistrict would be adjacent to the west of the plaza and would cast late afternoon shadows in spring, summer, and fall.

On the March 21/September 21 analysis day, incremental shadow from the development in the Coney West subdistrict would enter the western edge of the plaza at 4:00 PM. By 5:29 PM, the end of the analysis day, the incremental shadow would fall across an area north and west of the Parachute Jump, while the eastern side of the plaza would still be in sun (see **Figure 6-3** depicting 5:00 PM). On the May 6/August 6 analysis day, incremental shadow from the development in the Coney West subdistrict would again enter the western edge of the plaza at 4:00 PM. By 5:00 PM it would fall across an area north and west of the Parachute Jump, while the majority of the plaza east and south of the Parachute Jump would still be in sun (see **Figure 6-6**). By 6:18 PM, the end of the analysis day, incremental shadow would fall across most of the western side of the plaza around the Parachute Jump and across half of the eastern side of the plaza. Similarly, on the June 21 analysis day, incremental shadow would once again enter the western edge of the plaza at 4:00 PM. By 5:00 PM it would fall across the area north and west of the Parachute Jump, while the plaza east and south of the Parachute Jump would still be in sun (see **Figure 6-8**). By 6:00 PM the area to the immediate east of the Parachute Jump would also be in shadow but most of the eastern half of the plaza would still be in sun (see **Figure 6-9** depicting 6:15 PM). At 7:00 PM, the end of the analysis day, incremental shadow would cover most of the plaza.

Steeplechase Plaza would experience between one and a half and three hours of incremental shadow at the end of the spring, summer, and fall analysis days, and the new shadow could reduce the attractiveness for users of the park at this time. However, even during the affected period, large portions of the park would continue to be in sun. Further, the park would experience direct sunlight throughout the mornings and most of the afternoons due to its location just north of the beach and the lack of development to its east. The health of the park's vegetation would not be threatened by the proposed development. Therefore, given all these factors, the proposed actions would not have a significant adverse impact on this park.

LUNA PARK PLAYGROUND

This playground would not experience any incremental shadow on the March/September, May/August, or June analysis days.

The elevated subway tracks that border the playground on its south side cast shadows on the playground throughout the day in all seasons. The low-rise RWCDS sites on the south side of the elevated tracks (and the north side of Surf Avenue) in the Coney East subdistrict would generally not be tall enough to cast additional shadows beyond the tracks and onto the playground. The only exception to this would be the easternmost structure of the RWCDS, located on Projected Development Site 20 at the northwest corner of Surf Avenue and West Eighth Street, which would rise to approximately 80 feet. On the December 21 analysis day, when shadows are longest, the incremental shadow from this projected development would pass across the playground from the start of the analysis period at 8:51 AM until early afternoon (see **Figures 6-10** and **6-11**). Additionally, the tower at the southeast corner of Surf Avenue and West 12th Street, on Projected Development Site 12 in the Coney East subdistrict, would cast a shadow long enough to fall on a portion of the playground from 12:15 PM until 2:53 PM (see **Figures 6-11** and **6-12**).

The Luna Park Playground is primarily a space for active recreation. Despite the long durations of incremental shadow on December 21, large areas of the playground would remain in sun throughout the day. In addition, December shadows are not a threat to the survival of any vegetation that may exist within the space. Therefore, given these factors, the proposed actions would not have a significant adverse impact on the playground.

GERALD J. CAREY GARDENS

In the Gerald J. Carey Gardens open space, there is a basketball court at the corner of Surf Avenue and West 22nd Street. The landscaped area immediately around it is fenced off and it is assumed that it is a visual amenity rather than a passive recreation space. There is a playground west of the ball court near the corner of Surf Avenue and West 23rd Street, and some grass and trees around it, also fenced off and presumably not for passive recreation.

From the start of the March 21/September 21 analysis day at 8:51 AM until about 10:00 AM, incremental shadow would stretch northwestward from Projected Development Site 2 in the Coney West subdistrict across the playground and a portion of the central landscaped area of the Carey Gardens open space (see **Figure 6-1**). At 10:30 AM incremental shadow would fall across the basketball court and surrounding landscaped area (see **Figure 6-2**). The shadow from Projected Development Site 2 would continue moving east and exit the eastern edge of the space at 11:45 AM. On the May 6/August 6 analysis day, a smaller area of incremental shadow from Projected Development Site 2 would enter the southwest corner of the landscaped area adjacent to Surf Avenue at 8:15 AM. The incremental shadow would move slowly northeastward; by 9:30 AM it would fall across the southwest corner of the open space but would not extend far enough north to reach the playground or basketball court (see **Figure 6-4**). Throughout the morning, the incremental shadow would continue moving eastward across the southern edge of the basketball court and the landscaped area south of it (see **Figure 6-5**), and would exit the southeast corner of the open space at 11:30 AM. On June 21 shadow from the RWCDS would fall just south of the open space throughout the morning, and would not affect it on this analysis day. On December 21, when shadows begin the analysis day falling to the northwest rather than west, shadow from Projected Development Site 2 would fall across the eastern part of the basketball court and some of the landscaped area at 8:51 AM. At 9:30 AM less of the basketball

court and landscaped area would be in shadow from the RWCDS (see **Figure 6-10**). Through the morning, the incremental shadow would continue moving eastward; at 10:00 AM it would exit the court, and at 10:30 it would exit the eastern edge of the landscaped area.

The Carey Gardens open space would experience incremental shadow in the mid-mornings of most seasons, ranging from one and a half hours to three hours and fifteen minutes. In the late spring and summer, the extent of incremental shadow would be small and limited to the landscaped areas near Surf Avenue, which appear to mainly function as visual amenities. The lawn and trees in this area would not be significantly impacted by the new shadow, as they would continue to get ample sun during the remainder of the day. The basketball court, playground and other areas of the open space would each get periods of new shadow during the fall, winter and early spring as the shadow from Projected Development Site 2 would pass across the open space, but the open space would continue to receive sun from late morning through the afternoon. Therefore, the limited duration of incremental shadow cast by the RWCDS on the Carey Gardens open space would not have a significant adverse impact on either the vegetation or use of the open space.

SANTOS WHITE COMMUNITY GARDEN

On the March 21/September 21 analysis day, a small portion of the garden would experience incremental shadow for the first 24 minutes of the analysis day. In May/August and June, incremental shadow from the RWCDS would be too short to reach the garden. In December, the garden is in existing shadows all day from tall intervening residential buildings to the east and south. No adverse impacts would occur to this open space from the RWCDS.

OUR LADY OF SOLACE R.C. CHURCH

The West 17th Street façade (the east façade) of the church has a small rose window, and the south façade facing Mermaid Avenue features two rows of stained glass windows (see Figure 7-18 in Chapter 7, "Historic Resources"). Incremental shadow cast by the RWCDS would be too short to reach the church on the March/September, May/August or June analysis days.

However, on December 21, projected development sites south of the church across Mermaid Avenue in the Coney North and Mermaid Avenue subdistricts would cast incremental shadows on the church's east façade rose window for an hour and 15 minutes in the morning, and on the south façade throughout the day.

The buildings of the No Build RWCDS (which would be constructed as-of-right under existing zoning) across Mermaid Avenue would also cast shadow on the south façade of the church throughout the December 21 analysis day.[1] The configuration and massing of the No Build developments would differ from that of the Build RWCDS, and as a result the two scenarios would cast different shadows on the south façade at varying times of the analysis day, with some overlap. In other words, there would be times when the Build scenario would cast shadow on portions of the façade where the No Build scenario would not, which would result in an area of incremental shadow; and there would be other times when a portion of the façade would not experience baseline shadow from the No Build nor shadow from the Build scenario, which would result in a reduction in shadow since the baseline shadow would be "replaced" by direct sunlight with the Build scenario at that time. For much of the day, there would be areas of

[1] As-of-right massings for the No Build RWCDS were provided by DCP for this analysis.

incremental shadow and areas of reduced shadow concurrently. **Figures 6-13** through **6-18** compare the RWCDS No Build massings with the RWCDS Build massings, and illustrate the differences in the shadows they would cast on the church's south façade at one-hour intervals throughout the December 21 day.

Incremental shadow from the Build scenario would fall across the east façade rose window from 9:00 AM until 10:15 AM, cast by Projected Development Site 5. No baseline shadow from the No Build scenario fell on this window at any time.

From 8:51 AM to 9:30 AM on December 21, incremental shadow from Projected Development Sites 5 and 9 would move across portions of both rows of windows along the church's south façade, removing all sunlight briefly around 9:00 AM (see **Figure 6-13**). From 9:30 AM to 10:10 AM, a small area would be affected as Site 5's incremental shadow would begin to move off the east side of the façade. Meanwhile, No Build shadow from Site 6 would begin moving onto the west side of the façade, whereas in the Build scenario direct sunlight would fall on this area, resulting in reduced shadow with the Build scenario (see (**Figure 6-14**). From 10:10 AM to 10:30 AM the Build scenario would result in a reduction in shadow only, and from 10:30 AM to 11:00 AM neither incremental nor reduced shadow would occur. From 11:00 AM to 12:45 PM, areas of both incremental and reduced shadow would move across the façade, reflecting the differing building configurations of Site 6 in the Build and No Build scenarios (see **Figures 6-15** and **6-16**). The areas of incremental and reduced shadow would be approximately equal, resulting essentially in no net change in shadow coverage. From 12:45 PM to 1:30 PM, a large area of incremental shadow from Projected Development Sites 6 and 7 would move across the church's south façade, covering most of the window area (see **Figure 6-17**). From 1:30 PM to 2:20 PM this incremental shadow would be moving eastward on the façade, while a reduction in shadow would spread across the façade from the western side, since the No Build shadow from Site 7 would mostly be replaced by sunlight (see **Figure 6-18**). From 2:20 PM until 2:40 PM only a reduction in sunlight would occur, and for the final 13 minutes of the analysis day areas of both reduced and incremental shadow would move across the façade.

The Build RWCDS would remove a substantial amount of sunlight from the windows of the church for approximately the first 45 minutes of the December 21 analysis day. From 9:45 AM until the end of the analysis day, the extent and duration of incremental shadow would be roughly equivalent to the extent and duration of reduced shadow on the church windows. In other words, with the exception of the first 45 minutes of the day, the areas of incremental and reduced shadow would essentially cancel each other out, and a significant adverse impact would therefore not be expected to occur as a result of the Build RWCDS. Forty-five minutes of incremental shadow in the winter months only would generally be too short a duration to be considered significant. The church windows would continue to experience areas of sunlight throughout the December 21 day after 9:00 AM, and in the spring, summer and fall the Build RWCDS would not affect the church.

PROPOSED OPEN SPACES

MAPPED AMUSEMENT PARK

As described in Chapter 1, "Project Description," the proposed actions include mapping a new open amusement park on the boardwalk between Steeplechase Plaza and West 10th Street. Under the reasonable worst-case development scenario, the majority of this proposed amusement park area would be in sun throughout the day in all seasons, as it is south of the projected and

potential development sites in the Coney East subdistrict and north of the beach and its open skies. However, a narrow strip at the eastern edge of the mapped amusement park, along West 10th Street adjacent to the Cyclone roller coaster, would be in shadow for much of the day. This narrow strip would only be a small fraction of the overall amusement area, which would remain in sun as mentioned (see **Figures 6-1** through **6-12**). It is noted that the Parachute Jump would cast shadow on the new amusement park during the late afternoon of the spring, summer and fall analysis days, and the Wonder Wheel would cast shadow on the new amusement park early in the morning and late in the afternoon on the late spring and summer analysis days.

HIGHLAND VIEW PARK

Similarly to the mapped amusement park, the proposed Highland View Park would experience large areas of direct sunlight for most of the analysis period in all seasons (see **Figures 6-1** through **6-12**). Projected development in the Coney West subdistrict to the east would cast shadows onto the proposed park's eastern side early in the mornings, but by the late morning the open space would be almost completely in sun. The entire park would be in sun from mid-day through late afternoon in all seasons.

G. CONCLUSIONS

The RWCDS would result in incremental shadows on the windows of Our Lady of Solace Roman Catholic Church, an architectural resource on Mermaid Avenue, for 45 minutes on the morning of the December 21 analysis day. For the remainder of the December 21 analysis day, portions of the church windows would experience incremental shadow, while other portions would experience a reduction in shadow, due to the fact that as-of-right buildings that would likely be built on the projected sites absent the proposed action would no longer cast shadow on the church. The extent and duration of incremental and reduced shadow would be roughly equivalent over the course of the day after 9:45 AM, and a significant adverse impact would therefore not be expected to occur as a result of the Build RWCDS. No incremental shadow would reach the church during the spring, summer, or fall.

Some incremental shadow would fall on several publicly accessible open spaces in and around the rezoning area at certain times of year, but in these cases the limited extent and duration of the new shadow would not result in any significant adverse impacts.

The two new areas of parkland that would be mapped with the proposed actions would experience very little shadow in any season. ✷

12.15.08

RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
March 21 / Sept. 21 - 9:30 AM EDT
Figure 6-1

12.15.08

RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
March 21 / Sept. 21 - 10:30 AM EDT
Figure 6-2

12.15.08

RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
March 21 / Sept. 21 - 5:00 PM EDT
Figure 6-3

12.15.08

RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
May 6 / August 6 - 9:30 AM EDT
Figure 6-4

12.15.08

RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

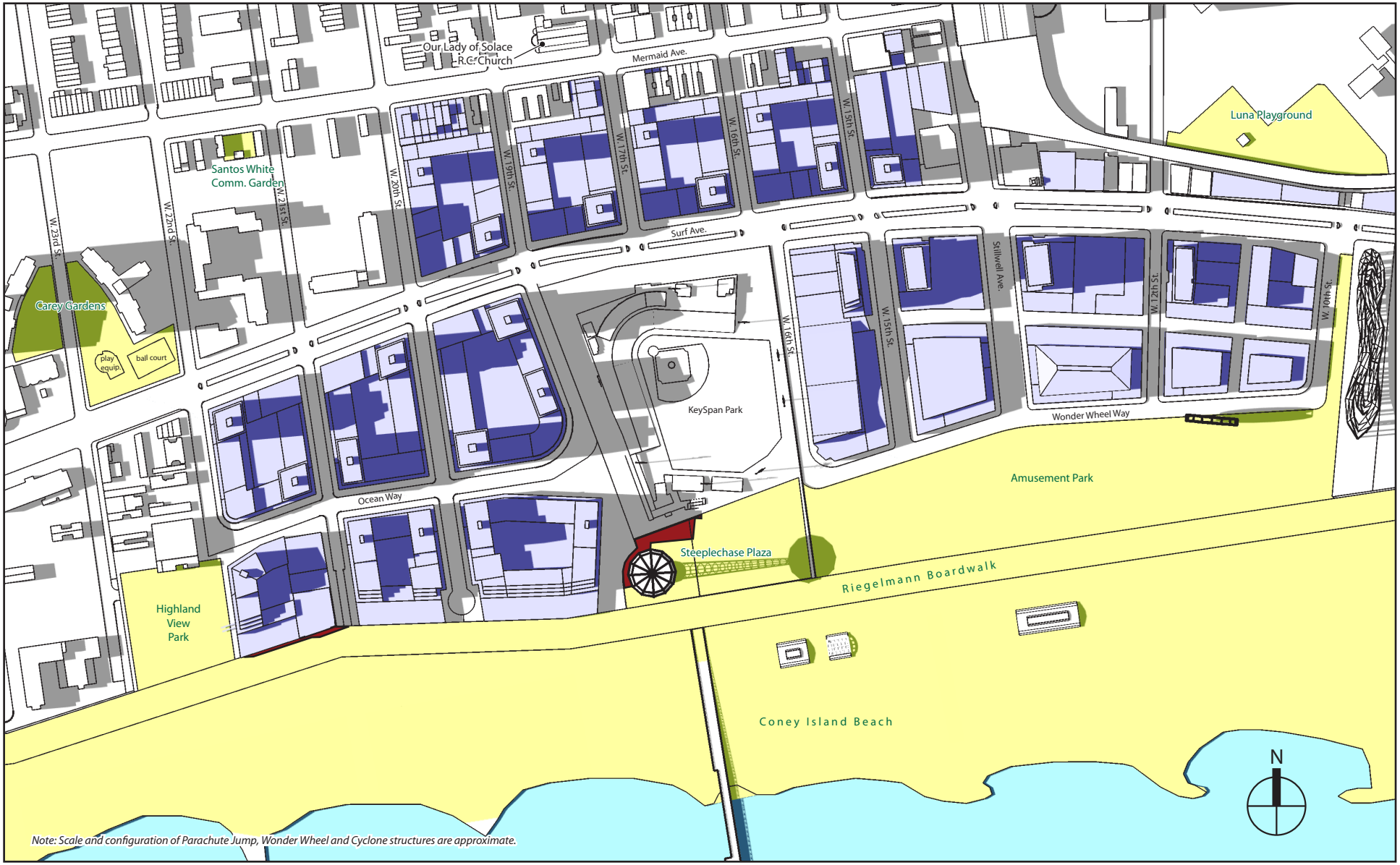
0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
May 6 / August 6 - 10:30 AM EDT
Figure 6-5

12.15.08



RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

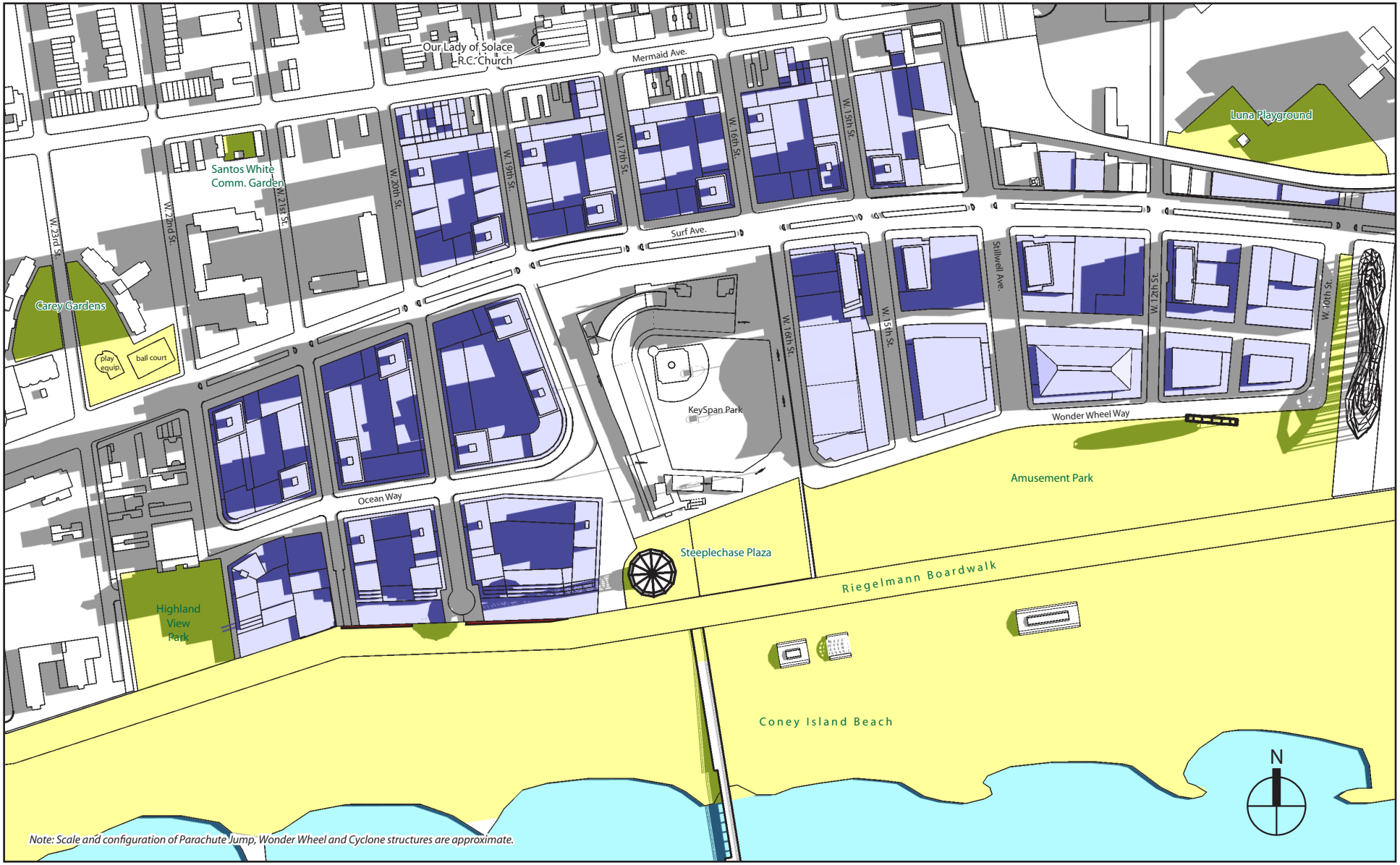
0 200 500 FEET

SCALE

CONEY ISLAND REZONING

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

12.15.08



RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
June 21 - 7:45 AM EDT
Figure 6-7

12.15.08

RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
June 21 - 5:00 PM EDT
Figure 6-8

12.15.08

RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
June 21 - 6:15 PM EDT
Figure 6-9

12.15.08

RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
December 21 - 9:30 AM EST
Figure 6-10

12.15.08

RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
December 21 - 12:30 PM EST
Figure 6-11

12.15.08

RWCDS Build Scenario

Shadow on RWCDS Build Scenario

Publicly-Accessible Open Space

Existing and No Build Shadow on Open Space

Incremental Shadow on Open Space

Shadow

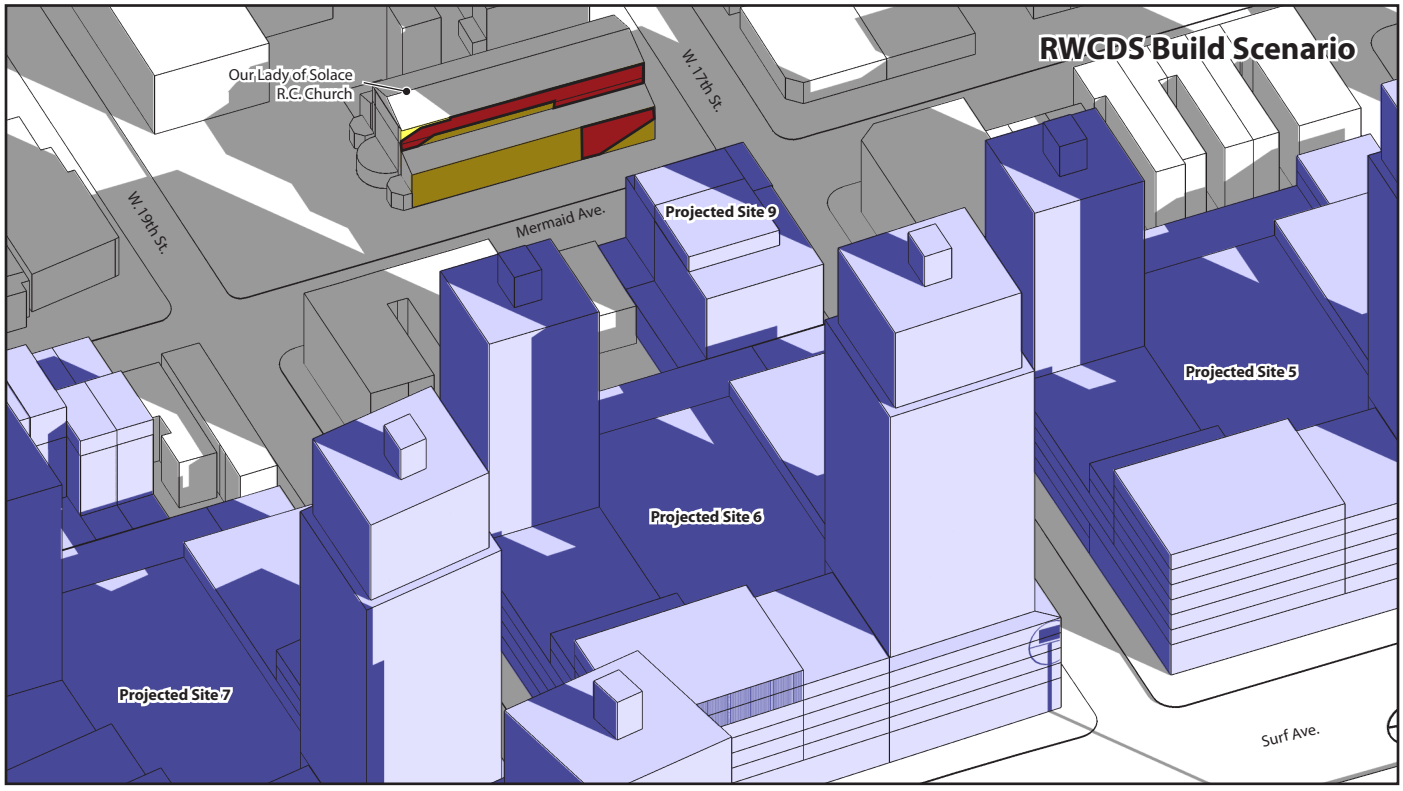
0 200 500 FEET

SCALE

CONEY ISLAND REZONING

Shadows
December 21 - 2:30 PM EST
Figure 6-12

12.15.08



Church facade with windows

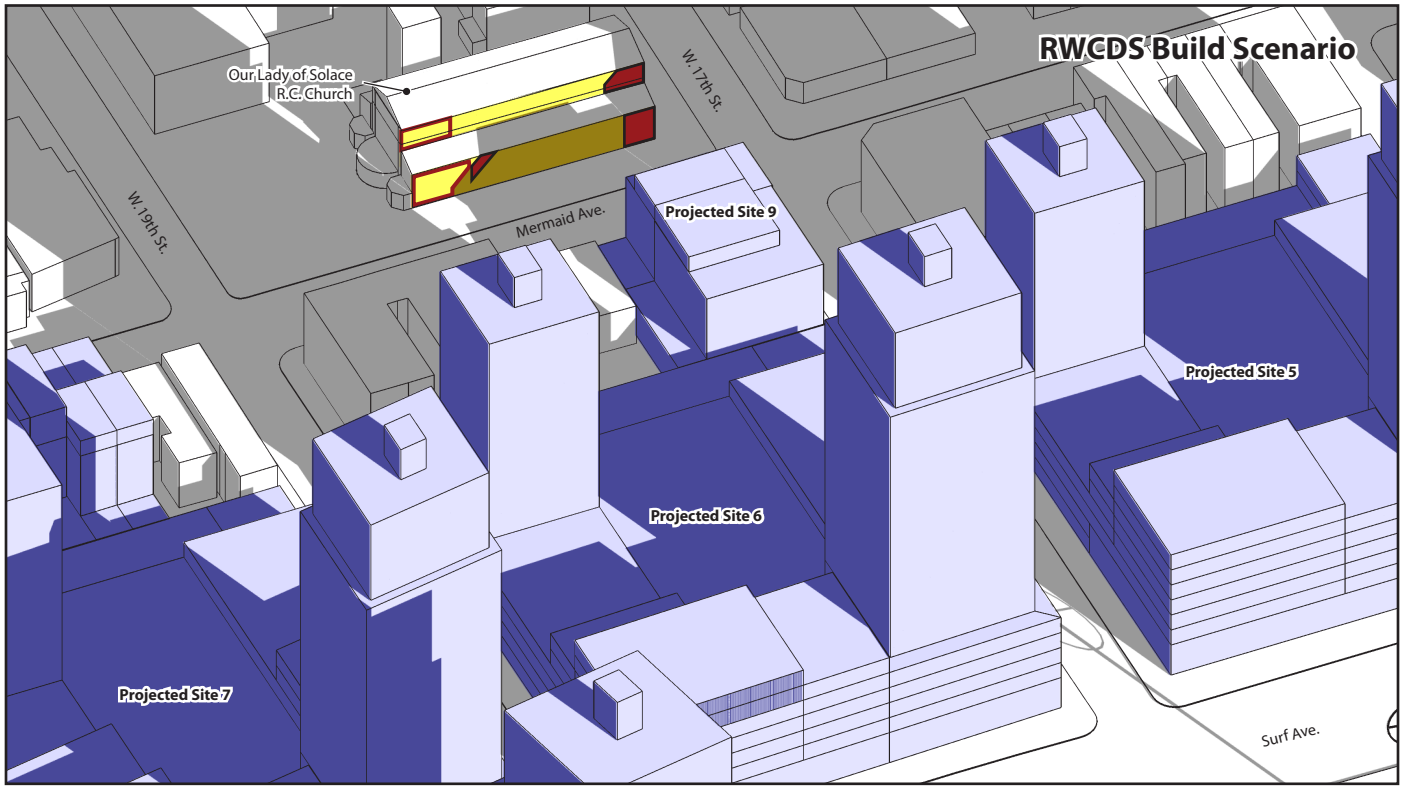
Baseline Shadow on Church facade

Incremental Shadow on Church Facade from RWCDS Build Scenario

Other Shadow

Shadows - Axonometric View Northeast
December 21 - 9:00 AM EST
Figure 6-13

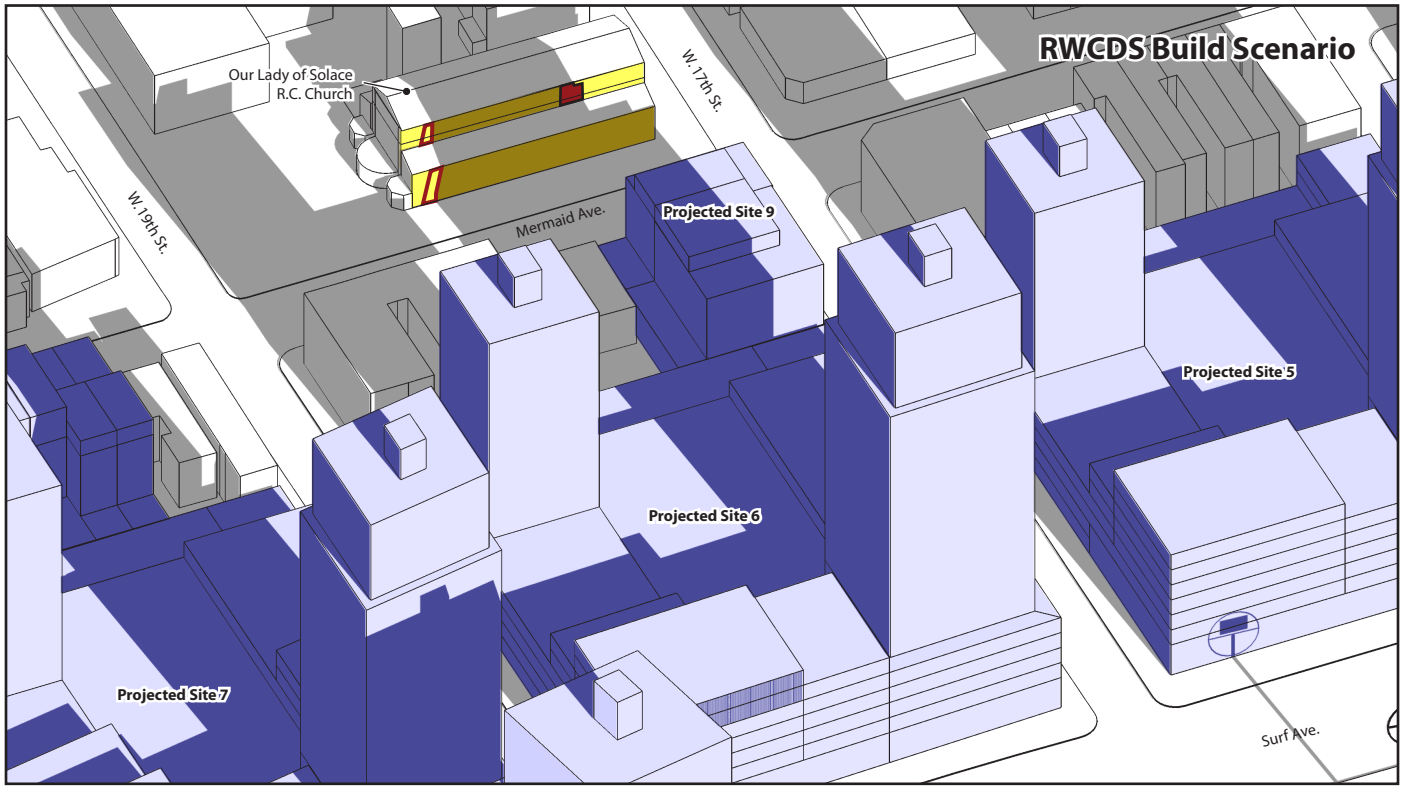
12.15.08

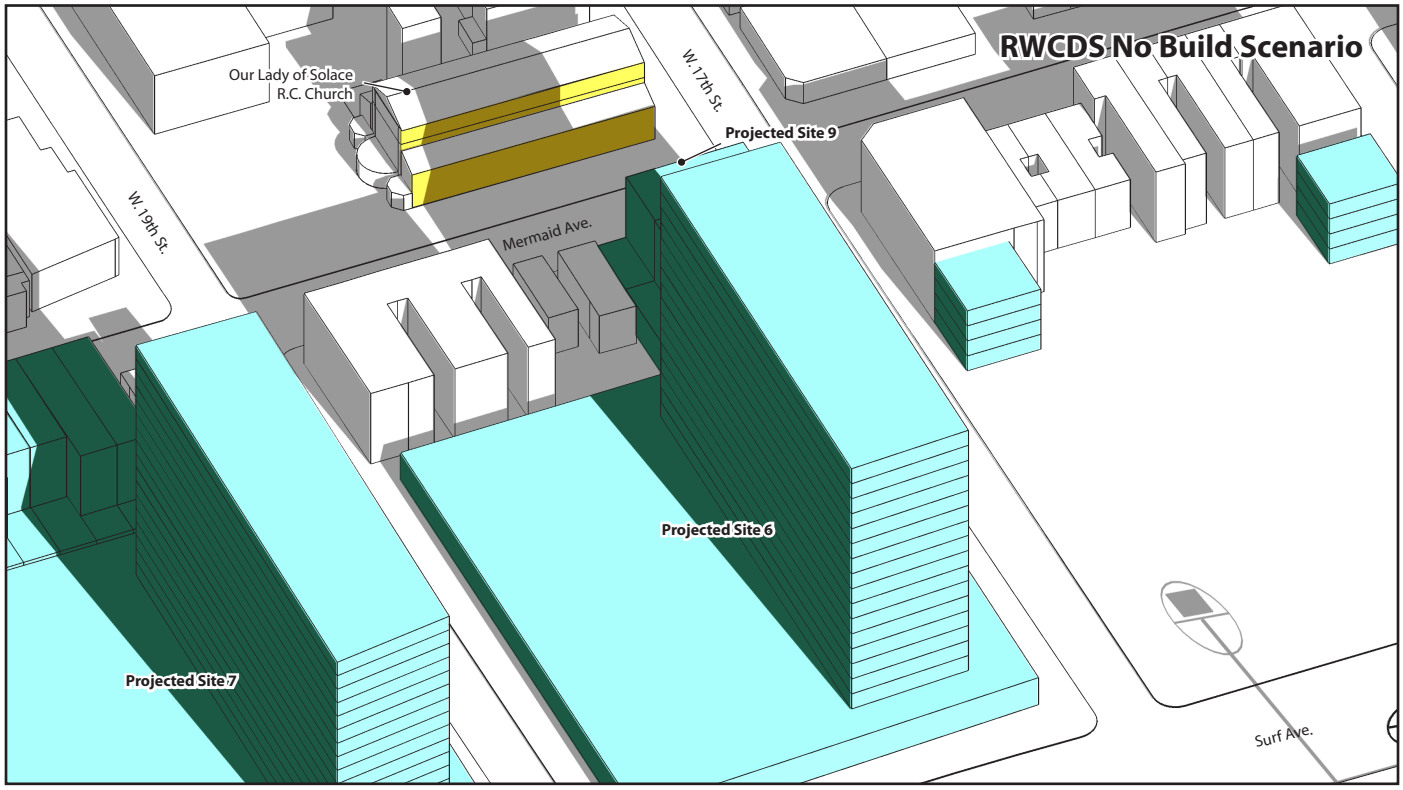


- Church facade with windows
- Baseline Shadow on Church facade
- Incremental Shadow on Church Facade with RWCDS Build Scenario
- Other Shadow
- Reduction in Shadow on Church Facade with RWCDS Build Scenario

Shadows - Axonometric View Northeast
December 21 - 10:00 AM EST
Figure 6-14

12.15.08





Church facade with windows

Baseline Shadow on Church facade

Incremental Shadow on Church Facade with RWCDS Build Scenario

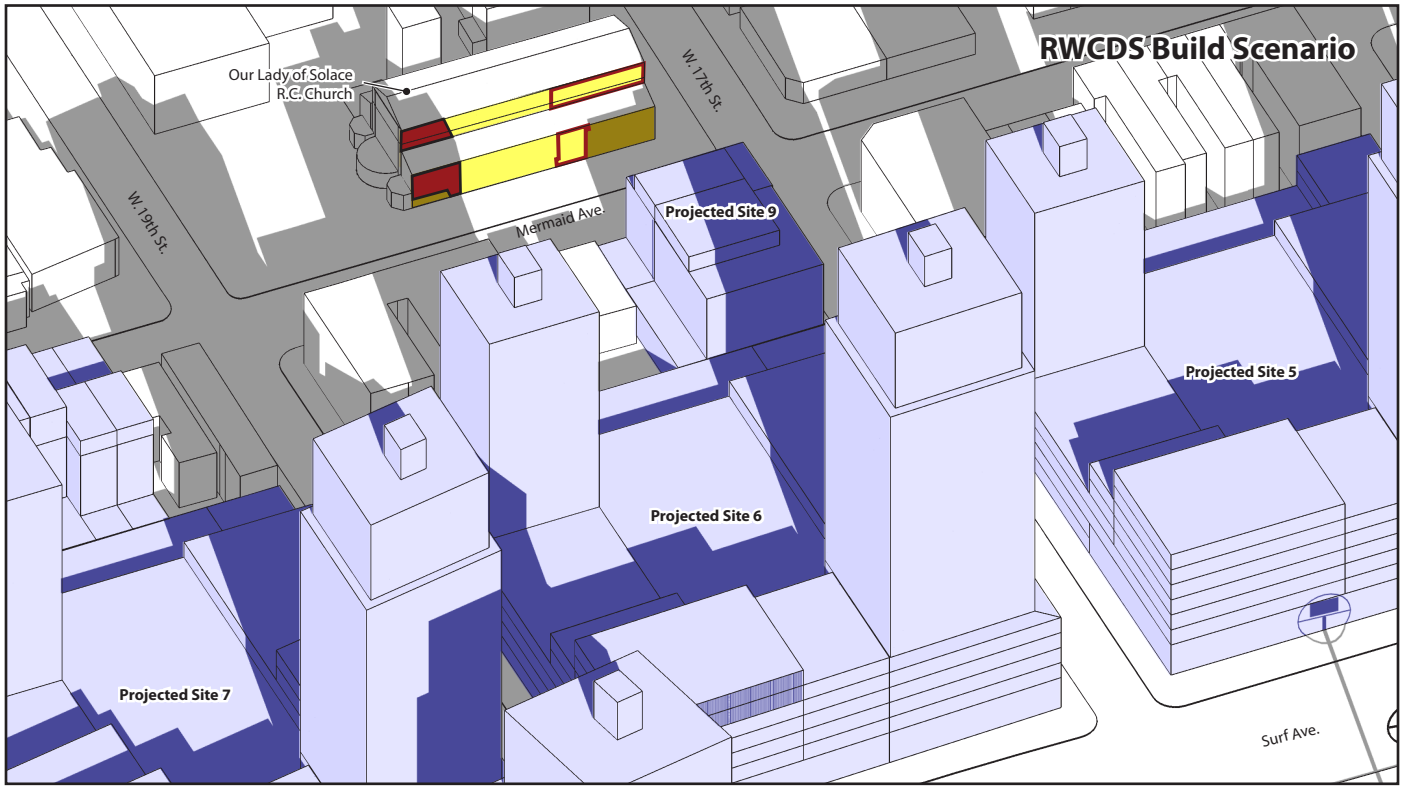
Other Shadow

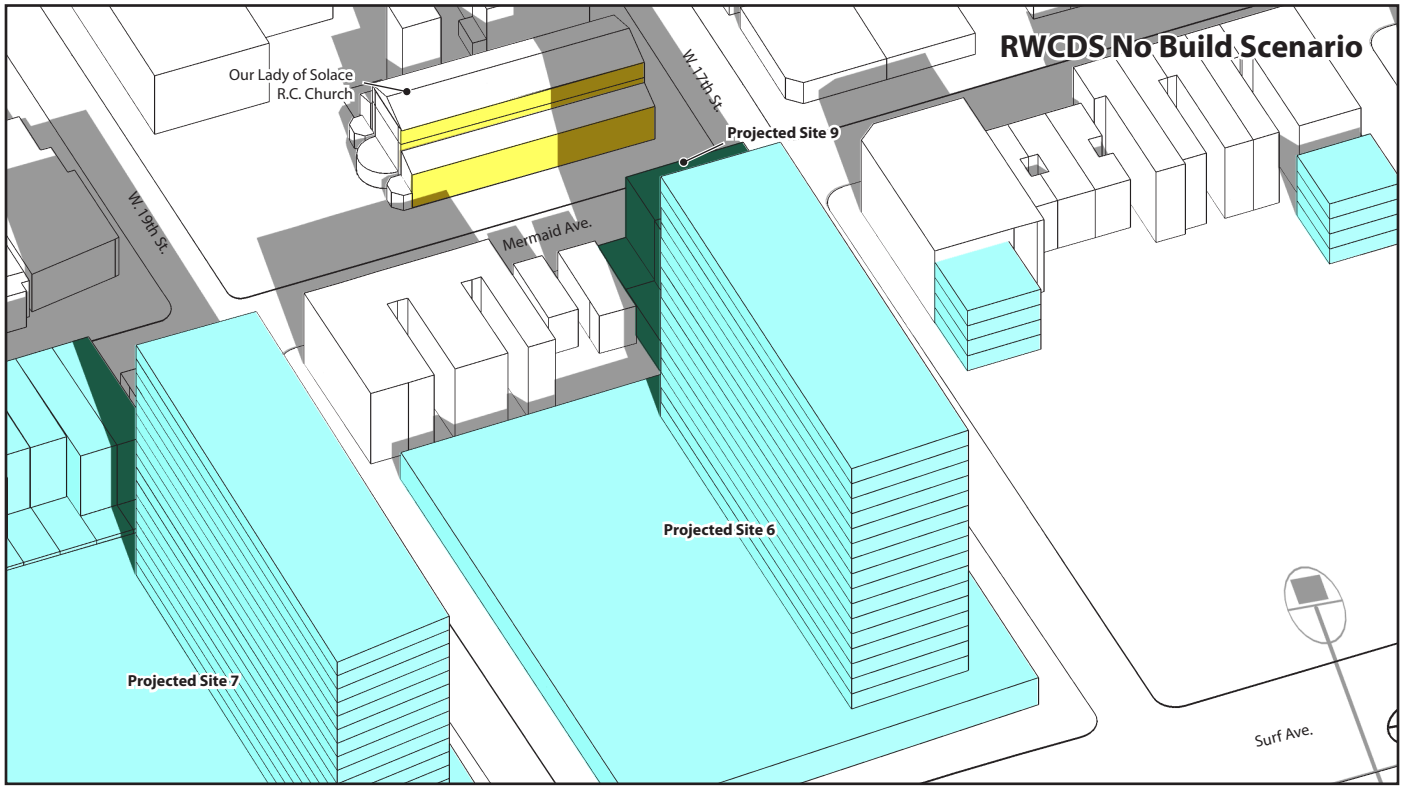
Reduction in Shadow on Church Facade with RWCDS Build Scenario

Shadows - Axonometric View Northeast
December 21 - 11:00 AM EST
Figure 6-15

CONEY ISLAND REZONING

12.15.08

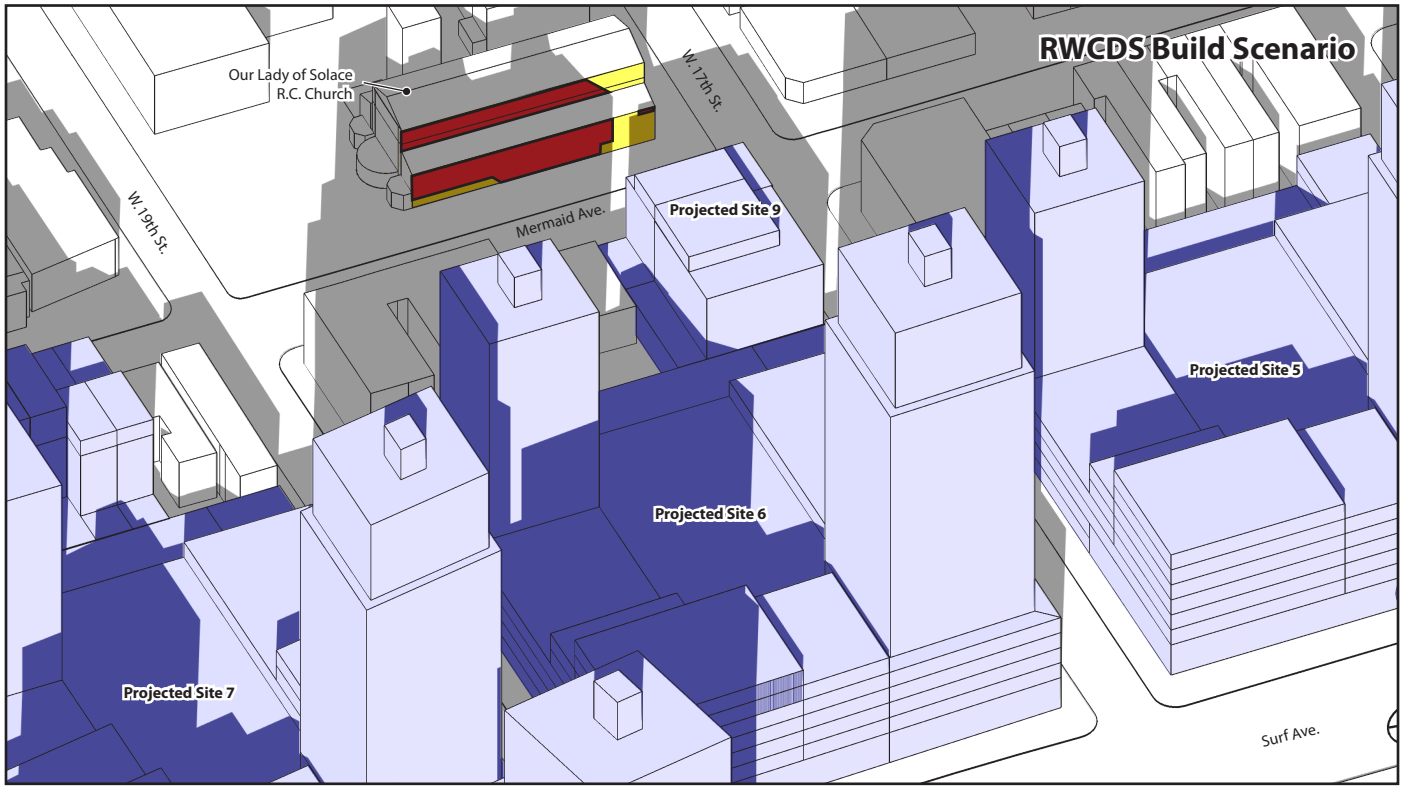


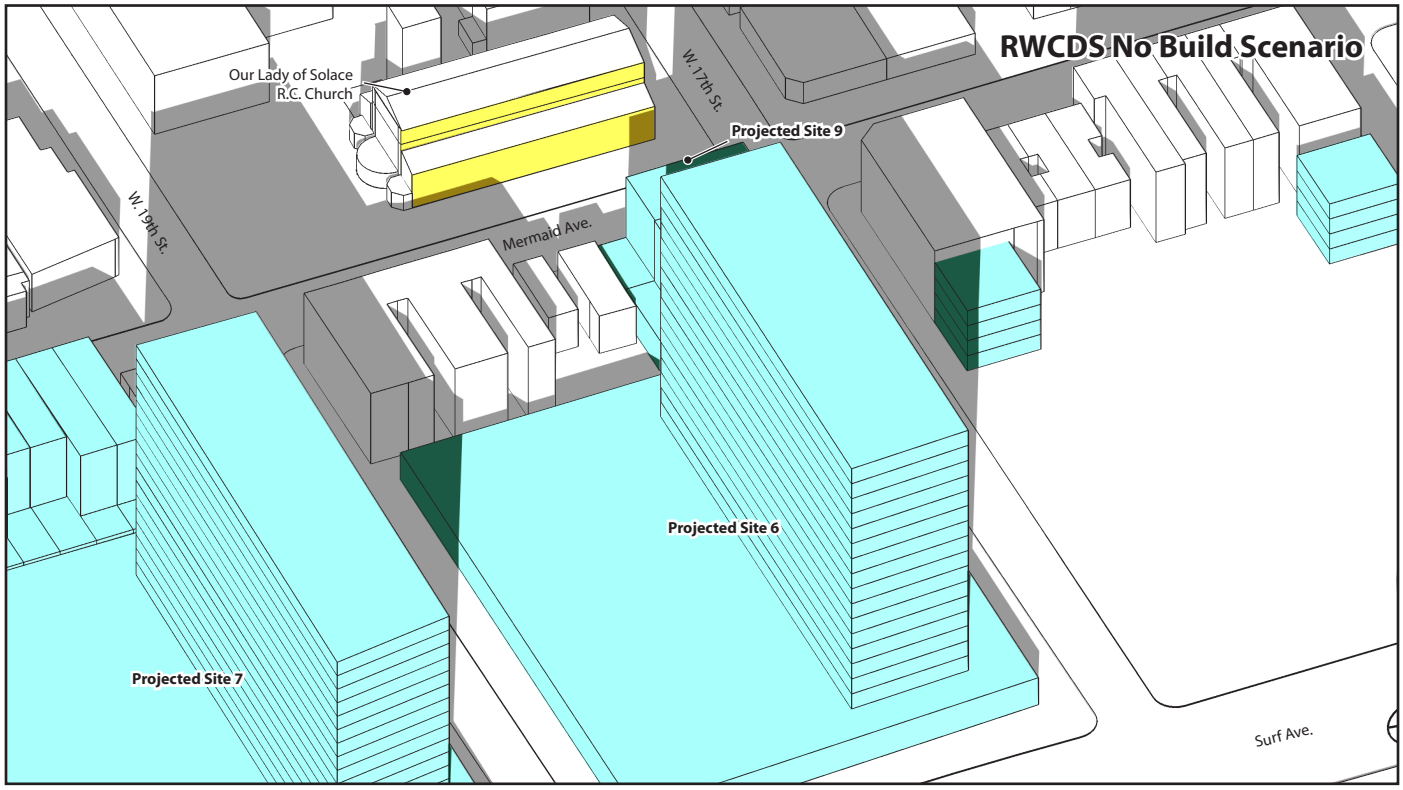


- Church facade with windows
- Baseline Shadow on Church facade
- Incremental Shadow on Church Facade with RWCDS Build Scenario
- Other Shadow
- Reduction in Shadow on Church Facade with RWCDS Build Scenario

Shadows - Axonometric View Northeast
December 21 - 12:00 PM EST
Figure 6-16

12.15.08





Church facade with windows

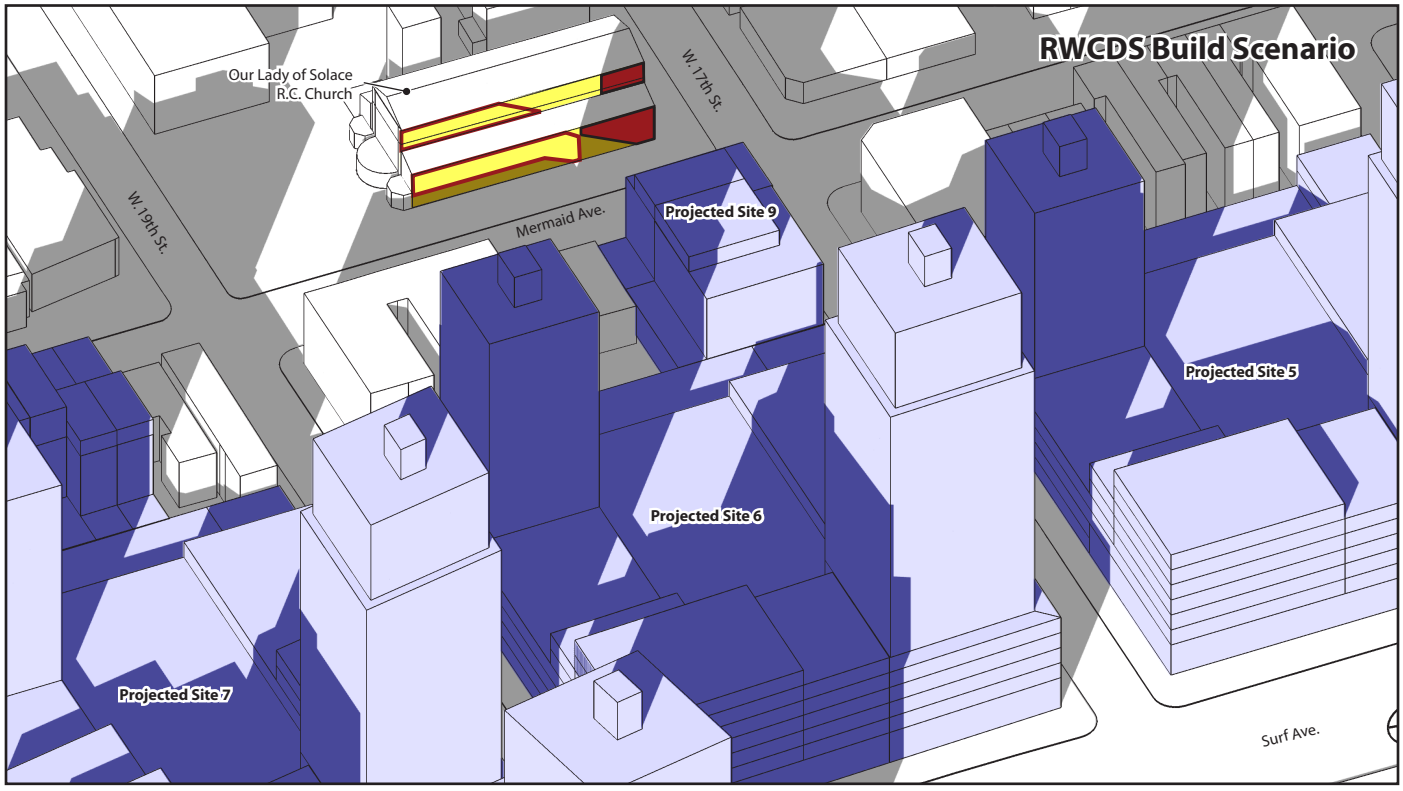
Baseline Shadow on Church facade

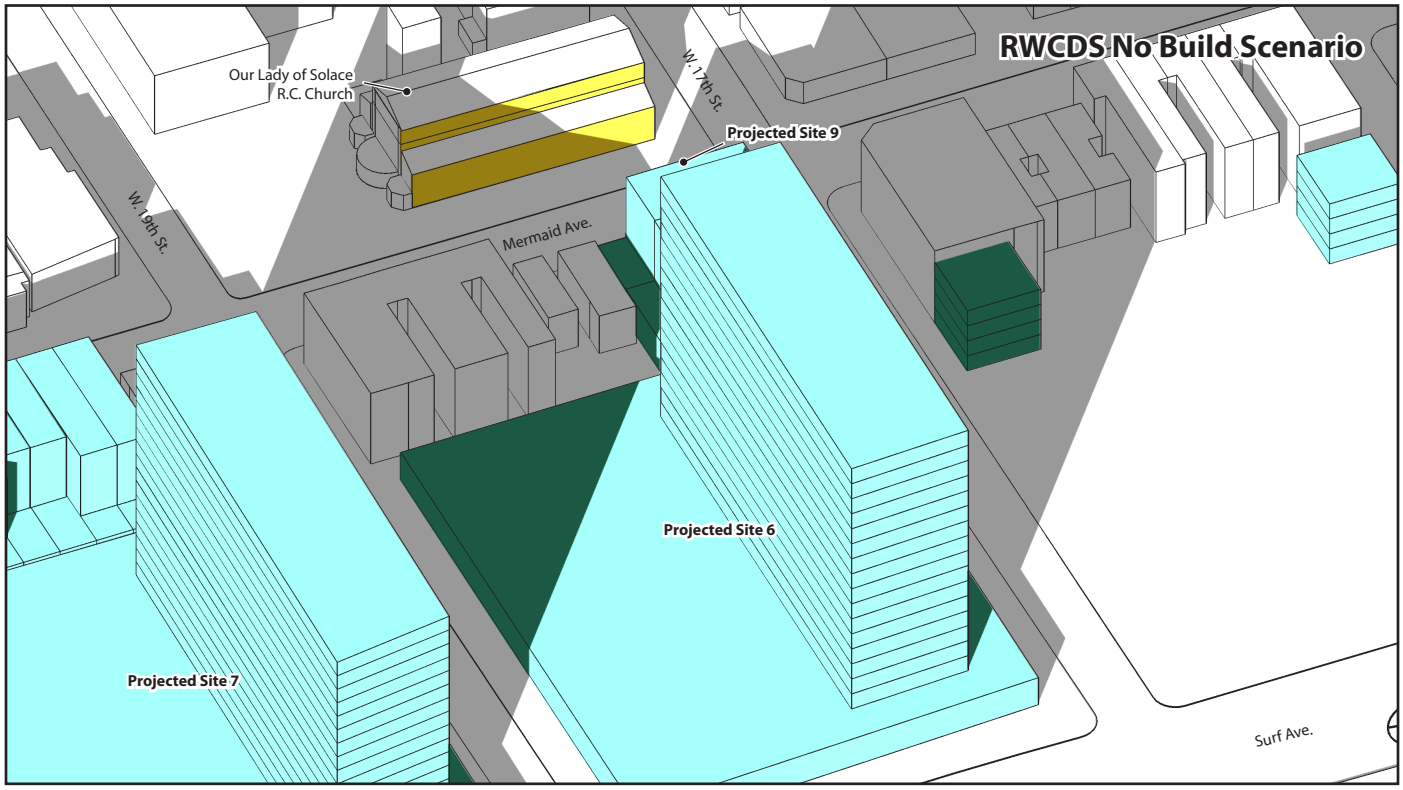
Incremental Shadow on Church Facade with RWCDS Build Scenario

Other Shadow

Shadows - Axonometric View Northeast
December 21 - 1:00 PM EST
Figure 6-17

12.15.08





Church facade with windows

Baseline Shadow on Church facade

Incremental Shadow on Church Facade with RWCDS Build Scenario

Other Shadow

Reduction in Shadow on Church Facade with RWCDS Build Scenario

Shadows - Axonometric View Northeast
December 21 - 2:00 PM EST
Figure 6-18