

# Chapter 7 : SHADOWS

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## A. INTRODUCTION

This chapter assesses the potential for the Proposed Actions to result in incremental shadows long enough to reach any nearby publicly accessible open spaces or other sunlight-sensitive resources.

The *CEQR Technical Manual* defines that shadow is the condition that results when a building or other built structure blocks the sunlight that would otherwise directly reach a certain area, space or feature. An incremental shadow is an additional or new shadow that a building or other built structure resulting from a proposed project would cast on a sunlight-sensitive resource during the year. Sunlight-sensitive resources of concern are those resources that depend on sunlight or for which direct sunlight is necessary to maintain the resource's usability or architectural integrity. Such resources generally include: (a) publicly accessible open spaces, (b) architectural resources with shadow sensitive features such as stained glass windows and façade elements that depend on direct sunlight for visual character, and (c) natural resources such as wetland and surface water bodies that are the habitat of vegetation or animals that depend on direct sunlight to live and/or grow.

According to the *CEQR Technical Manual*, the following features are not considered to be sunlight-sensitive resources: (a) city streets and sidewalks, except when improved as part of the New York City's Greenstreets program, (b) architectural resources that do not have sunlight-sensitive features, and (c) private open spaces such as front and back yards, stoops, and other open spaces that are not accessible to the general public. Additionally, paved areas on public open spaces, such as handball and basketball courts with no seating areas and no vegetation, are not considered sunlight-sensitive.

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

The Proposed Action would affect zoning regulations on a citywide basis and would result in changes to the height, bulk, and parking regulations for multi-family residential, inclusionary housing, affordable senior housing and long term care facilities, and therefore, a shadows assessment is warranted.

## B. PRINCIPAL CONCLUSIONS

The Proposed Action would potentially result in significant adverse shadow impacts. In accordance with the methodology outlined in the *CEQR Technical Manual*, a detailed shadow analysis was conducted to assess the extent and duration of the incremental shadow resulting from the Proposed Action. The detailed shadow analysis concluded that the Proposed Action would potentially result in incremental shadows being cast on sunlight sensitive features of historic resources and public open spaces based on prototypical analysis. Although the duration and coverage of incremental shadows would be limited, the Proposed Action could potentially result in significant adverse shadow impacts under limited conditions as described in the analysis. Even though none of the prototypes showed significant adverse shadows impacts, some provisions of the Proposed Action could potentially result in shadow impacts under certain circumstances where sunlight sensitive features of public open spaces and historic resources are directly located adjacent to potential development.

## C. METHODOLOGY

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

First step in assessing the potential shadow impacts is a preliminary screening assessment to determine if shadows resulting from an action could reach any sunlight-sensitive resources at any time of the year. The *CEQR Technical Manual* defines sunlight-sensitive resources as those resources that depend on sunlight or for which direct sunlight is necessary to maintain the resource's usability or architectural integrity. The following are considered to be sunlight-sensitive resources:

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

According to the *CEQR Technical Manual*, the preliminary screening assessment consists of three tiers of analysis. The first tier determines a simple radius (4.3 times the height of a building) around the proposed buildings representing the longest shadow that could be cast. If there are sunlight-sensitive resources within the radius, the analysis proceeds to the second tier, which reduces the area that could be affected by project-generated shadows by accounting for a specific range of angles that can never receive shade in New York City due to the path of the sun in the northern hemisphere. If the second tier of analysis does not eliminate the possibility of new shadows on sunlight-sensitive resources, a third tier of screening analysis further refines the area that could be reached by new shadows by looking at specific representative days of the year and determining the maximum extent of shadow over the course of each representative day. If the third tier of analysis does not eliminate the possibility of new shadows on sunlight-sensitive resources, a detailed shadow analysis is required to determine the extent and duration of the incremental shadow resulting from the project. However, for a conservative approach, no screening assessment was conducted and therefore, this shadows assessment includes a detailed shadow impact assessment.

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

such as May 6<sup>th</sup> or August 6<sup>th</sup> (which are approximately the same). For the cold-weather months, the December 21<sup>st</sup> winter solstice is included to demonstrate conditions when open space users rely most heavily on available sunlight warmth. As these months and days are representative of the full range of possible shadows, they are also used for assessing shadows on sunlight-sensitive historic and natural resources. The *CEQR Technical Manual* defines the temporal limits of a shadow analysis period to fall from an hour and a half after sunrise to an hour and a half before sunset.

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

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

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

According to the 2014 *CEQR Technical Manual*, five representative days during the growing season, as well as one representative day of cold-weather conditions, were analyzed. The growing season representative days include: 1) the spring and fall equinoxes (March 20<sup>th</sup> and September 22<sup>nd</sup>, respectively) where shadow sweeps follow approximately the same path on these two days and the length of a shadow would be about the middle of the longest and the shortest days in the year; 2) summer solstice (June 20<sup>th</sup>) which is the longest day and the length of a shadow would be the shortest in the year, and; 3) May 6<sup>th</sup> and August 6<sup>th</sup> where shadow sweeps follow approximately the same path on these two days and the shadow length is about halfway between summer solstice and the spring or fall equinoxes. The winter solstice (December 21<sup>st</sup>) was used as a representative day for cold weather conditions. The winter solstice is the shortest day and a shadow would be the longest in the year.

In accordance with the *CEQR Technical Manual*, this shadow analysis depicts the "worst case" Scenario for shadows from a prototypical building that may result from the Proposed Action. Since the allowable building envelope generally allows for multiple configurations of a building with the same floor area, a "worst case" scenarios is modeled for a shadows assessment that combines the worst possible features, in terms of casting shadows, of all possible configurations. In accordance with the *CEQR Technical Manual*, the building envelope depicting the worst case includes maximum possible extent of the building envelope, and all rooftop mechanical equipment.

## Prototypes and Prototypical Neighborhoods

The Proposed Action is a "Generic Action," and there are no known potential or projected development sites and, due to its broad applicability, it is difficult to predict the sites where development would be facilitated by the Proposed Action. To produce a reasonable analysis of likely effect of the Proposed Action, 27 representative

development prototypes have been identified as described in Chapter 2, Analytical Framework. These prototypes were used to create prototypical neighborhoods as described below. Since many of the prototypes include similar height/setback changes, they were grouped for analysis as described in Table 1, below.

*Prototypical Neighborhood 1* represents a generic neighborhood typically seen in medium density areas in the outer boroughs, and is assumed to include two prototypical developments (Prototype 1 and Prototype 3), an open space and a historic resource. In medium density areas, R7A districts are typically mapped along wide avenues while some R7A districts are mapped along narrow street sections that are build-out with large and high lot coverage buildings predating the 1961 Zoning Resolution. The bulk and density of these older residential buildings are similar to those permitted under R7A bulk regulations.

*Prototypical Neighborhood 2* represents a generic neighborhood typically seen in medium density areas in the outer boroughs, and is assumed to include a prototypical development (Prototype 11) and an open space. In these areas, R7A districts are typically mapped along wide avenues while some R7A districts are mapped along narrow street sections that are build-out with large and high lot coverage buildings predating the 1961 Zoning Resolution. Prototype 11 assumes that an existing Non-profit Residences for the Elderly (to be redefined as Affordable Independent Residences for Seniors under the Proposed Action).

*Prototypical Neighborhood 3* represents a generic neighborhood typically seen in high density residential neighborhoods in Manhattan, and is assumed to include a prototypical development (Prototype 12) and an open space. In these areas, R10A districts are typically mapped along wide avenues and narrow street sections are typically mapped with moderate density preservation districts such as R8B districts. Some R10A districts are mapped along narrow street sections that are build-out with large and high lot coverage buildings predating the 1961 Zoning Resolution. However, these areas along narrow streets mapped with R10A districts are most likely be fully build-out with large residential buildings.

*Prototypical Neighborhood 4* represents a generic high-density residential neighborhood typically seen in Manhattan, and is assumed to include two prototypical developments (Prototype 13, and Prototype 15) and open space. In these areas, R10A districts are typically mapped along wide avenues and narrow street sections are typically mapped with moderate density districts such as R8B districts. Some R10A districts are mapped along narrow street sections that are build-out with large and high lot coverage buildings predating the 1961 Zoning Resolution. These areas along narrow streets mapped with R10A districts are most likely be fully build-out with large residential buildings.

*Prototypical Neighborhood 5* represents a generic neighborhood typically seen in high density commercial areas in Midtown and Lower Manhattan, and is assumed to include a prototypical development (Prototype 14) and a historic resource. To assess potential shadow impacts from the proposed height and setback changes for an Inclusionary Housing development in contextual R10A district along narrow streets, where the largest incremental height change is proposed under the Proposed Action, it was necessary to assemble a high density contextual neighborhood such as an area mapped with C6-4A districts. As described in Prototypical Neighborhood 4, residential R10A districts are primarily mapped along wide street and when they are mapped in an area along narrow street beyond 100 feet from a wide street, they are most likely be build-out and it is not reasonable to project or assume a development in these areas. On the other hand, high density contextual commercial districts that are R10A equivalent districts are mapped along narrow streets in wider (but still very limited) areas and contain some potential residential or mixed-use development sites.

*Prototypical Neighborhood 6* represents a generic neighborhood typically seen in medium to high density areas in the outer boroughs, and is assumed to include a prototypical development (Prototype 17) and a historic resource. In these areas, higher density districts are mapped along a wide street and narrow street sections are typically mapped with low to medium density districts such as R6B and R7B districts. In this prototypical neighborhood, a high density R8A district is mapped along both sides of a wide north-south avenue and areas beyond 100 feet from the avenue is mapped with lower density R6B districts.

*Prototypical Neighborhood 7* represents a generic R4 neighborhood typically seen in low density areas in the outer boroughs and is assumed to include a prototypical development (Prototype 24) and an open space. These neighborhoods are typically not easily accessible to public transit and build-out with single- or two-family homes and

small walk-up multi-family apartments. Larger institutional buildings such as schools and medical facilities are scattered throughout the neighborhood.

**Table 7-1: Shadows Assessment Matrix**

Prototype	Title	Detailed Analysis Required	Representing Prototype	Prototypical Neighborhood
Prototype 1	R7A district, 100' x 100' interior lot on narrow street	Yes	-	1
Prototype 2	R7A district, Inclusionary Housing, 100' x 100' interior lot on narrow street	Yes	3	n/a
Prototype 3	R7A district adjoining an R4A District, Inclusionary Housing, 100' x 100' corner lot on wide and narrow streets	Yes	-	1
Prototype 4	R7A district, 100' x 85' shallow interior lot on narrow street	Yes	1	n/a
Prototype 5	R7A district, 100' x 170' shallow interior through lot on wide and narrow streets	Yes	1	n/a
Prototype 6	R7D District, Affordable Independent Residences for Seniors, 100' x 100' interior lot on narrow street	Yes	3	n/a
Prototype 7	R7X District, Inclusionary Housing Designated Area, 100' x 100' interior lot on narrow street	Yes	3	n/a
Prototype 8	R7-2 District, Affordable Independent Residences for Seniors, 200' x 100' corner lot on wide and narrow streets	No	n/a	n/a
Prototype 9	R7A District, Long-term Care Facility, 100' x 100' interior lot on narrow street	Yes	3	n/a
Prototype 10	R7A District, second building, 200' x 200' through lot on wide and narrow streets	Yes	1	n/a
Prototype 11	R7A District, parking reduction for Affordable Independent Residences for Seniors, 200' x 200' through lot on wide and narrow streets	Yes	-	2
Prototype 12	R10A District, 100' x 100' interior lot on wide street	Yes	-	3
Prototype 13	R10A District, Inclusionary Housing, 100' x 100' interior lot on wide street	Yes	-	4
Prototype 14	R10A/equivalent commercial district, Inclusionary Housing, narrow street, 100'x100'	Yes	-	5
Prototype 15	R10A District, Inclusionary Housing (R10 program), 40' x 100' interior lot on wide street	Yes	-	4
Prototype 16	R10 District, Inclusionary Housing (R10 Program) utilizing increased density allowance, 100' x 100' corner lot on wide and narrow streets	No	n/a	n/a
Prototype 17	R8A District, Inclusionary Housing adjoining R6B District, 100' x 100' corner lot on wide and narrow streets	Yes	-	6
Prototype 18	R8A District, Inclusionary Housing, 100' x 85' shallow interior lot on wide street	Yes	17	n/a
Prototype 19	R8A, Inclusionary Housing, 100' x 170' shallow through lot on wide and narrow streets	Yes	17	n/a
Prototype 20	R8 District, Affordable Independent Residences for Seniors, 200' x 100' corner lot on wide and narrow streets	No	n/a	n/a
Prototype 21	C6-3A District (R9A equivalent commercial district), Inclusionary Housing with ground floor commercial, acutely angled corner lot on wide and narrow streets	Yes	13	n/a
Prototype 22	R8 District, Affordable Independent Residences for Seniors, 200' x 100' interior lot on narrow street	Yes	16	n/a
Prototype 23	R10A District, Long-term Care Facility, 100' x 100' interior lot on Wide Street	Yes	13	n/a
Prototype 24	R4 District, Affordable Independent Residences for Seniors, 150' x 100' interior lot on narrow street outside the Transit Zone	Yes	26	n/a
Prototype 25	R5 District, Affordable Independent Residences for Seniors, 150' x 100' interior lot on narrow street	Yes	22	n/a
Prototype 26	R5 District, Long-term Care Facility and Affordable Independent Residences for Seniors, 200' x 200' on wide and narrow streets	Yes	26	7
Prototype 27	R4 District, Affordable Independent Residences for Seniors, 200' x 200' corner/through lot on wide and narrow streets on steep topography.	Yes	26	n/a

## **D. DETAILED ANALYSIS**

The following section summarizes the result of detailed shadow assessments. A full set of incremental shadow diagrams are included at the end of this chapter.

**Table 7-2: Incremental Shadow by Prototype**

Note: According to *CEQR Technical Manual*, "worst case" building envelopes, as opposed to "reasonable worst case" envelopes, are used to render shadows and are shown in Chapter 2H. These "worst case" massings are generally 10 to 20 percent over-built than permitted FAR.

Analysis Group	Prototype	Title	Analysis Day	March 21/Sept. 21	May 6/August 6	June 21	December 21
				7:36 AM – 4:29 PM	6:27 AM – 5:18 PM	5:57 AM – 6:01 PM	8:51 AM – 2:53 PM
Group 1	Prototype 1	R7A district, 100' x 100' interior lot on narrow street	Shadow enter - exit time	HR01 7:36AM - 10:58AM	-	-	HR01 8:51AM - 11:02AM
			Incremental shadow duration	HR01 3 hrs 22 mins	-	-	HR01 2 hrs 11 mins
Group 1	Prototype 3	R7A district adjoining an R4A District, Inclusionary Housing, 100' x 100' corner lot on wide and narrow streets	Shadow enter - exit time	HR01 7:36AM - 8:06AM OS01 7:36AM - 1:09PM	HR01 6:27AM - 8:09AM	HR01 5:57AM - 7:58AM	OS01 8:51AM - 2:37PM
			Incremental shadow duration	HR01 30 mins OS01 5 hrs 33 mins	HR01 1 hr 42 mins	HR01 2 hrs 1 mins	OS01 5 hrs 46 mins
Group 2	Prototype 11	R7A District, parking reduction for Affordable Independent Residences for Seniors, 200' x 200' through lot on wide and narrow streets	Shadow enter - exit time	OS02 7:48AM - 12:30PM	-	-	OS02 8:51AM - 09:42AM OS02 11:12AM - 2:32PM
			Incremental shadow duration	OS02 4 hrs 42 mins	-	-	OS02 51 mins OS02 3 hrs 20 mins
Group 3	Prototype 12	R10A District, 100' x 100' interior lot on wide street	Shadow enter - exit time	OS03 1:34PM - 2:51PM	-	-	OS03 10:45AM - 1:04PM
			Incremental shadow duration	OS03 1 hr 17 mins	-	-	OS03 2 hrs 19 mins
Group 4	Prototype 13	R10A District, Inclusionary Housing, 100' x 100' interior lot on wide street	Shadow enter - exit time	OS03 12:26PM - 12:29PM OS03 12:49 - 2:51PM	-	-	OS03 10:45AM - 1:04PM
			Incremental shadow duration	OS03 3 mins OS03 2 hrs 2 mins	-	-	OS03 2 hrs 19 mins
Group 5	Prototype 14	C6-4A (R10A equivalent commercial district), Inclusionary Housing, narrow street, 100'x100'	Shadow enter - exit time	HR02 12:44PM - 4:29PM	HR02 12:15PM - 4:54PM	HR02 12:18PM - 5:06PM	-
			Incremental shadow duration	HR02 3 hrs 45 mins	HR02 4 hrs 39 mins	HR02 4 hrs 48 mins	-
Group 4	Prototype 15	R10A District, Inclusionary Housing (R10 program), 40' x 100' interior lot on wide street	Shadow enter - exit time	OS03 12:27PM - 3:44PM	-	-	OS03 12:14PM - 1:35PM
			Incremental shadow duration	OS03 3 hrs 17 mins	-	-	OS03 1 hr 21 mins
Group 6	Prototype 17	R8A District, Inclusionary Housing adjoining R6B District, 100' x 100' corner lot on wide and narrow streets	Shadow enter - exit time	HR03 12:00PM - 4:35PM	HR03 1:40PM - 3:11PM	-	HR03 10:48AM - 2:53PM
			Incremental shadow duration	HR03 4 hrs 35 mins	HR03 1 hr 31 mins	-	HR03 4 hrs 5 mins
Group 7	Prototype 24	R4 District, Affordable Independent Residences for Seniors, 150' x 100' interior lot on narrow street outside the Transit Zone	Shadow enter - exit time	OS04 7:36AM - 8:38AM	OS04 6:27AM - 7:47AM	OS04 5:57AM - 6:59AM	OS04 8:51 - 9:30AM
			Incremental shadow duration	OS04 1 hr 2 mins	OS04 1 hr 20 mins	OS04 1 hr 2 mins	OS04 39 mins

Note: All times are Eastern Standard Time; Daylight Savings Time was not accounted for per *CEQR Technical Manual* guidelines.

Table indicates the entry and exit times and total duration of incremental shadow for each potential sunlight-sensitive resource.



## ***Prototypical Neighborhood 1: R7A District, Prototype 1 and Prototype 3***

### Open Space 1:

This open space (OS 01) is a generic 1.75 acre publicly accessible open space typically seen in New York City's neighborhoods where R7A districts are mapped. OS 01 functions as a playground with multiple jungle-gyms, bench seating and also contains planting areas, a multi-purpose sports field, basketball and wall tennis fields.

The proposed Action would result in new incremental shadows of varying duration and coverage on Spring/Fall equinoxes (March 21/September 21, respectively) and on winter solstice (December 21). Incremental shadows would last for a total of approximately 5 hours and 33 minutes (from 7:36AM to 1:09PM) on March 21/September 21, and approximately 5 hours and 46 minutes (from 8:51AM to 2:37PM) on December 21.

On March 21/September 21, as Figure 7-1 shows, an incremental shadow from Prototype 3 would be generally limited to the southernmost portions of OS 01 during the early morning and early afternoon. At 7:36AM, when the analysis timeframe begins, the incremental shadow is covering a small southwestern portion of OS01. The incremental shadow moves along the southern boundary of OS1 and it gets shorter toward noon. By 1:09PM, the incremental shadow would exit OS 01 completely.

There is no incremental shadow on OS 01 on May 6/August 6 and June 21.

On December 21, as 7-4 shows, incremental shadows from either or both Prototype 1 and Prototype 3 would reach OS 01 during the most of analysis timeframe. The incremental shadow from Prototype 1 enters OS 01 by 8:51AM, when the analysis timeframe starts, and moves along the southernmost edge of OS 01 until it completely exit the open space at 11:02AM. The incremental shadow from Prototype 1 enters OS 01 by 8:51AM and reaches the northernmost portion of the open space. The incremental shadow moves through the middle of the open space and gets shorter as time nears noon. The incremental shadow completely exists OS 01 by 2:37PM, just before the analysis timeframe ends at 2:53PM.

### Assessment

During the early spring and early fall seasons, around spring and fall equinoxes, when direct sunlight is mostly appreciated by open space users, an incremental shadow from Prototype 3 would be limited to the southernmost section of the open space. The area could potentially feature sunlight sensitive resources including seating areas and planting areas. Since the incremental shadow would be limited and the shadow moves from east to west throughout the day, these potential sunlight sensitive resources would not suffer from a significant loss of direct sunlight. Furthermore, the open space would continue to receive adequate sunlight (at least the four to six hours minimum in accordance with the *CEQR Technical Manual*) during the plant growth season and the health of vegetation would not be significantly affected.

During the summer season, around summer solstice, there would be no incremental shadows from Prototype 1 and Prototype 3.

During the cold winter season, around winter solstice, when shadows would be stretched farthest from their origin, there would be notable incremental shadow coverage. However, the open space would continue to receive direct sunlight as such stretched shadows move from east to west quickly throughout the day and the open space would be affected by the incremental shadows for a limited amount of time during the day. Incremental shadows during the cold winter season is not expected to significantly affect the utilization or enjoyment of open space resources. . Further, the potential amount of heat one could gain from direct sunlight during New York City's cold season would be limited. In addition, existing vegetation is not expected to be affected by incremental shadows, as the December 21 analysis day falls outside of the plant growing season defined by the *CEQR Technical Manual*. Therefore, the incremental shadows that could result from the Proposed Action are not anticipated to adversely impact the usability of OS 01.

### Historic Resource:

This historic resource (HR 01) is assumed to be a generic house of worship typically seen in New York City's neighborhoods where R7A districts are mapped. HR 01 is also assumed to have a historic significance and contain sunlight sensitive features which may include stained glasses and/or architectural design elements.

The Proposed Action would result in new incremental shadows of varying duration and coverage on all of representative analysis days. Incremental shadows would last for a total of approximately 3 hours and 22 minutes (from 7:36AM to 10:58AM) on March 21/September 21, approximately 1 hour and 42 minutes (from 6:27AM to 8:09AM) on May 6/August 6, approximately 2 hours and 1 minutes (from 5:57AM to 7:58AM) on June 21, and approximately 2 hours and 11 minutes on December 21.

On March 21/September 21, as shown, incremental shadows from Prototype 1 would reach facades of HR 01 during the early morning. At 7:36AM, when the analysis timeframe begins. The incremental shadow reaches small portions of east and south facades of the historic resource. The small incremental shadow moves through the east façade of HR 01 until 10:58AM when the incremental shadow complete exit HR 01.

On May 6/August 6, as shown, incremental shadows from Prototype 3 reaches the east façade of HR 01 by 6:27AM, when the analysis timeframe starts, and moves toward the northern edge of the eastern façade. By 8:09AM, the incremental shadow completely exits HR 01.

On June 21, as shown,, incremental shadows from Prototype 3 reaches the east façade of HR 01 by 5:57AM, when the analysis timeframe starts. The incremental shadow moves toward the ground level of HR 01 and it completely exits HR 01 by 7:58 AM.

On December 21, as shown, incremental shadows from Prototype 1 touches on the roof top of the historic resource. The incremental shadow moves toward the northern section of HR 01 and completely exists by 11:02AM.

### Assessment

During the early spring and early fall seasons, around spring and fall equinoxes, incremental shadows from both Prototype 1 and Prototype 3 would cover limited portions of the south and east facades of HR 01 for limited amount of time in the early morning. As shadows are not static and move from east to west throughout the day, sunlight sensitive features on the façade of historic and architectural resources is not expected to suffer from a significant loss of direct sunlight as a result of the Proposed Action.

During the summer season, around summer solstice, an incremental shadow from Prototype 3 covers a large portion of the east façade of HR 01 very early in the morning, when these historic and architectural resources are typically not being enjoyed by users of such resources. By 8:00AM, the incremental shadow is almost comply out of the façade. Sunlight sensitive features on HR 01 is not expected to suffer from significant loss of direct sunlight.

During the cold winter season, around winter solstice, when shadows would be stretched farthest from their origin, the south and east facades of HR 01 were mostly covered by shadows from surrounding buildings and there were very limited incremental shadow from both Prototype 01 and Prototype 03. Sunlight sensitive features on HR 01 is not expected to suffer from significant loss of direct sunlight.

The detailed shadow analysis for this prototypical neighborhood concluded that although there is potential for incremental shadows being cast on sunlight sensitive features of historic resources and public open spaces, the duration and coverage of incremental shadows would be limited; and therefore, the Proposed Action is not expected to result in significant adverse shadow impacts.


Figure 7-1




March 21 (September 21)

Sweep (8:00AM - 1:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype


 Worst case building envelop


Figure 7-2




May 6

Sweep (7:00AM - 8:00AM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype


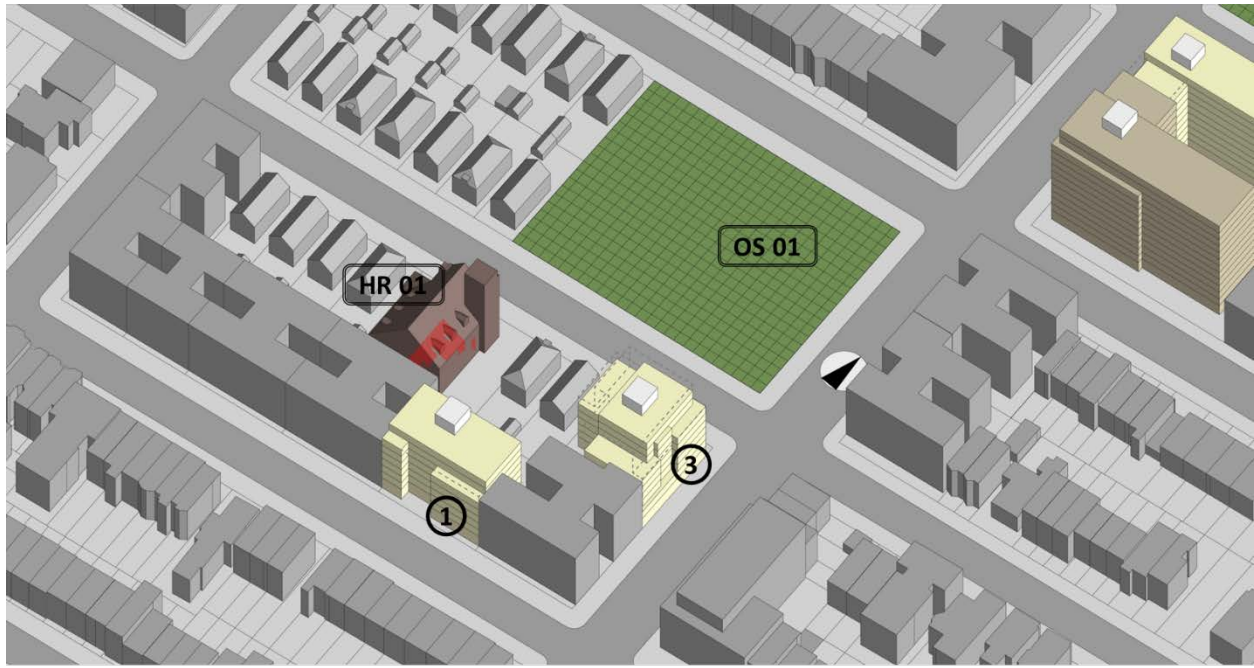
 Worst case building envelop


Figure 7-3




June 21

Sweep (6:00AM - 7:00AM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype


 Worst case building envelop


Figure 7-4




December 21


Sweep (9:00AM - 2:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop

## ***Prototypical Neighborhood 2: R7A District, Prototype 11***

### Open Space:

This open space (OS 02) is assumed to be a generic small publicly accessible open space that is 0.18 acres in size. OS 02 is assumed to function as a playground with multiple jungle-gyms and bench seating and also contain planting areas.

The proposed Action would result in new incremental shadows of varying duration and coverage on Spring/Fall equinoxes (March 21/September 21, respectively), and on winter solstice (December 21). Incremental shadows would last for a total of approximately 4 hours and 42 minutes (from 7:48AM to 12:30PM) on March 21/September 21, and a total of approximately 4 hours and 11 minutes (from 8:51AM to 9:42AM and from 11:12AM to 2:32PM) on December 21.

On March 21/September 21, as shown, an incremental shadow from Prototype 11 would reach the southwest corner of OS 02 at 7:48, shortly after the analysis timeframe starts, and moves through the south end portion of the open space until it completely exists from OS 02 at 12:30PM.

There is no incremental shadow on OS 01 on May 6/August 6 and June 21.

On December 21, as ~~Figure 7-6 Error! Reference source not found.~~ shows, an incremental shadow from Prototype 11 reaches the open space by 8:51, when the analysis timeframe starts, and goes completely behind a shadow cast by the existing building on the southern portion of the same zoning lot by 9:42AM. The incremental shadow again reaches OS 02 at 11:12AM and a thin but long north-south of shadow moves through the middle of the open space until it completely exist OS 02 at 2:32PM, just before the analysis timeframe ends at 2:53PM.

### Assessment:

During the early spring and early fall seasons, around spring and fall equinoxes, when direct sunlight is mostly appreciated by open space users, an incremental shadow from Prototype 11 would be limited to the southernmost section of the open space. The area could potentially feature sunlight sensitive resources including seating areas and planting areas. Since the incremental shadow would be limited and the shadow moves from east to west throughout the day, these potential sunlight sensitive resources would not suffer from a significant loss of direct sunlight. Furthermore, the open space would continue to receive adequate sunlight during the plant growth season (at least the four to six hours minimum specified in the *CEQR Technical Manual*) and the health of vegetation would not be significantly affected.

During the summer season, around summer solstice, there would be no incremental shadows from Prototype 11. Sunlight sensitive features on Open Space 02 would not suffer from significant loss of direct sunlight.

During the cold winter season, around winter solstice, when shadows would be stretched farthest from their origin, there would be notable incremental shadow coverage. However, the open space would continue to receive direct sunlight as such stretched shadows move from east to west quickly throughout the day and each seating area would only be affected by the incremental shadows for limited amount of time in a day. The incremental shadow in cold winter season, when temperatures is cold and the use of open space would not be as high (compared to warmer months), would not significantly affect the utilization or enjoyment of this open space resource. The potential amount of heat one could gain from direct sunlight during New York City's cold season would be limited. Furthermore, any vegetation would not be affected by incremental shadows, as the December 21 analysis day falls outside of the plant growing season defined by the *CEQR Technical Manual*. Therefore, the incremental shadows that could result from the Proposed Action are not anticipated to adversely impact the usability of OS 02. Therefore, the Proposed Action is not expected to result in significant adverse shadow impacts.


Figure 7-5




March 21 (September 21)

Sweep (8:00AM - 12:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype


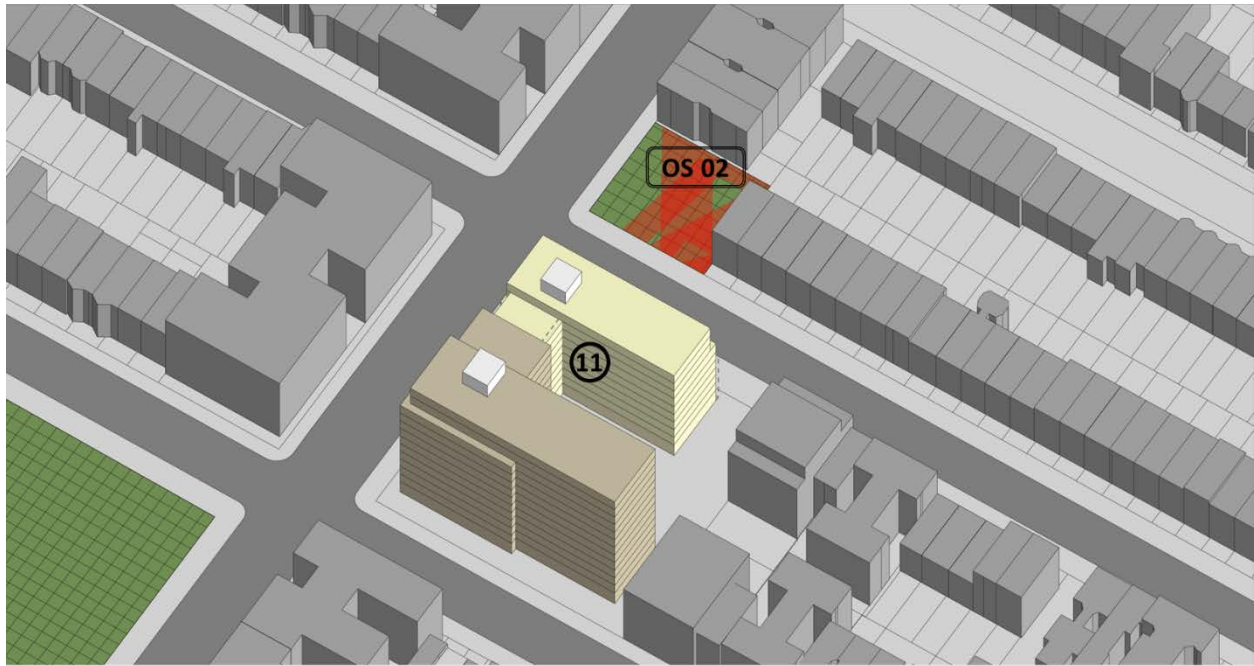
 Worst case building envelop




Figure 7-6




December 21


Sweep (9:00AM, 12:00PM - 2:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Prototype

 Shadow sensitive resource

 Worst case building envelop

### ***Prototypical Neighborhood 3: R10A District, Prototype 12***

#### Open Space:

This open space (OS 03) is assumed to be a generic 1.65 acre publicly accessible open space typically seen in New York City's neighborhoods where high density residence districts such as R10A districts are mapped. OS 03 is assumed to function as a playground with multiple jungle-gyms, bench seating and contain planting areas, a multi-purpose sports field and basketball and wall tennis fields.

The Proposed Action would result in new incremental shadows of varying duration and coverage on Spring/Fall Equinoxes (March 21/September 21, respectively) and on Winter Solstice (December 21). Incremental shadows would last for a total of approximately 1 hour and 17 minutes (from 1:34PM to 2:51PM) on March 21/September 21, and approximately 2 hours and 19 minutes (from 10:45AM to 1:04PM) on December 21.

On March 21/September 21, as shown, a small incremental shadow from Prototype 12 would reach the southeast section of OS 03 at 1:34PM, move toward east, and then exit by 2:51PM.

There is no incremental shadow on OS 01 on May 6/August 6 and June 21.

On December 21, as shown, a small incremental shadow from Prototype 12 reaches the open space at 10:45AM near the northwest edge of OS 03, moves toward east through the northwestern section and almost completely exits OS 03 by 1:00PM.

#### Assessment:

During the early spring and early fall seasons, around spring and fall equinoxes, when direct sunlight is mostly appreciated by open space users, an incremental shadow from Prototype 12 would be limited to cover about 10' by 10' area and quickly blend into shadows from surrounding buildings. The impacted area could potentially feature sunlight sensitive resources including seating areas and planting areas. Since the incremental shadow would be limited and the shadow moves from east to west throughout the day, these potential sunlight sensitive resources would not suffer from a significant loss of direct sunlight. Furthermore, the open space would continue to receive adequate sunlight during the plant growth season (at least the four to six hours minimum specified in the *CEQR Technical Manual*) and the health of vegetation would not be significantly affected.

During the summer season, around summer solstice, there would be no incremental shadow from Prototype 12. Sunlight sensitive features on Open Space 03 would not suffer from significant loss of direct sunlight due to the Proposed Action.

During the cold winter season, around winter solstice, when shadows would be stretched farthest from their origin, a significant portion of OS 03 is already in shadow from surrounding buildings. The incremental shadow from Prototype 12 would be the largest in size among all of analysis dates. However, such stretched shadow would move from east to west quickly throughout the shadow in and exit timeframe and each potential seating area within the impacted area would only be affected by the incremental shadows for limited amount of time in a day. The incremental shadow in cold winter season, when temperatures is cold and the use of open space would not be as high (compared to warmer months), would not significantly affect the utilization or enjoyment of this open space resource. The potential amount of heat one could gain from direct sunlight during New York City's cold season would be limited. Furthermore, any vegetation would not be affected by incremental shadows, as the December 21 analysis day falls outside of the plant growing season defined by the *CEQR Technical Manual*. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact the usability of OS 03.

Therefore, the Proposed Action is not expected to result in significant adverse shadow impacts.


Figure 7-7





March 21 (September 21)

2:00PM

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Prototype

 Shadow sensitive resource


 Worst case building envelop

Figure 7-8



**Prototypical Neighborhood 4: R10A District, Prototype 13 and Prototype 15**

Open Space:

As described above, OS 03 is assumed to be a generic 1.65 acre publicly accessible open space typically seen in New York City’s neighborhoods where high density residence districts such as R10A districts are mapped. OS 03 functions as a playground with multiple jungle-gyms, bench seating and also contains planting areas, a multi-purpose sports field and basketball and wall tennis fields.

The Proposed Action would result in new incremental shadows of varying duration and coverage on Spring/Fall Equinoxes (March 21/September 21, respectively) and on Winter Solstice (December 21). Incremental shadows would last for a total of approximately 3 hours and 18 minutes (from 12:26PM to 3:44PM) on March 21/September 21, and approximately 2 hours and 50 minutes (from 10:45AM to 1:35PM) on December 21.

On March 21/September 21, as shown, a small incremental shadow from Prototype 13 reaches the southeast section of OS 03 at 12:26PM. A small incremental shadow from Prototype 15 reaches approximately the lower middle section of OS 03 at 12:37. These two incremental shadows moves toward the eastern section of the open space and their size slightly increase as time nears the middle of the afternoon. By 2:51PM, the incremental shadow from Prototype 13 completely exits OS 03. The incremental shadow from Prototype 15 completely exists OS 03 by 3:44PM.

There is no incremental shadow on OS 01 on May 6/August 6 and June 21.

On December 21, as shown, an incremental shadow from Prototype 13 reaches OS 03 at 10:44AM near the northwestern corner of the open space. The incremental shadow moves along the northern boundary of OS 03 and completely exists the open space by 1:04PM. An incremental shadow from Prototype 15 reaches OS 03 near the northwest corner of OS03 at 12:14PM and moves along the northern boundary of OS 03 toward the middle of the open space. The incremental shadow completely exits OS 03 by 1:35PM.

Assessment:

During the early spring and early fall seasons, around spring and fall equinoxes, when direct sunlight is mostly appreciated by open space users, incremental shadows from Prototype 13 and 15 would cover limited portions of lower western section of OS 03 in early afternoon. The impacted area could potentially feature sunlight sensitive resources including seating areas and planting areas. Since the incremental shadow would be limited and the shadow moves from east to west throughout the day, these potential sunlight sensitive resources would not suffer from a significant loss of direct sunlight. Furthermore, the open space would continue to receive adequate sunlight during the plant growth season (at least the four to six hours minimum specified in the *CEQR Technical Manual*) and the health of vegetation would not be significantly affected.

During the summer season, around summer solstice, there would be no incremental shadow from both Prototype 13 and Prototype 15. Sunlight sensitive features on Open Space 03 would not suffer from significant loss of direct sunlight due to the Proposed Action.

During the cold winter season, around winter solstice, when shadows would be stretched farthest from their origin, a significant portion of OS 03 is already in shadow from surrounding buildings. The incremental shadow from Prototype 13 and Prototype 15 would be limited to the northwestern section of OS 03. Such stretched shadow would move from east to west quickly throughout the shadow in and exit timeframe and each potential seating area within the impacted area would only be affected by the incremental shadows for limited amount of time in a day. The incremental shadow in cold winter season, when temperatures is cold and the use of open space would not be as high (compared to warmer months), would not significantly affect the utilization or enjoyment of this open space resource. The potential amount of heat one could gain from direct sunlight during New York City's cold season would be limited. Furthermore, any vegetation would not be affected by incremental shadows, as the December 21 analysis day falls outside of the plant growing season defined by the *CEQR Technical Manual*. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact the usability of OS 03.

Therefore, the Proposed Action is not expected to result in significant adverse shadow impacts.


Figure 7-9




March 21 (September 21)

Sweep (1:00PM - 3:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Prototype

 Shadow sensitive resource


 Worst case building envelop


Figure 7-10




December 21


Sweep (11:00AM - 1:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Prototype

 Shadow sensitive resource

 Worst case building envelop

## ***Prototypical Neighborhood 5: C6-4A District, Prototype 14***

### Historic Resource:

This historic resource (HR 02) is assumed to be a generic house of worship typically seen in New York City's high density commercial/residential mixed-use districts. HR 02 is assumed to have a historic significance and contains sunlight sensitive features including stained glasses and sunlight-sensitive architectural design elements.

The Proposed Action would result in new incremental shadows of varying duration and coverage on three representative analysis days. Incremental shadows would last for a total of approximately 3 hours and 45 minutes (from 12:44 to 4:29PM) on March 21/September 21, approximately 4 hours and 39 minutes (from 12:15PM to 4:54PM) on May 6/August 6, and approximately 4 hours and 48 minutes (from 12:18PM to 5:06PM) on June 21.

On March 21/September 21, as shown, an incremental shadow from Prototype 14 would reach the rooftop on the western section of the house of worship building at 12:44PM and it moves through, mostly over the roof, toward the eastern frontage of HR 02. The incremental shadow reaches the easternmost section of HR 02 by 4:29PM, when the analysis timeframe ends.

On May 6/August 6, as shown, an incremental shadow from Prototype 14 would reach the western section of HR 02 and moves toward east, mostly over the roof, until the analysis timeframe ends at 4:54PM.

On June 21, as shown, an incremental shadow from Prototype 14 reaches the upper west corner of the south façade of HR 02 at 12:18PM and moves toward east, mostly over the roof and its small portion covering the south façade until shortly after 4:00PM when the incremental shadow completely exists the south façade.

### Assessment

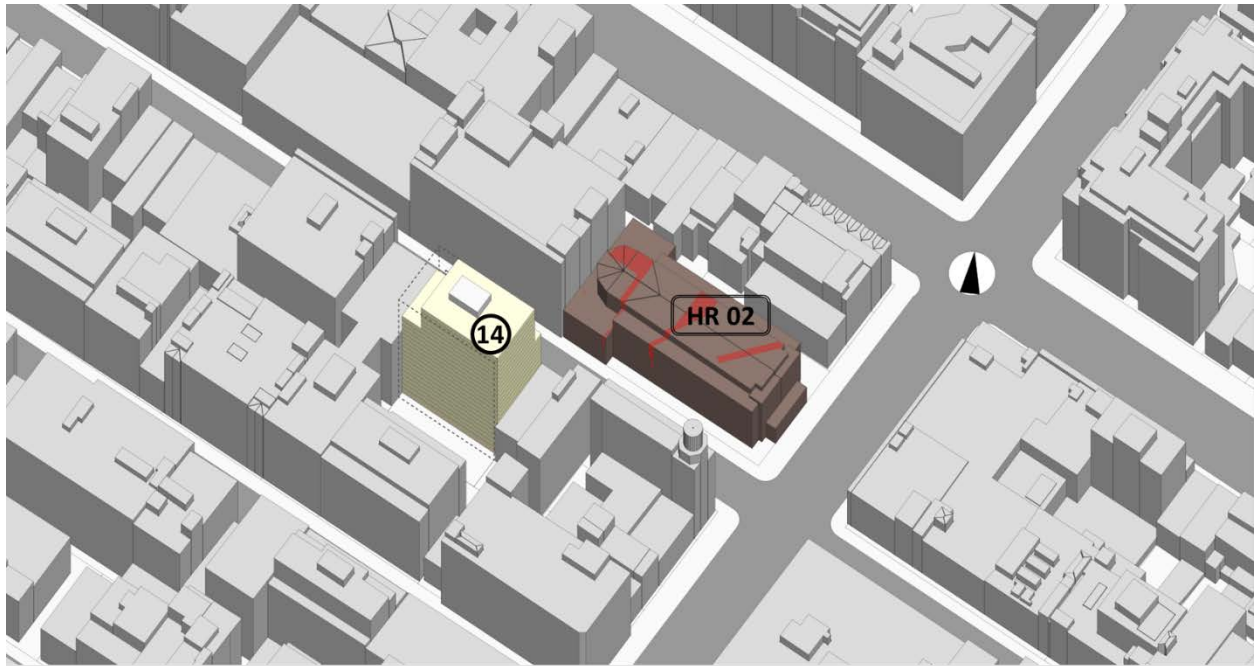
During the early spring and early fall seasons, around spring and fall equinoxes, a small incremental shadow from Prototype 14 would cover limited portion of the south facades of HR 02 for almost entire afternoon. However, since incremental shadow is thin and limited, surface area of a building façade with sunlight sensitive features would typically be limited, and shadows move from east to west throughout the day, sunlight sensitive features on the façade of historic and architectural resources would not suffer from a significant loss of direct sunlight for a prolonged time period as a result of the proposed action.

During the summer season, around summer solstice, a small incremental shadow from Prototype 14 covers a small portion of the south façade of HR 02 in the afternoon. However, sunlight sensitive features on the façade of historic and architectural resources would not suffer from a significant loss of direct sunlight for a prolonged time period as a result of the proposed action, since incremental shadow is thin and limited, surface area of a building façade with sunlight sensitive features would typically be limited, and a shadow move from east to west throughout the day.

During the cold winter season, around winter solstice, when shadows would be stretched farthest from their origin, almost entire HR 02 is under existing shadows from surrounding buildings. Sunlight sensitive features on HR 01 would not suffer from significant loss of direct sunlight. Therefore, the Proposed Action is not expected to result in significant adverse shadow impacts.



Figure 7-11



March 21 (September 21)

Sweep (1:00PM - 4:00PM)

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Figure 7-12

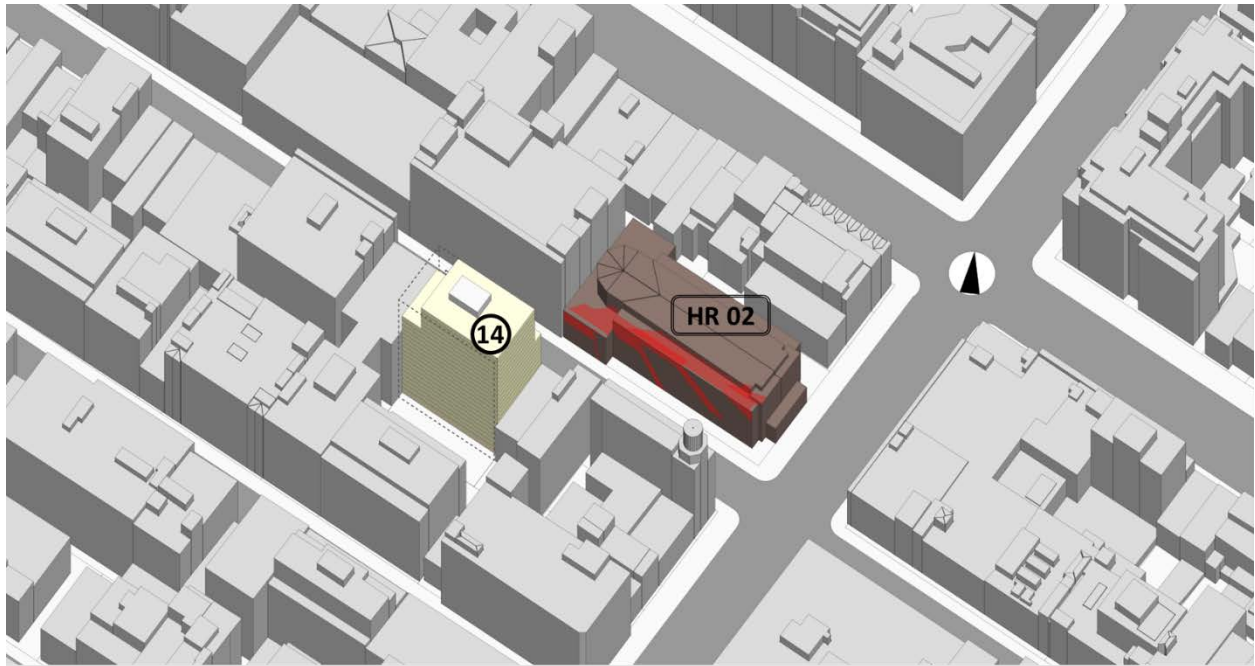


May 6 (August 6)

Sweep (1:00PM - 4:00PM)

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Figure 7-13



June 21

Sweep (1:00PM - 5:00PM)

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

## ***Prototypical Neighborhood 6: R8A District, Prototype 17***

### Historic Resource:

This historic resource (HR 03) is assumed to be a generic house of worship typically seen in New York City's medium to high density areas outside of Manhattan. HR 03 is assumed to have a historic significance and contain architectural features including stained glasses and other sunlight-sensitive architectural design elements.

The Proposed Action would result in new incremental shadows of varying duration and coverage on three representative analysis days. Incremental shadows would last for a total of approximately 4 hours and 35 minutes (from 12:00AM to 4:35PM) on March 21/September 21, approximately 1 hours and 31 minutes (from 1:40 to 3:11PM) on May 6/August 6, and approximately 4 hours and 5 minutes (from 10:48AM to 2:53PM) on December 21.

On March 21/September 21, as Figure 7-14 ~~Error! Reference source not found.~~ shows, an incremental shadow from Prototype 17 would reach the south façade of HR 03 at 12:00PM and moves through the façade toward the upper east corner of the façade. By 4:00PM, the incremental shadow completely exits the façade but still covers a small area on the roof of HR 03.

On May 6/August 6, as Figure 7-15 ~~Error! Reference source not found.~~ shows, an incremental shadow from Prototype 17 would reach the lower east portion of the south façade of HR 03 at 1:40PM. The incremental shadow continues to cover the lower portion and completely exits the façade by 3:11PM.

On December 21, as Figure 7-16 ~~Error! Reference source not found.~~ shows, an incremental shadow from Prototype 17 would reach the lower west portion of the south façade of HR 03 at 10:48AM and reaches approximately the middle portion of the façade by 12:00PM. By 1:00PM, the incremental shadow would reach the lower east portion of the south façade and it completely exits the façade at 2:04PM while the incremental shadow continue to cover a portion of the roof of HR 03 until 2:53PM, when the analysis timeframe ends.

### Assessment:

During the early spring and early fall seasons, around spring and fall equinoxes, a small incremental shadow from Prototype 17 would cover limited portion of the south facades of HR 03 in the early afternoon. Sunlight sensitive features on the façade of historic and architectural resources would not suffer from a significant loss of direct sunlight for a prolonged time period as a result of the proposed action, since the surface area of a building façade with sunlight sensitive features would typically be limited, and shadows move from east to west throughout the day.

During the late spring and mid-summer seasons, a small incremental shadow from Prototype 17 covers a small portion of the lower south façade portion of HR 03 in short period in the afternoon. Sunlight sensitive features on the façade of historic and architectural resources would not suffer from a significant loss of direct sunlight for a prolonged time period as a result of the proposed action, since incremental shadow is thin and limited, surface area of a building façade with sunlight sensitive features would typically be limited, and a shadow move from east to west throughout the day.

During the early summer season, around summer solstice, there would be no incremental shadow from Prototype 12. Sunlight sensitive features on Open Space 03 would not suffer from significant loss of direct sunlight due to the Proposed Action.

During the cold winter season, around winter solstice, when shadows would be stretched farthest from their origin, almost entire HR 02 is under existing shadows from surrounding buildings. Sunlight sensitive features on HR 01 would not suffer from significant loss of direct sunlight. Therefore, the Proposed Action is not expected to result in significant adverse shadow impacts.

Figure 7-14



March 21 (September 21)

Sweep (1:00PM - 3:00PM)





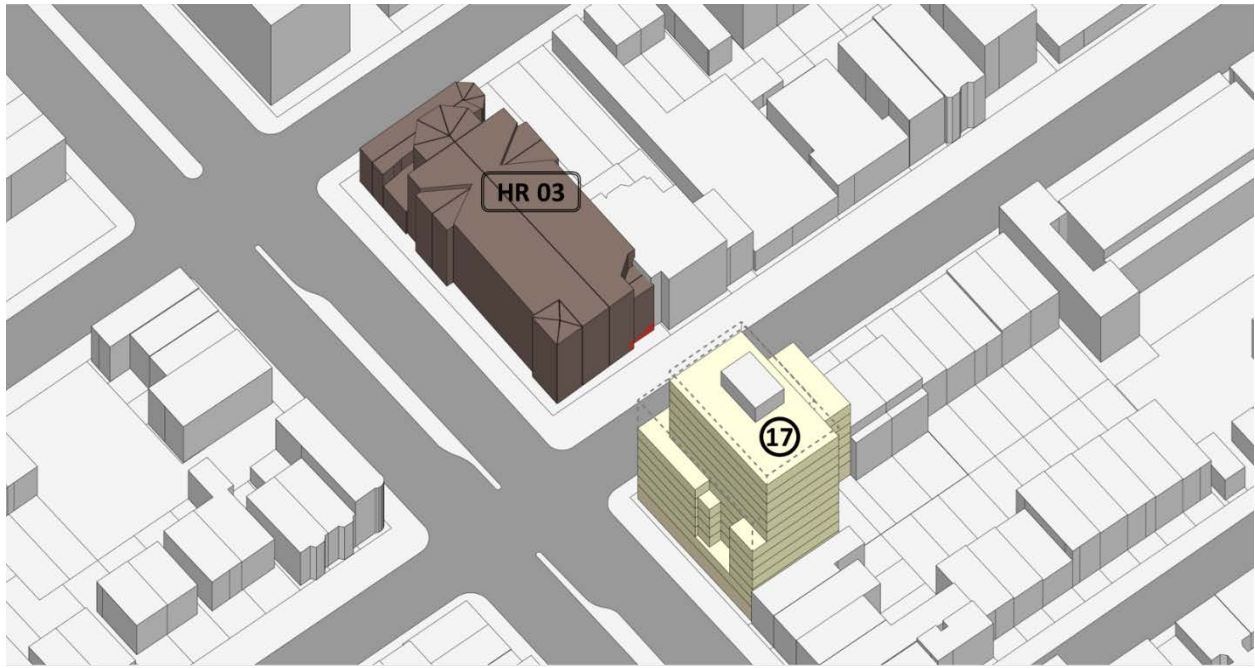
-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

Figure 7-15



May 6 (August 6)

Sweep (2:00PM - 3:00PM)





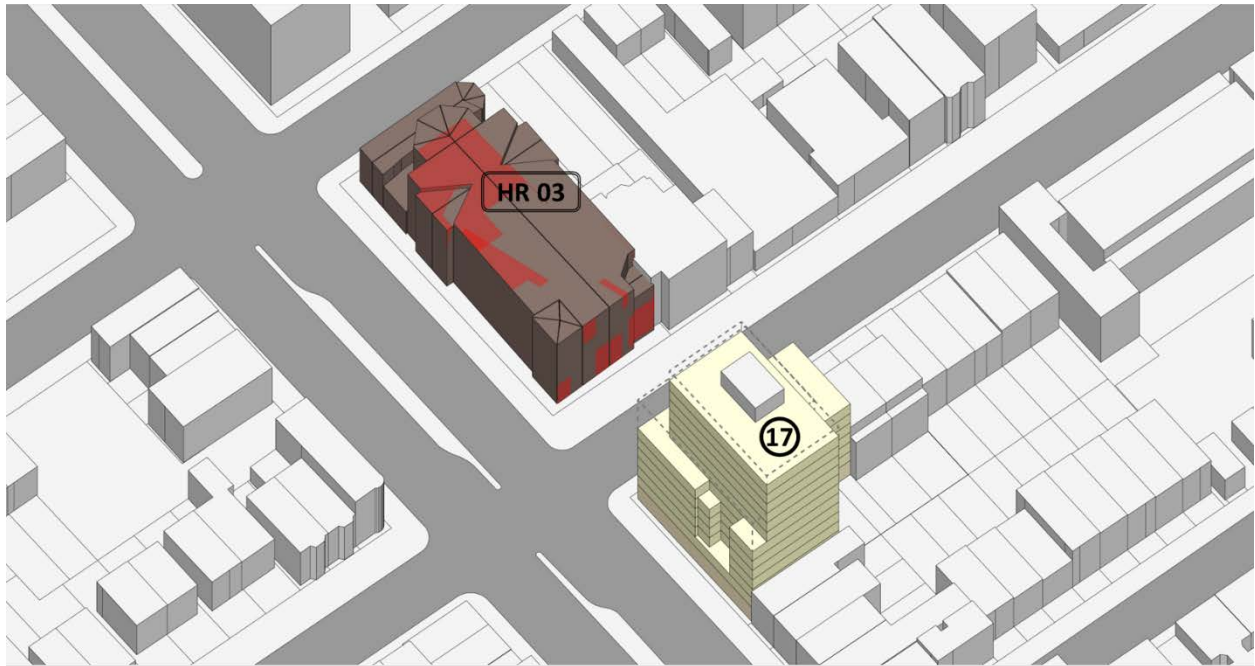




-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

Figure 7-16



December 21

Sweep (11:00PM - 2:00PM)

-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

## ***Prototypical Neighborhood 7: R4 District Prototype 24***

### Open Space:

This open space (OS 04) is assumed to be a generic 3.57 acre publicly accessible open space typically seen in New York City's neighborhoods where R4 districts are mapped. OS 04 is assumed to function as a playground with multiple jungle-gyms, bench seating and contain planting areas, a multi-purpose sports field, and basketball and wall tennis fields.

The proposed Action would result in new incremental shadows of varying duration and coverage on all of representative analysis days. Incremental shadows would last for a total of approximately 1 hour and 2 minutes (from 7:36AM to 8:38AM) on March 21/September 21, approximately 1 hour and 20 minutes (from 6:27AM to 7:47AM) on May 6/August 6, approximately 1 hour and 2 minutes (from 5:57AM to 6:59AM) on June 21, and 39 minutes (from 8:51AM to 9:30AM).

On March 21/September 21, as shown, an incremental shadow from Prototype 24 covers a portion of the southeast section of OS 04 by 7:36AM, when the analysis timeframe starts. The incremental shadow moves toward east and completely exits the open space by 8:38AM.

On May 6, as shown an incremental shadow from Prototype 24 covers a portion of the southeast section of OS 04 by 6:27AM, when the analysis timeframe starts. The incremental shadow moves toward east and completely exits the open space by 7:47AM.

On June 21, as Figure 7-19 shows, an incremental shadow from Prototype 24 covers a portion of the southeast section of OS 04 by 5:57AM, when the analysis timeframe starts. The incremental shadow moves toward east and completely exits the open space by 6:59AM.

On December 21, as shown, an incremental shadow from Prototype 24 covers a portion of the southeast section of OS 04 by 8:51PM. The incremental shadow moves toward east and completely exits the open space by 9:30AM.

### Assessment

During the early spring and early fall seasons, around spring and fall equinoxes, when direct sunlight is mostly appreciated by open space users, an incremental shadow from Prototype 24 would cover a limited portions of lower south section of OS 04 in early morning. The impacted area could potentially feature sunlight sensitive resources including seating areas and planting areas. Since the incremental shadow would be limited and the shadow moves from east to west throughout the day, these potential sunlight sensitive resources would not suffer from a significant loss of direct sunlight. Furthermore, the open space would continue to receive adequate sunlight during the plant growth season (at least the four to six hours minimum specified in the *CEQR Technical Manual*) and the health of vegetation would not be significantly affected.

During the summer season, around summer solstice, an incremental shadow from Prototype 24 would cover a limited portions of lower south section of OS 04 in early morning. The impacted area could potentially feature sunlight sensitive resources including seating areas and planting areas. Since the incremental shadow would be limited and the shadow moves early in the morning, these potential sunlight sensitive resources would not suffer from a significant loss of direct sunlight. Furthermore, the open space would continue to receive adequate sunlight during the plant growth season (at least the four to six hours minimum specified in the *CEQR Technical Manual*) and the health of vegetation would not be significantly affected.

During the cold winter season, around winter solstice, when shadows would be stretched farthest from their origin, the incremental shadow from Prototype 24 would be limited to the middle section of OS 04. Such stretched shadow would move to east quickly and each potential seating area within the impacted area would only be affected by the incremental shadows for limited amount of time in a day. The incremental shadow in cold winter season, when temperatures is cold and the use of open space would not be as high (compared to warmer months), would not significantly affect the utilization or enjoyment of this open space resource. The potential amount of heat one could gain from direct sunlight during New York City's cold season would be limited. Furthermore, any vegetation would



not be affected by incremental shadows, as the December 21 analysis day falls outside of the plant growing season defined by the *CEQR Technical Manual*. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact the usability of OS 03. Therefore, the Proposed Action is not expected to result in significant adverse shadow impacts.

**Figure 7-17**



March 21 (September 21)

8:00AM

Each grid cell on open space represents approximately 10' x 10' land area

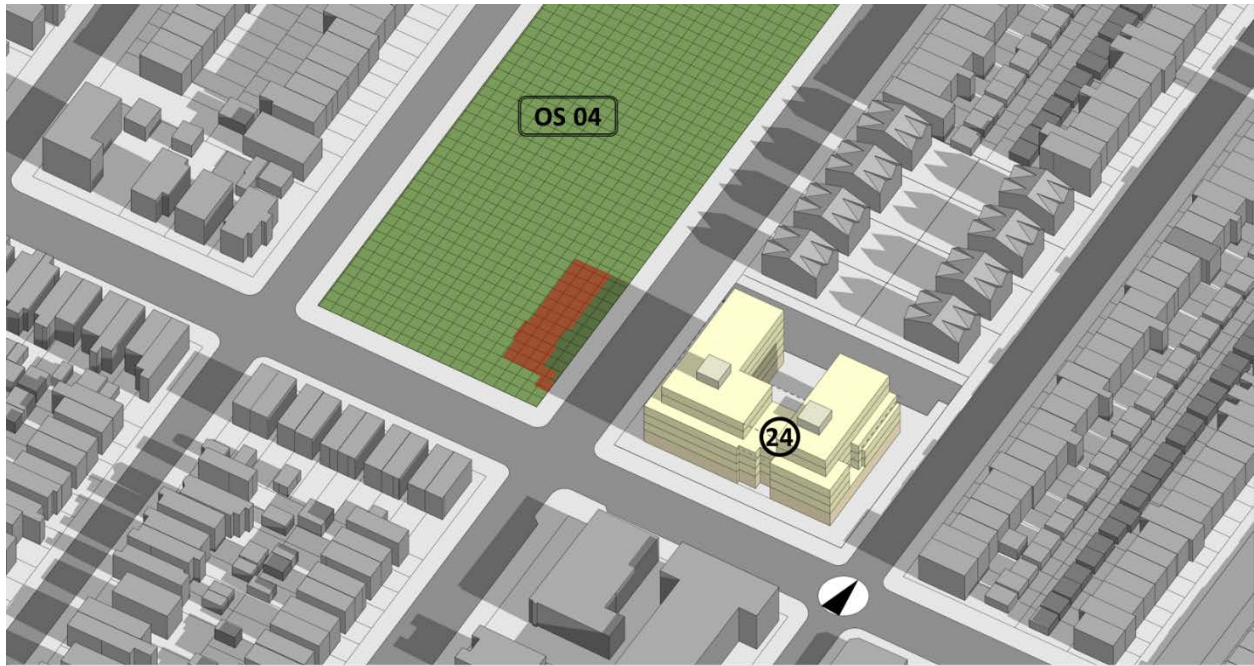
Potential incremental shadow

# Prototype

XX ## Shadow sensitive resource

Worst case building envelop


Figure 7-18




May 6 (August 6)

7:00AM

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Prototype

 Shadow sensitive resource


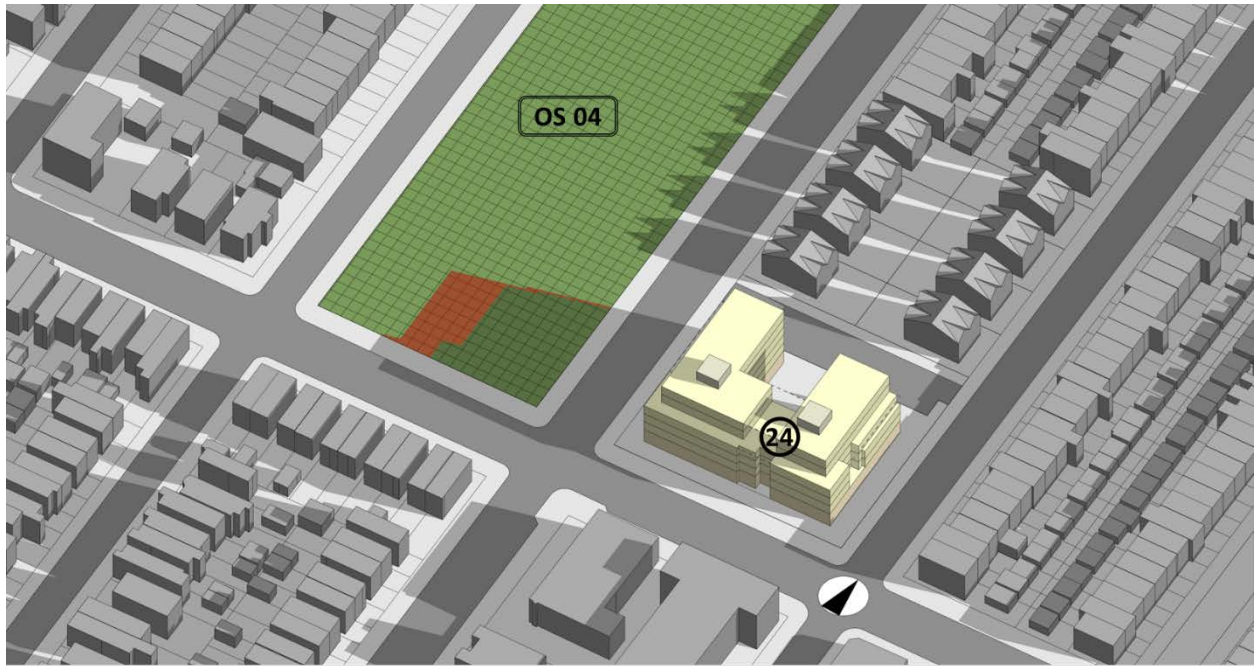
 Worst case building envelop


Figure 7-19




June 21

6:00AM

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Prototype

 Shadow sensitive resource


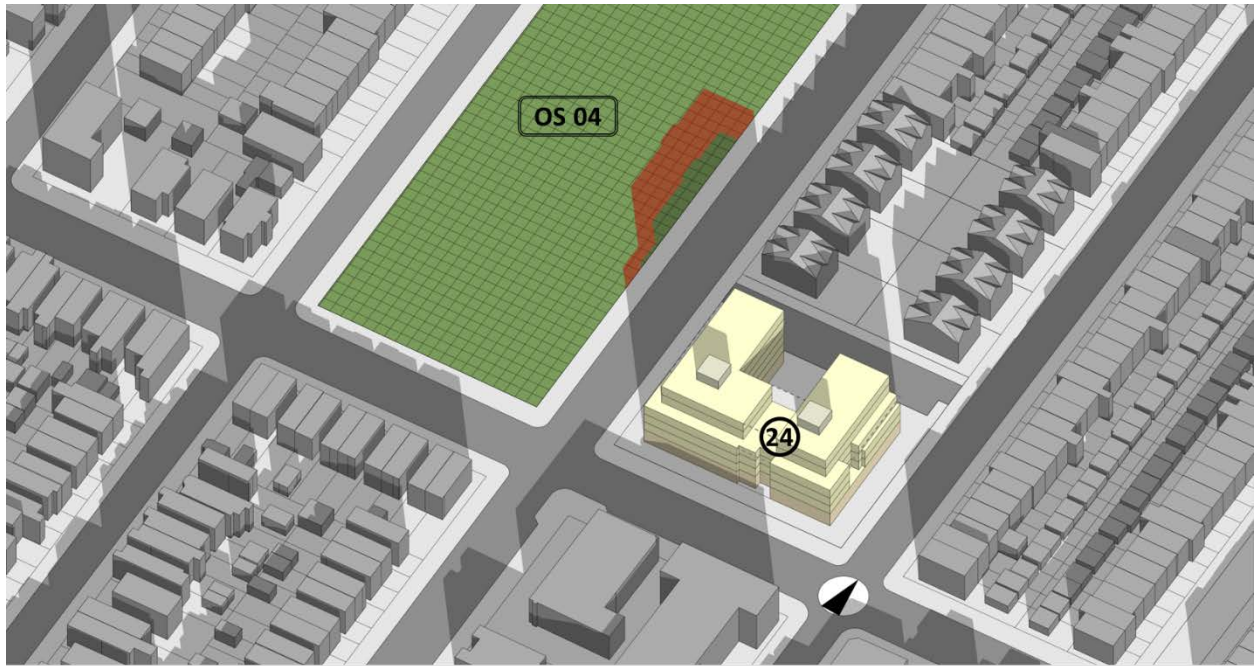
 Worst case building envelop


Figure 7-20




December 21


9:00AM

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Prototype

 Shadow sensitive resource

 Worst case building envelop

## ***Shadow Impact Assessment***

Detailed shadow impact assessments are included on the following pages.

## Analysis Group 1: Prototypes 1 and 3

Note: According to CEQR Technical Manual, "worst case" building envelopes, opposed to "reasonable worst case" envelopes modeled and shown in Prototype Chapter, are used to render shadows. These "worst case" massings are generally 10 to 20 percent over-built than permitted FAR.

Analysis Group	Prototype	Title	Analysis Day	March 21/Sept. 21	May 6/August 6	June 21	December 21
				7:36 AM – 4:29 PM	6:27 AM – 5:18 PM	5:57 AM – 6:01 PM	8:51 AM – 2:53 PM
Group 1	Prototype 1	R7A district, 100' x 100' interior lot on narrow street	Shadow enter - exit time	HR01 7:36AM - 10:58AM	-	-	HR01 8:51AM - 11:02AM
			Incremental shadow duration	HR01 3 hrs 22 mins	-	-	HR01 2 hrs 11 mins
Group 1	Prototype 3	R7A district adjoining an R4A District, Inclusionary Housing, 100' x 100' corner lot on wide and narrow streets	Shadow enter - exit time	HR01 7:36AM - 8:06AM OS01 7:36AM - 1:09PM	HR01 6:27AM - 8:09AM	HR01 5:57AM - 7:58AM	OS01 8:51AM - 2:37PM
			Incremental shadow duration	HR01 30 mins OS01 5 hrs 33 mins	HR01 1 hr 42 mins	HR01 2 hrs 1 mins	OS01 5 hrs 46 mins

Analysis Group 1: Prototypes 1 and 3

March 21 (September 21)

Incremental Shadow Start and End:  
7:36AM - 1:09PM



Analysis Group 1: Prototypes 1 and 3





March 21 (September 21)

8:00AM

Each grid cell on open space represents  
approximately 10' x 10' land area

 Potential incremental shadow  
 Shadow sensitive resource

 Prototype  
 Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



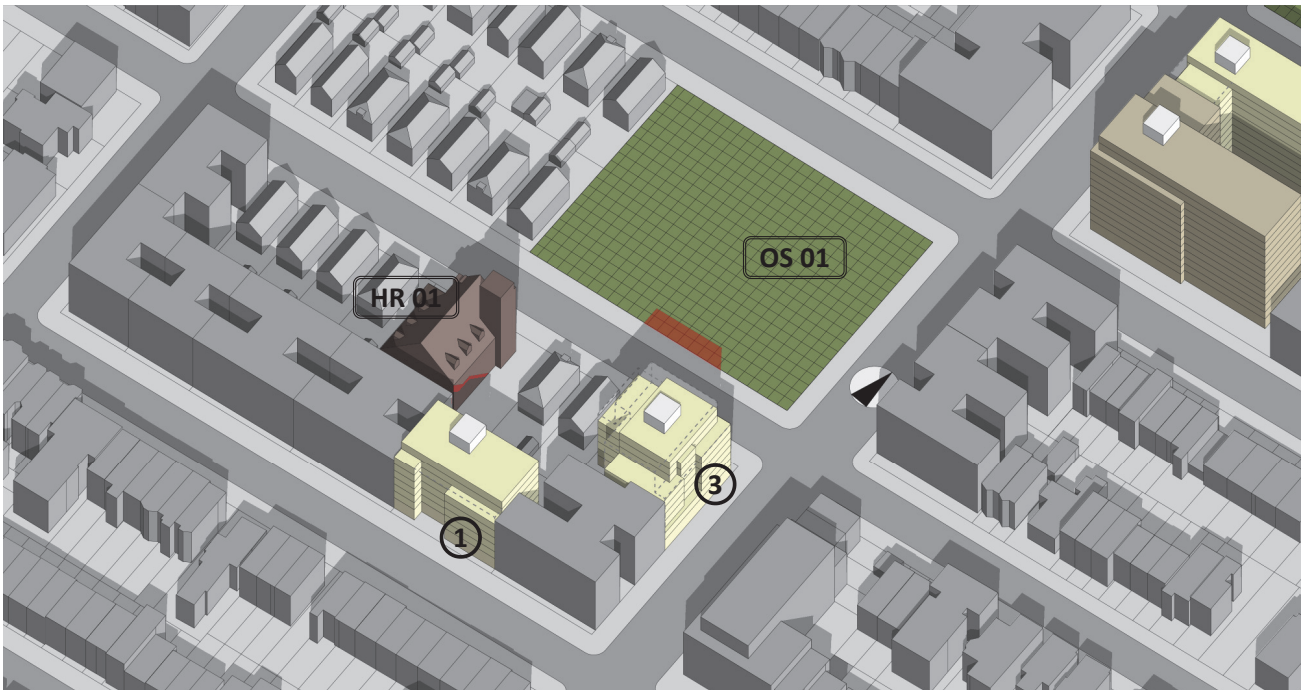
March 21 (September 21)

9:00AM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



March 21 (September 21)

10:00AM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop



Analysis Group 1: Prototypes 1 and 3



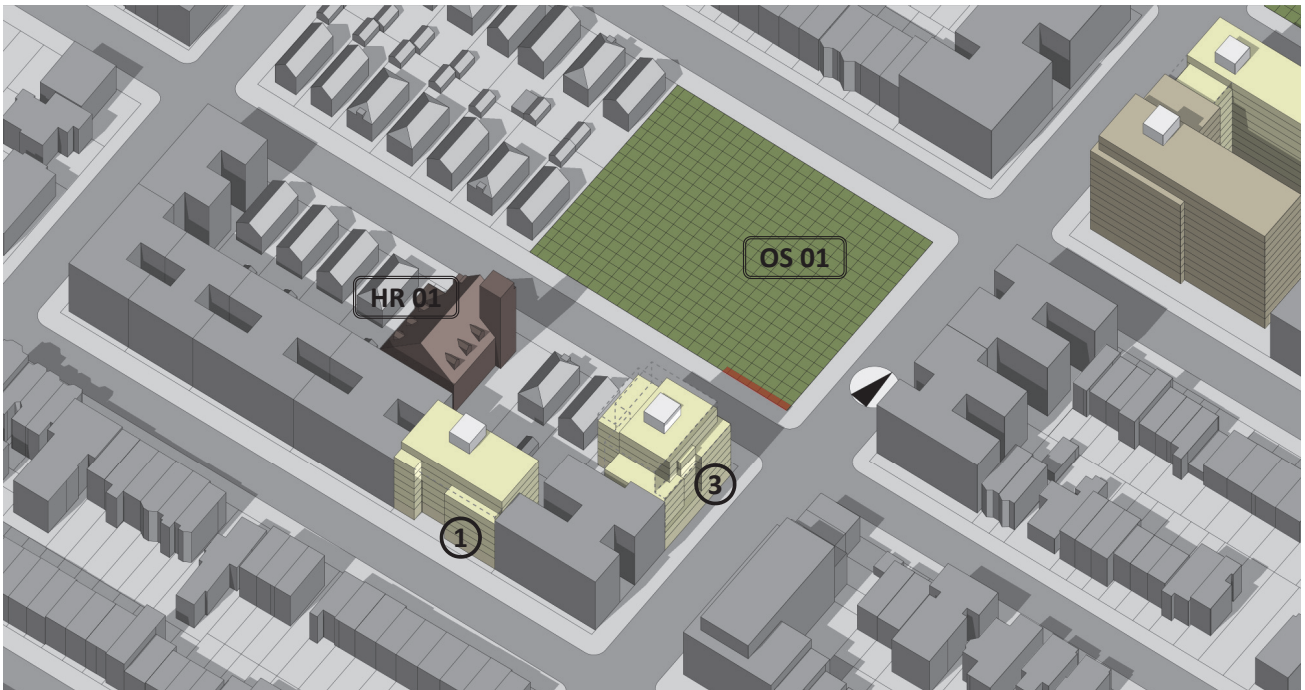
March 21 (September 21)

11:00AM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



March 21 (September 21)

12:00PM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



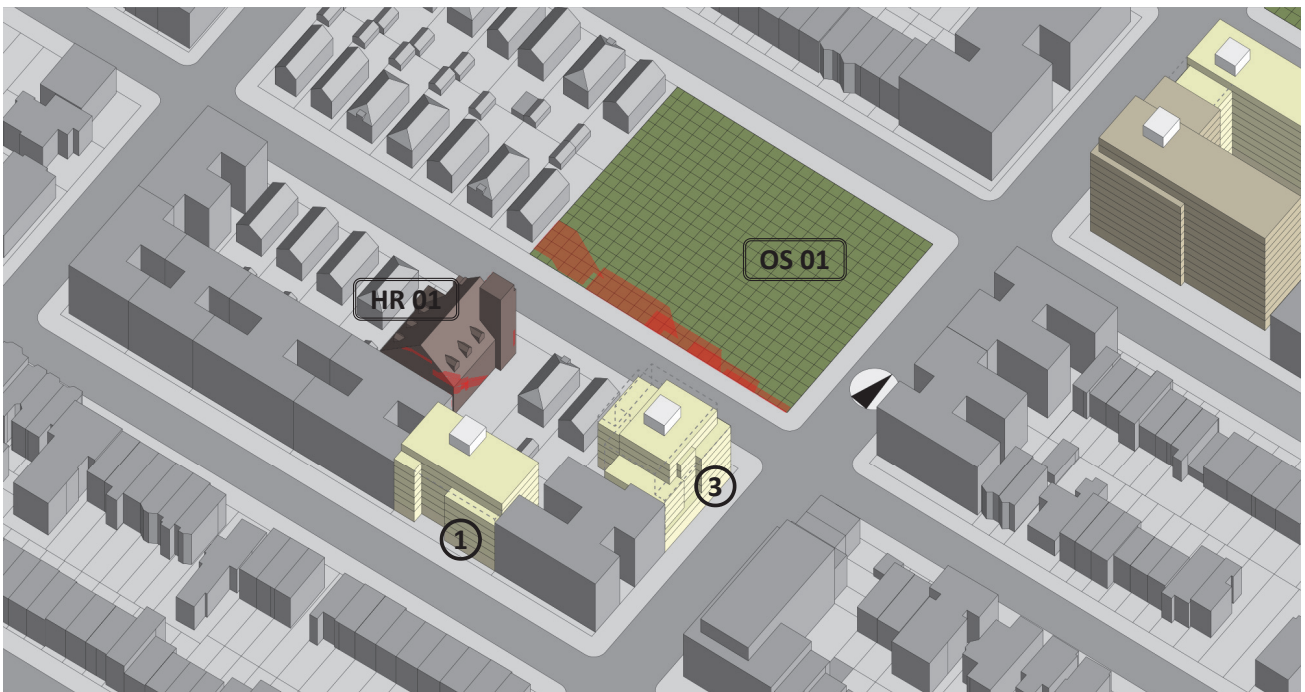
March 21 (September 21)

1:00PM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



March 21 (September 21)

Sweep (8:00AM - 1:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 1: Prototypes 1 and 3

May 6 (August 6)

Incremental Shadow Start and End:  
6:27AM - 8:09AM


Analysis Group 1: Prototypes 1 and 3




May 6

7:00AM

Each grid cell on open space represents approximately 10' x 10' land area

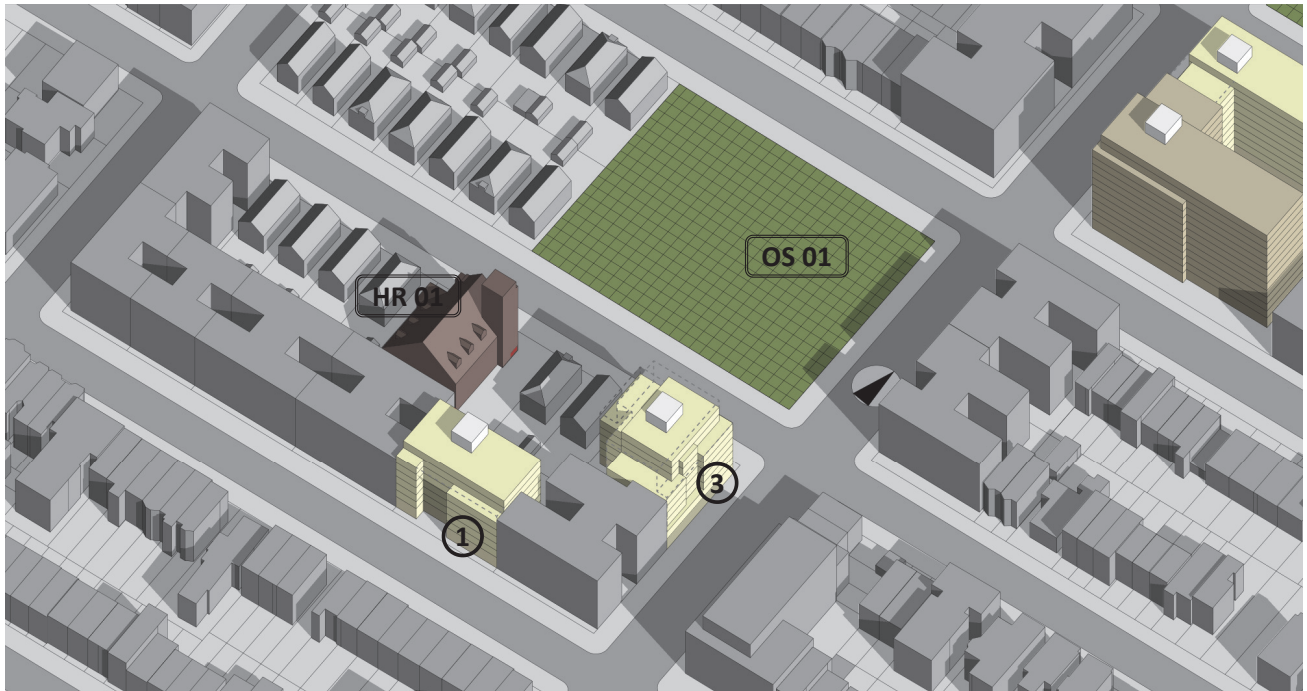
 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



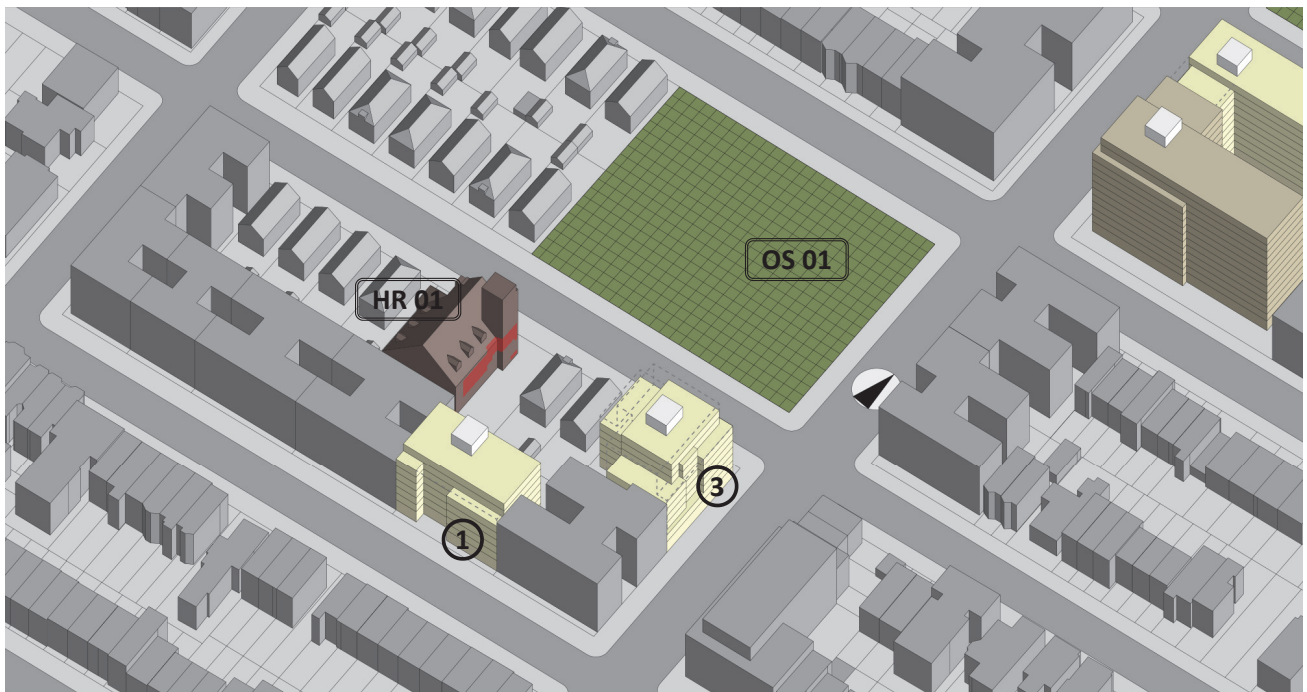
May 6

8:00AM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



May 6

Sweep (7:00AM - 8:00AM)

Each grid cell on open space represents approximately 10' x 10' land area

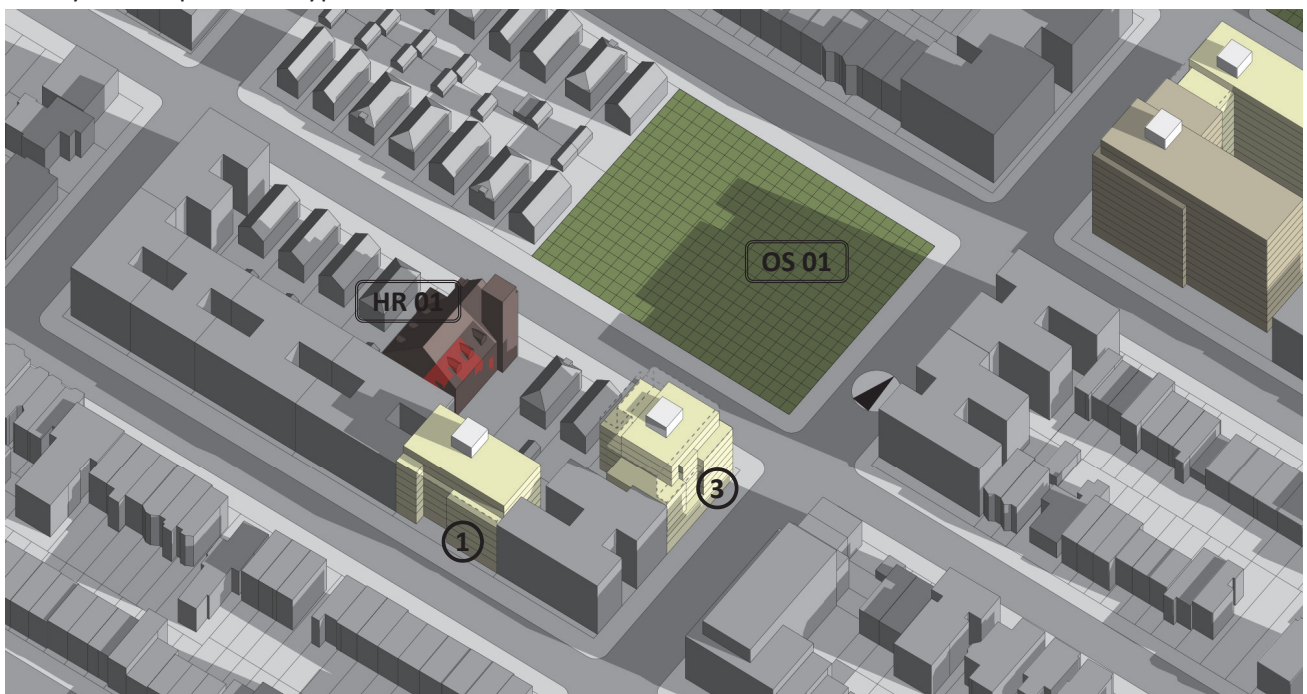
- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 1: Prototypes 1 and 3

June 21

Incremental Shadow Start and End:  
5:57AM - 7:58AM


Analysis Group 1: Prototypes 1 and 3




June 21

6:00AM

Each grid cell on open space represents approximately 10' x 10' land area

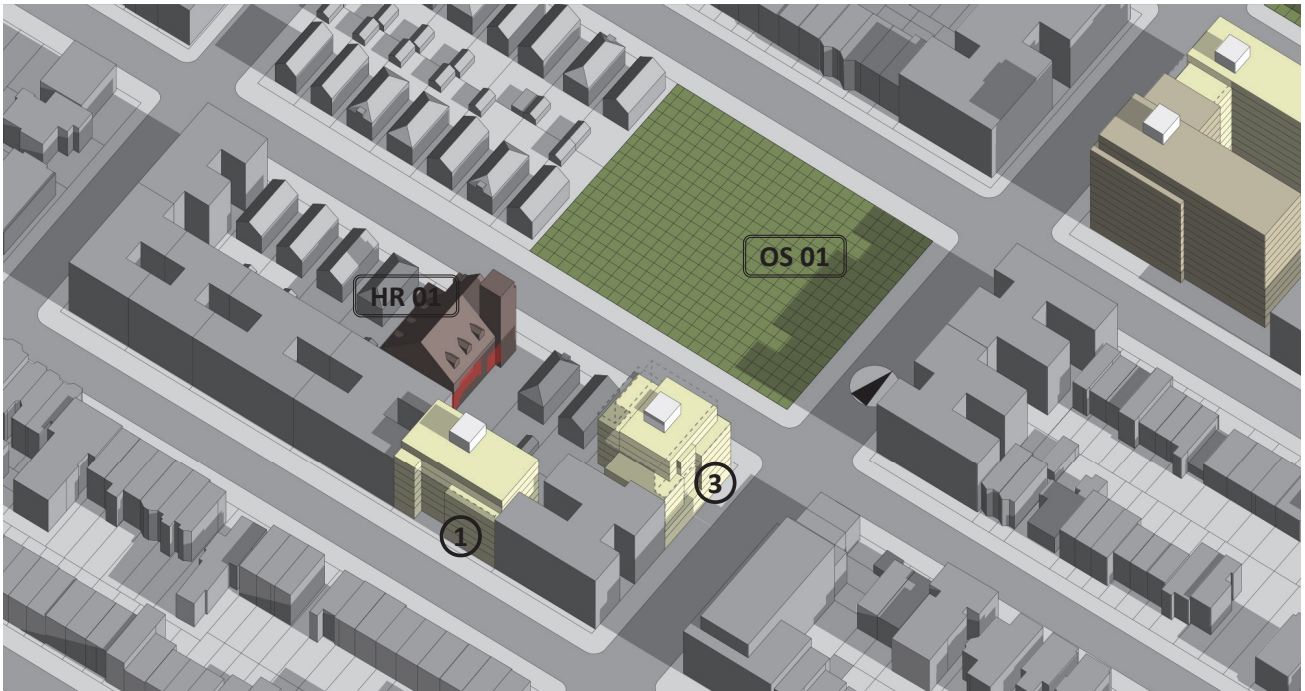
 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



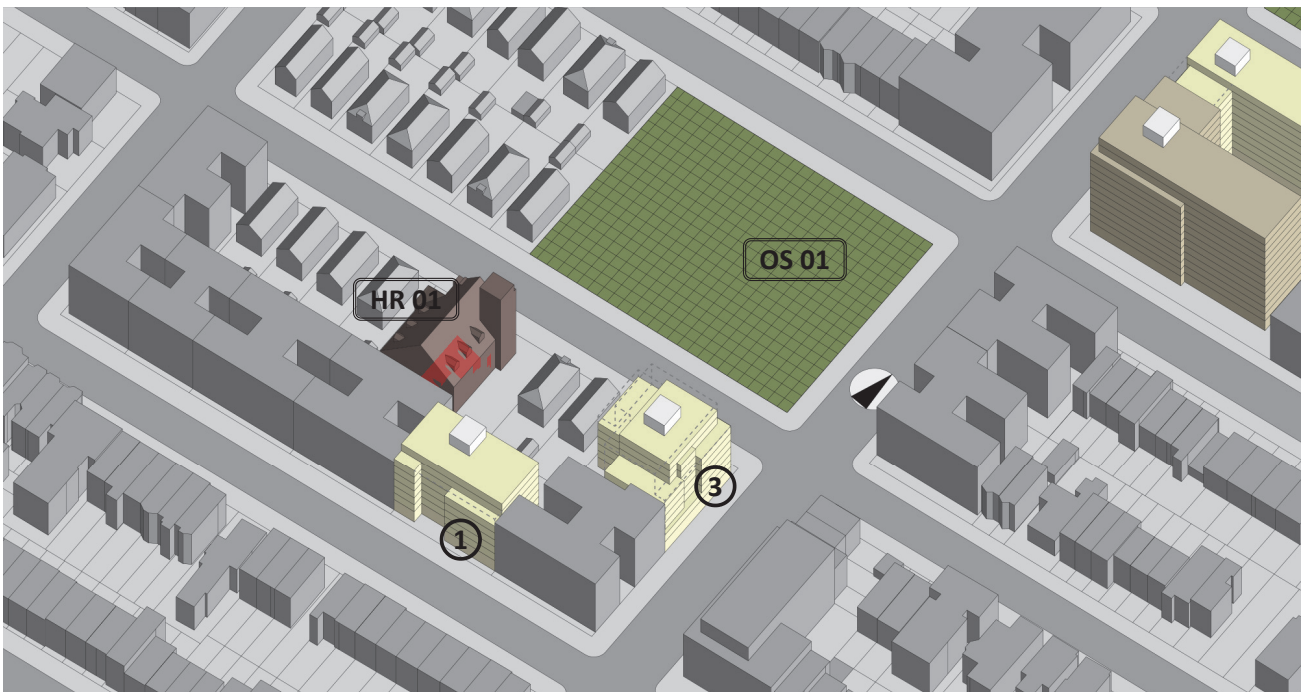
June 21

7:00AM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



June 21

Sweep (6:00AM - 7:00AM)

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 1: Prototypes 1 and 3

December 21

Incremental Shadow Start and End:  
8:51AM - 2:37PM



Analysis Group 1: Prototypes 1 and 3





December 21

9:00AM

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow  
 Shadow sensitive resource

 Prototype  
 Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



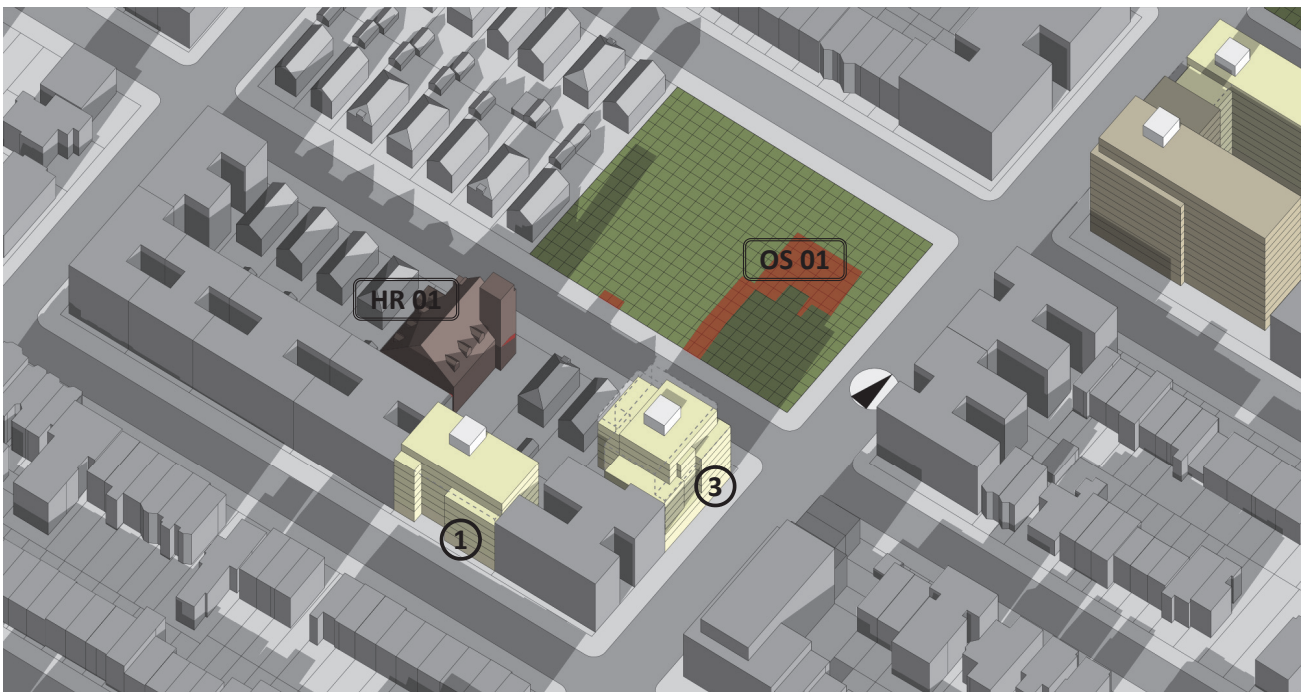
December 21

10:00AM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- # Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



December 21

11:00AM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- # Worst case building envelop



Analysis Group 1: Prototypes 1 and 3



December 21

12:00PM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- Worst case building envelop
- # Prototype

Analysis Group 1: Prototypes 1 and 3



December 21

1:00PM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- Worst case building envelop
- # Prototype

Analysis Group 1: Prototypes 1 and 3



December 21

2:00PM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 1: Prototypes 1 and 3



December 21

Sweep (9:00AM - 2:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

## Analysis Group 2: Prototype 11

Note: According to CEQR Technical Manual, "worst case" building envelopes, opposed to "reasonable worst case" envelopes modeled and shown in Prototype Chapter, are used to render shadows. These "worst case" massings are generally 10 to 20 percent over-built than permitted FAR.

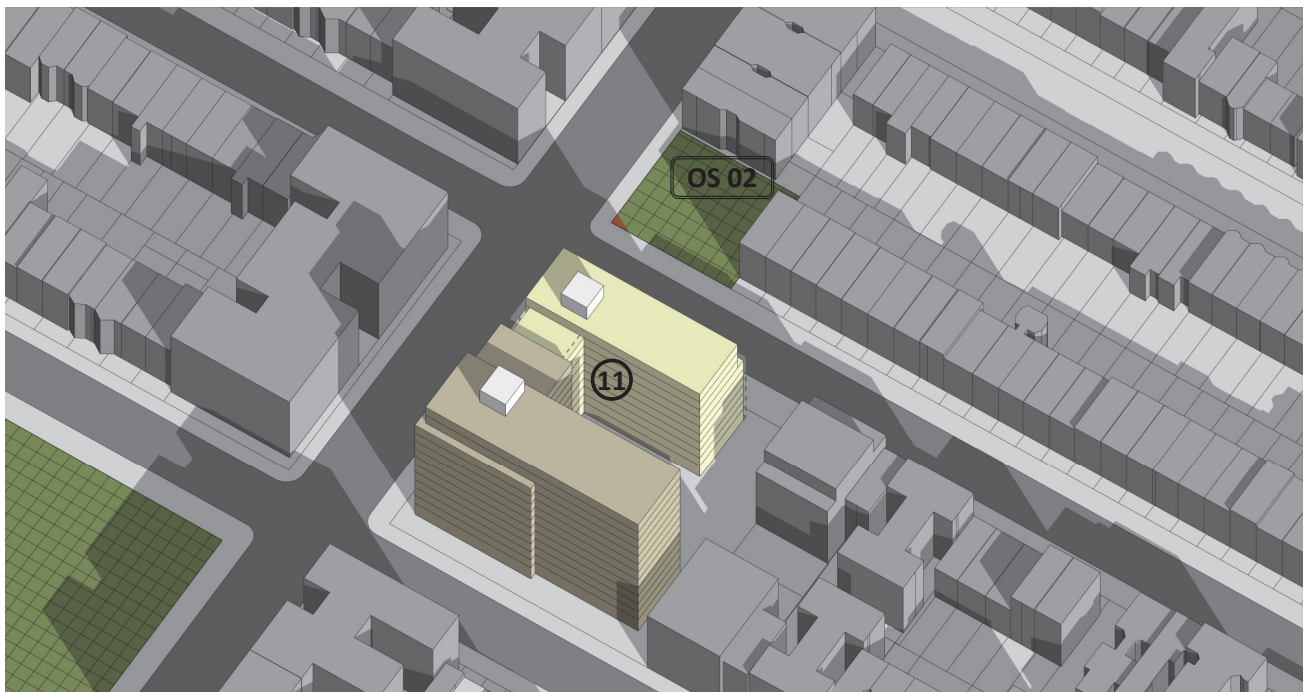
Analysis Group	Prototype	Title	Analysis Day	March 21/Sept. 21	May 6/August 6	June 21	December 21
				7:36 AM – 4:29 PM	6:27 AM – 5:18 PM	5:57 AM – 6:01 PM	8:51 AM – 2:53 PM
Group 2	Prototype 11	R7A District, parking reduction for Affordable Independent Residences for Seniors, 200' x 200' through lot on wide and narrow streets	Shadow enter - exit time	OS02 7:48AM - 12:30PM	-	-	OS02 8:51AM - 09:42AM OS02 11:12AM - 2:32PM
			Incremental shadow duration	OS02 4 hrs 42 mins	-	-	OS02 51 mins OS02 3 hrs 20 mins

Analysis Group 2: Prototype 11

March 21 (September 21)

Incremental Shadow Start and End:  
7:48AM - 12:30PM


Analysis Group 2: Prototype 11





March 21 (September 21)

8:00AM

Each grid cell on open space represents  
approximately 10' x 10' land area

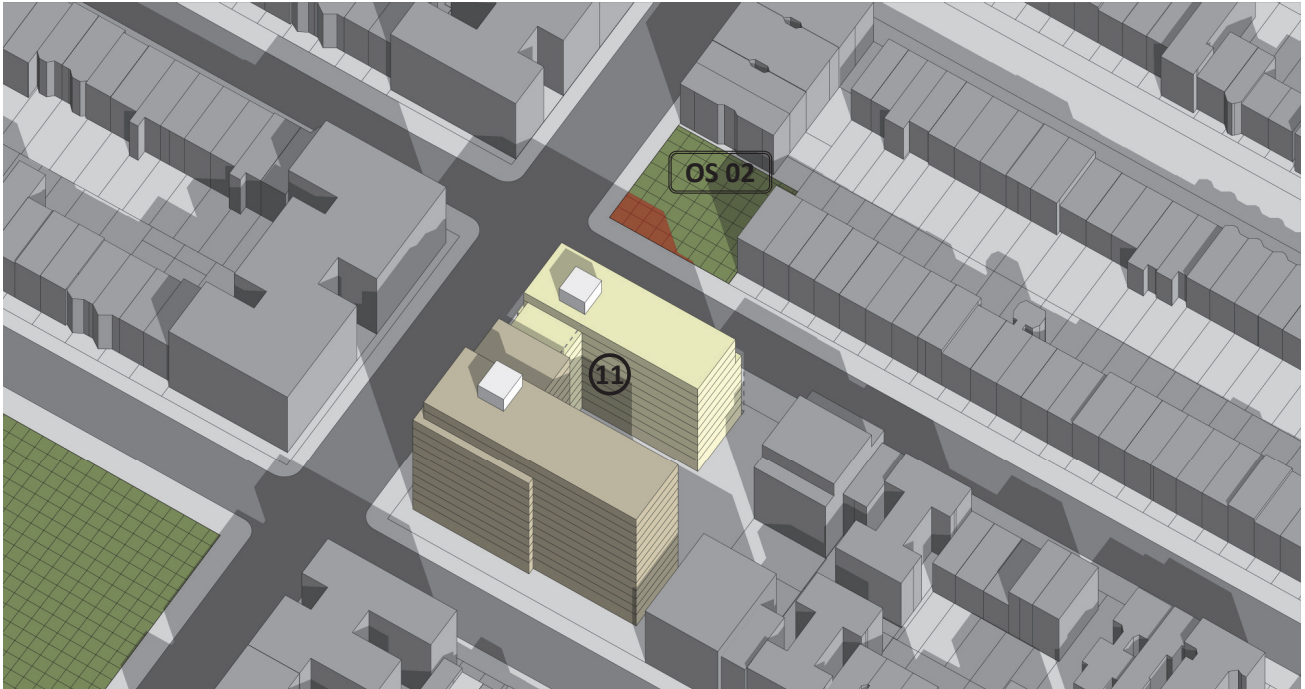
 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop



Analysis Group 2: Prototype 11



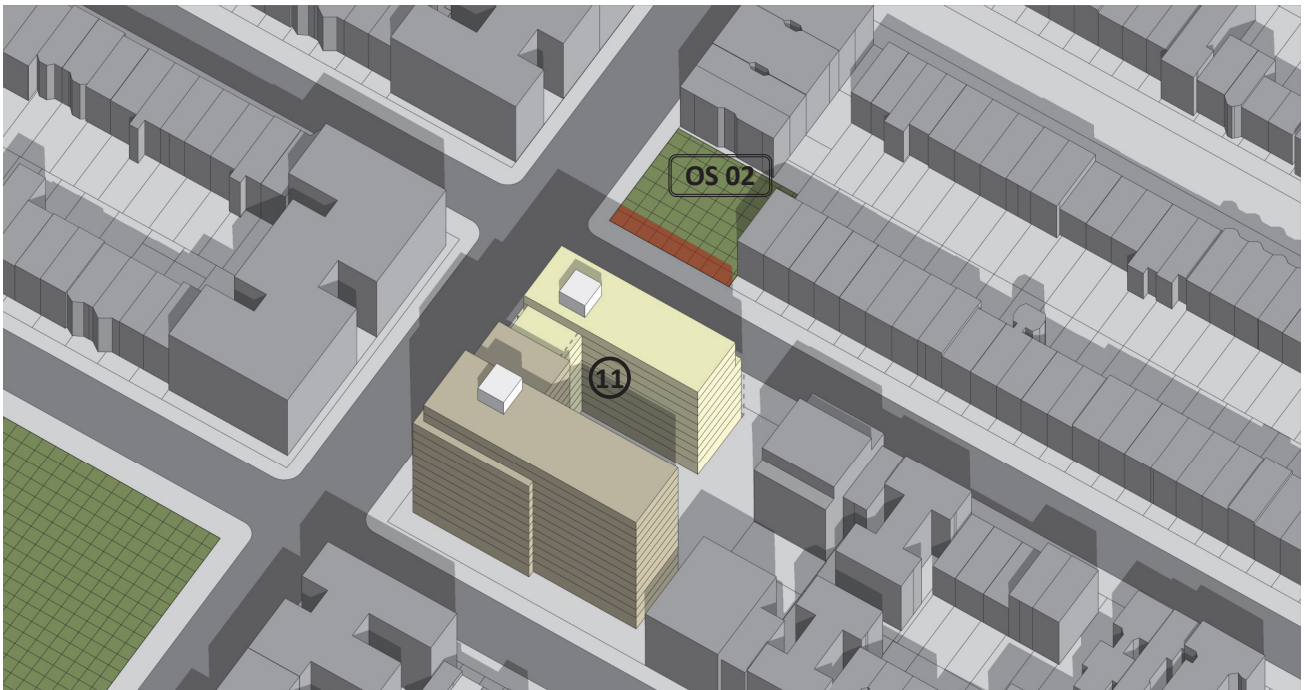
March 21 (September 21)

9:00AM

Each grid cell on open space represents approximately 10' x 10' land area

-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop





Analysis Group 2: Prototype 11



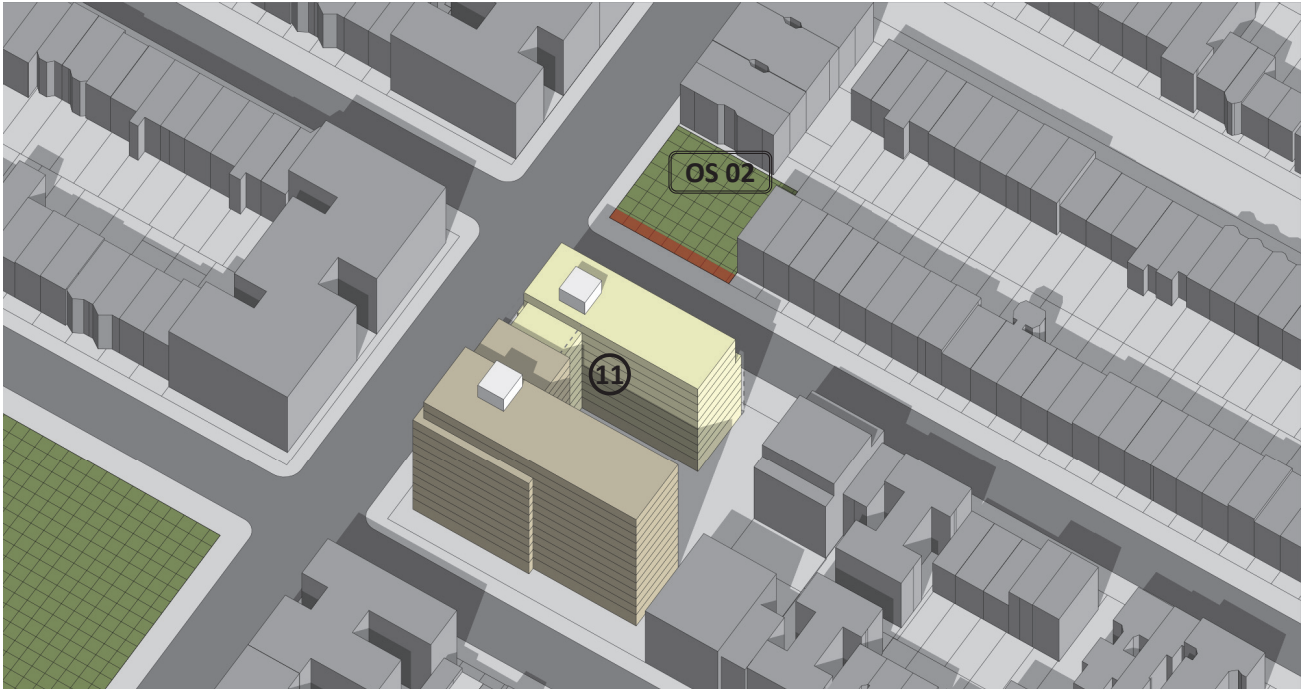
March 21 (September 21)

10:00AM

Each grid cell on open space represents approximately 10' x 10' land area

-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop





Analysis Group 2: Prototype 11



March 21 (September 21)

11:00AM

Each grid cell on open space represents approximately 10' x 10' land area

-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop





Analysis Group 2: Prototype 11



March 21 (September 21)

12:00PM

Each grid cell on open space represents approximately 10' x 10' land area

-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop


## Analysis Group 2: Prototype 11




March 21 (September 21)


Sweep (8:00AM - 12:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop

Analysis Group 2: Prototype 11

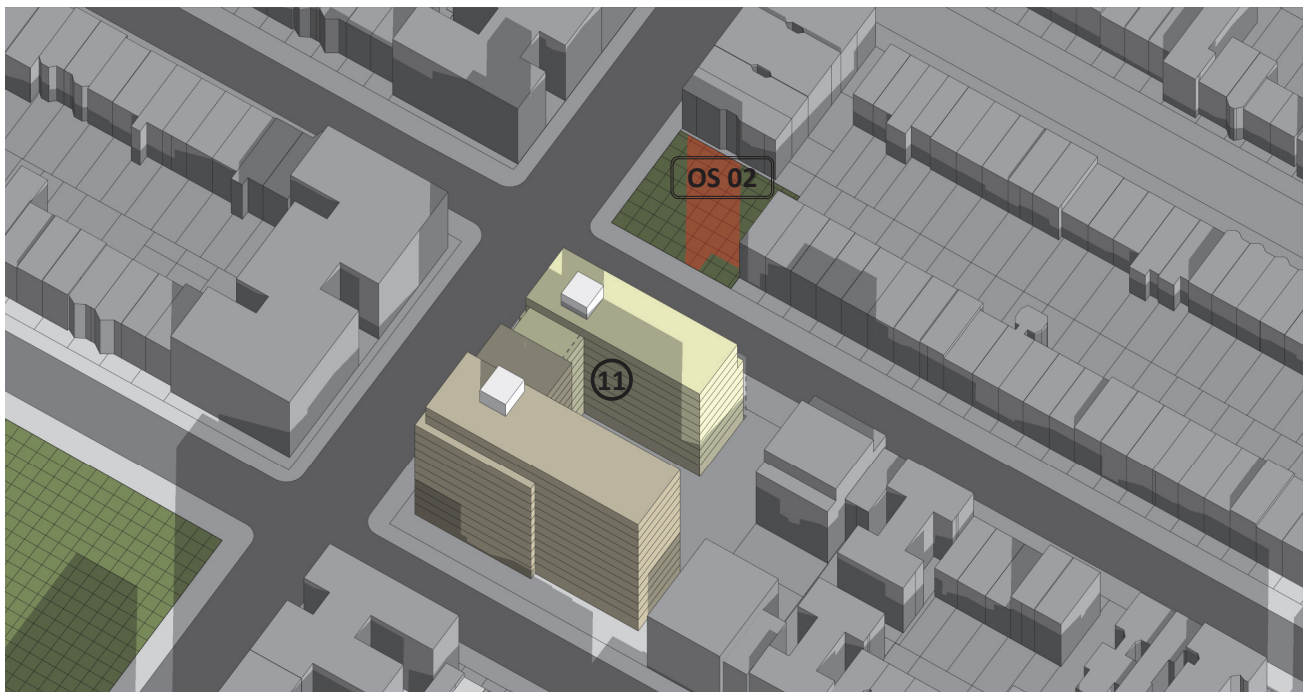
December 21

Incremental Shadow Start and End:

8:51AM - 9:42AM

11:12AM - 2:32PM


Analysis Group 2: Prototype 11




December 21

9:00AM

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

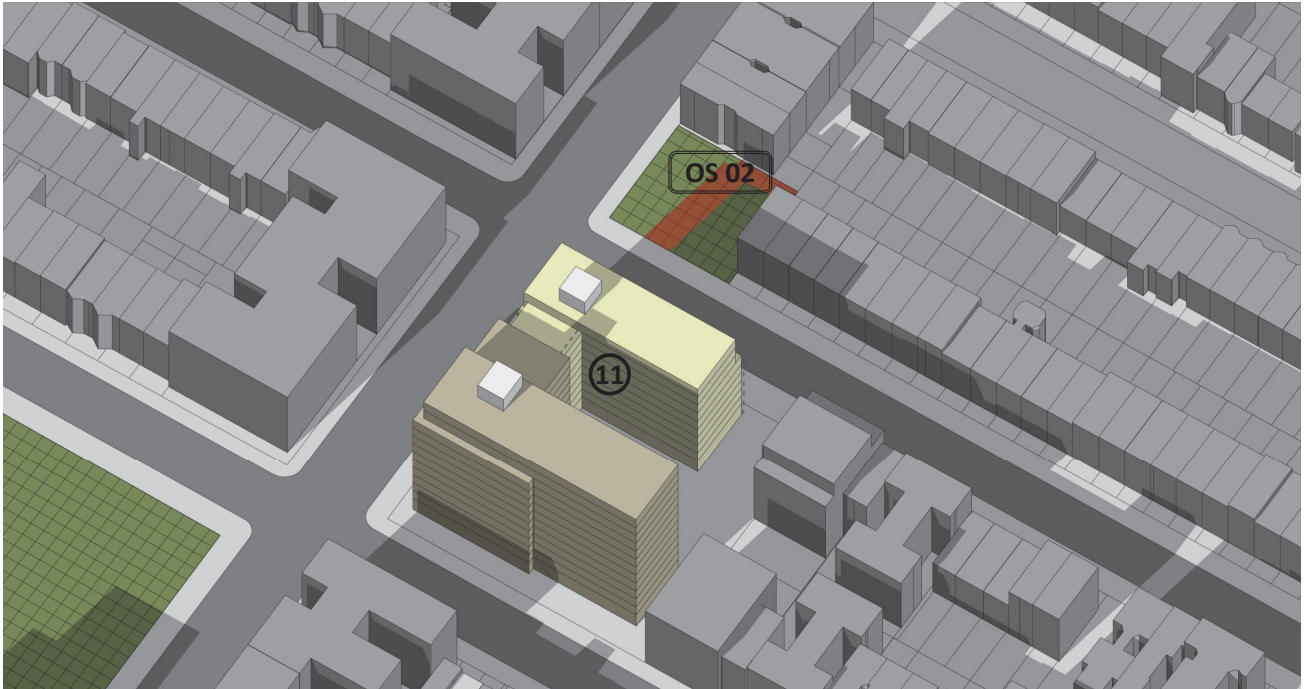
 Shadow sensitive resource

 Prototype

 Worst case building envelop




Analysis Group 2: Prototype 11




December 21


12:00PM

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop


Analysis Group 2: Prototype 11




December 21


1:00PM

Each grid cell on open space represents approximately 10' x 10' land area

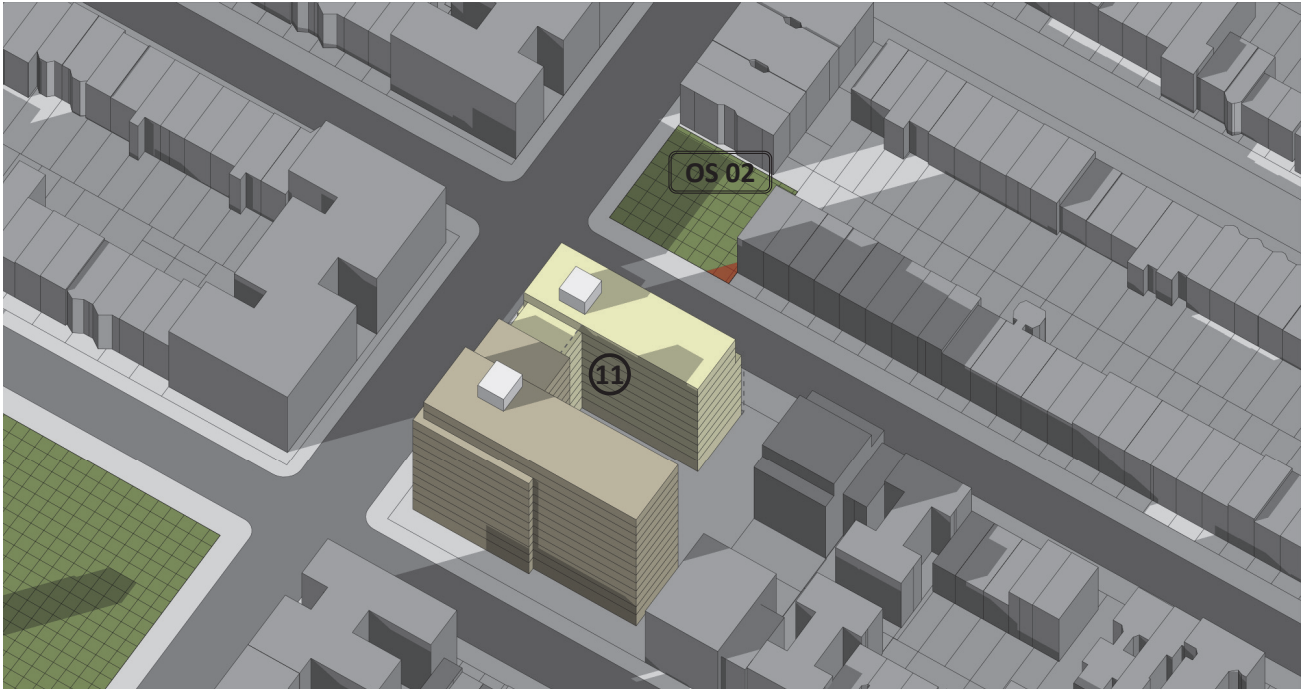
 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop

Analysis Group 2: Prototype 11



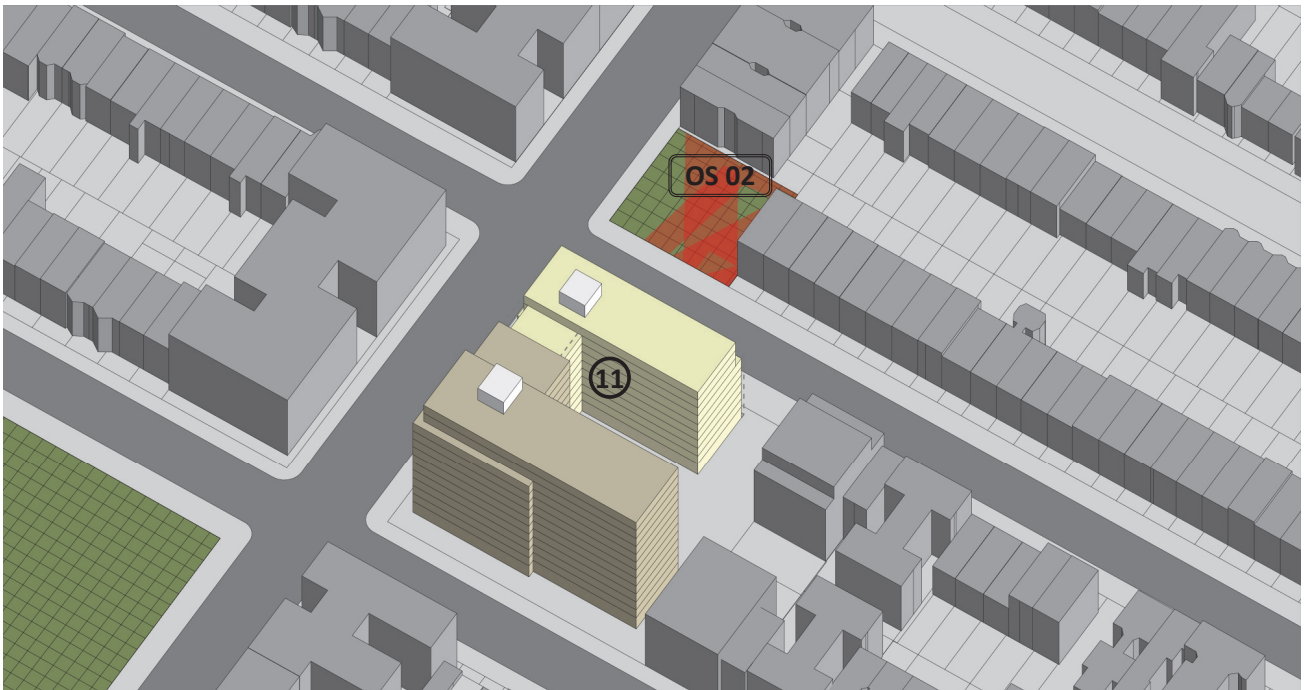
December 21

2:00PM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- # Worst case building envelop

Analysis Group 2: Prototype 11



December 21

Sweep (9:00AM, 12:00PM - 2:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- # Worst case building envelop

## Analysis Group 3: Prototype 12

Note: According to CEQR Technical Manual, "worst case" building envelopes, opposed to "reasonable worst case" envelopes modeled and shown in Prototype Chapter, are used to render shadows. These "worst case" massings are generally 10 to 20 percent over-built than permitted FAR.

Analysis Group	Prototype	Title	Analysis Day	March 21/Sept. 21	May 6/August 6	June 21	December 21
				7:36 AM – 4:29 PM	6:27 AM – 5:18 PM	5:57 AM – 6:01 PM	8:51 AM – 2:53 PM
Group 3	Prototype 12	R10A District, 100' x 100' interior lot on wide street	Shadow enter - exit time	OS03 1:34PM - 2:51PM	-	-	OS03 10:45AM - 1:04PM
			Incremental shadow duration	OS03 1 hr 17 mins			OS03 2 hrs 19 mins

Analysis Group 3: Prototype 12

March 21 (September 21)

Incremental Shadow Start and End:  
1:34PM - 2:51PM


Analysis Group 3: Prototype 12




March 21 (September 21)

2:00PM

Each grid cell on open space represents  
approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop

Analysis Group 3: Prototype 12

December 21

Incremental Shadow Start and End:  
10:45AM - 1:04PM


Analysis Group 3: Prototype 12




December 21

11:00AM

Each grid cell on open space represents  
approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop

Analysis Group 3: Prototype 12



December 21

12:00PM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 3: Prototype 12



December 21

1:00PM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop


Analysis Group 3: Prototype 12




December 21


Sweep (11:00AM - 1:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop

# Analysis Group 4: Prototype 13 and Prototype 15

Note: According to CEQR Technical Manual, "worst case" building envelopes, opposed to "reasonable worst case" envelopes modeled and shown in Prototype Chapter, are used to render shadows. These "worst case" massings are generally 10 to 20 percent over-built than permitted FAR.

Analysis Group	Prototype	Title	Analysis Day	March 21/Sept. 21	May 6/August 6	June 21	December 21
				7:36 AM – 4:29 PM	6:27 AM – 5:18 PM	5:57 AM – 6:01 PM	8:51 AM – 2:53 PM
Group 4	Prototype 13	R10A District, Inclusionary Housing, 100' x 100' interior lot on wide street	Shadow enter - exit time	OS03 12:26PM - 12:29PM OS03 12:49 - 2:51PM	-	-	OS03 10:45AM - 1:04PM
			Incremental shadow duration	OS03 3 mins OS03 2 hrs 2 mins	-	-	OS03 2 hrs 19 mins
Group 4	Prototype 15	R10A District, Inclusionary Housing (R10 program), 40' x 100' interior lot on wide street	Shadow enter - exit time	OS03 12:27PM - 3:44PM	-	-	OS03 12:14PM - 1:35PM
			Incremental shadow duration	OS03 3 hrs 17 mins	-	-	OS03 1 hr 21 mins



Analysis Group 4: Prototype 13 and Prototype 15

March 21 (September 21)

Incremental Shadow Start and End:  
12:26PM - 3:44PM

Analysis Group 4: Prototype 13 and Prototype 15



March 21 (September 21)

1:00PM

Each grid cell on open space represents approximately 10' x 10' land area



Potential incremental shadow



Shadow sensitive resource



Prototype



Worst case building envelop

Analysis Group 4: Prototype 13 and Prototype 15



March 21 (September 21)

2:00PM

Each grid cell on open space represents approximately 10' x 10' land area



Potential incremental shadow



Prototype



Shadow sensitive resource



Worst case building envelop

Analysis Group 4: Prototype 13 and Prototype 15



March 21 (September 21)

3:00PM

Each grid cell on open space represents approximately 10' x 10' land area



Potential incremental shadow



Prototype



Shadow sensitive resource



Worst case building envelop

# Analysis Group 4: Prototype 13 and Prototype 15




March 21 (September 21)


Sweep (1:00PM - 3:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop

Analysis Group 4: Prototype 13 and Prototype 15

December 21

Incremental Shadow Start and End:  
10:44AM - 1:35PM


Analysis Group 4: Prototype 13 and Prototype 15




December 21

11:00AM

Each grid cell on open space represents  
approximately 10' x 10' land area

 Potential incremental shadow

 Prototype

 Shadow sensitive resource

 Worst case building envelop

Analysis Group 4: Prototype 13 and Prototype 15



December 21

12:00PM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop

Analysis Group 4: Prototype 13 and Prototype 15



December 21

1:00PM

Each grid cell on open space represents approximately 10' x 10' land area

- Potential incremental shadow
- XX ## Shadow sensitive resource
- # Prototype
- Worst case building envelop


Analysis Group 4: Prototype 13 and Prototype 15





December 21


Sweep (11:00AM - 1:00PM)

Each grid cell on open space represents approximately 10' x 10' land area

 Potential incremental shadow

 Prototype

 Shadow sensitive resource

 Worst case building envelop

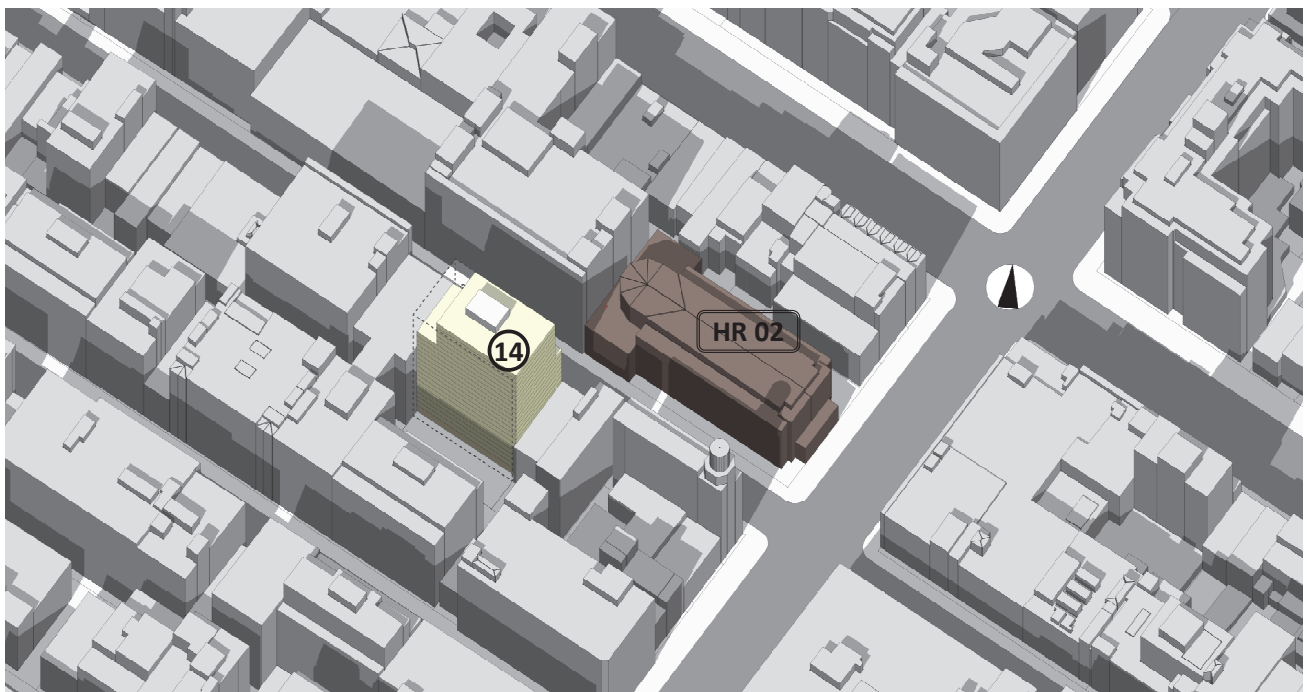
## Analysis Group 5: Prototype 14

Note: According to CEQR Technical Manual, "worst case" building envelopes, opposed to "reasonable worst case" envelopes modeled and shown in Prototype Chapter, are used to render shadows. These "worst case" massings are generally 10 to 20 percent over-built than permitted FAR.

Analysis Group	Prototype	Title	Analysis Day	March 21/Sept. 21	May 6/August 6	June 21	December 21
				7:36 AM – 4:29 PM	6:27 AM – 5:18 PM	5:57 AM – 6:01 PM	8:51 AM – 2:53 PM
Group 5	Prototype 14	C6-4A (R10A equivalent commercial district), Inclusionary Housing, narrow street, 100'x100'	Shadow enter - exit time	HR02 12:44PM - 4:29PM	HR02 12:15PM - 4:54PM	HR02 12:18PM - 5:06PM	-
			Incremental shadow duration	HR02 3 hrs 45 mins	HR02 4 hrs 39 mins	HR02 4 hrs 48 mins	-

March 21 (September 21)

Incremental Shadow Start and End:  
12:44PM - 4:29PM



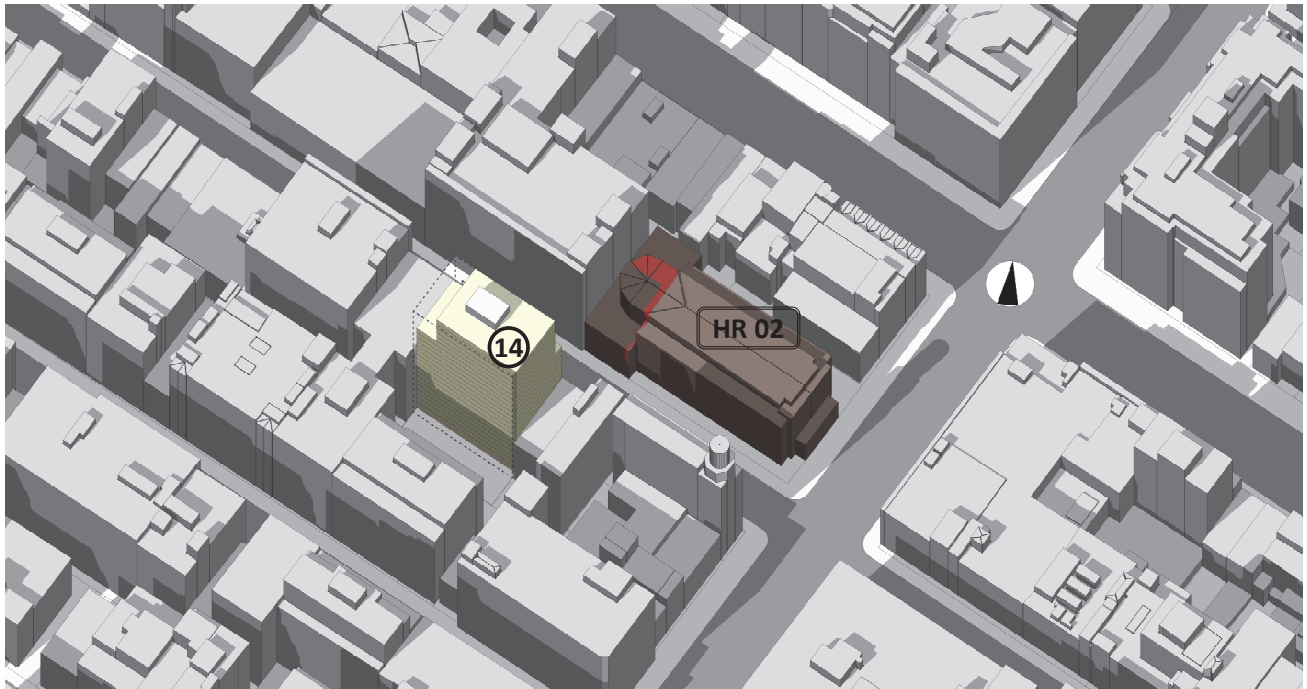
March 21 (September 21)

1:00PM

-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop







Analysis Group 5: Prototype 14



March 21 (September 21)

2:00PM





-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

Analysis Group 5: Prototype 14

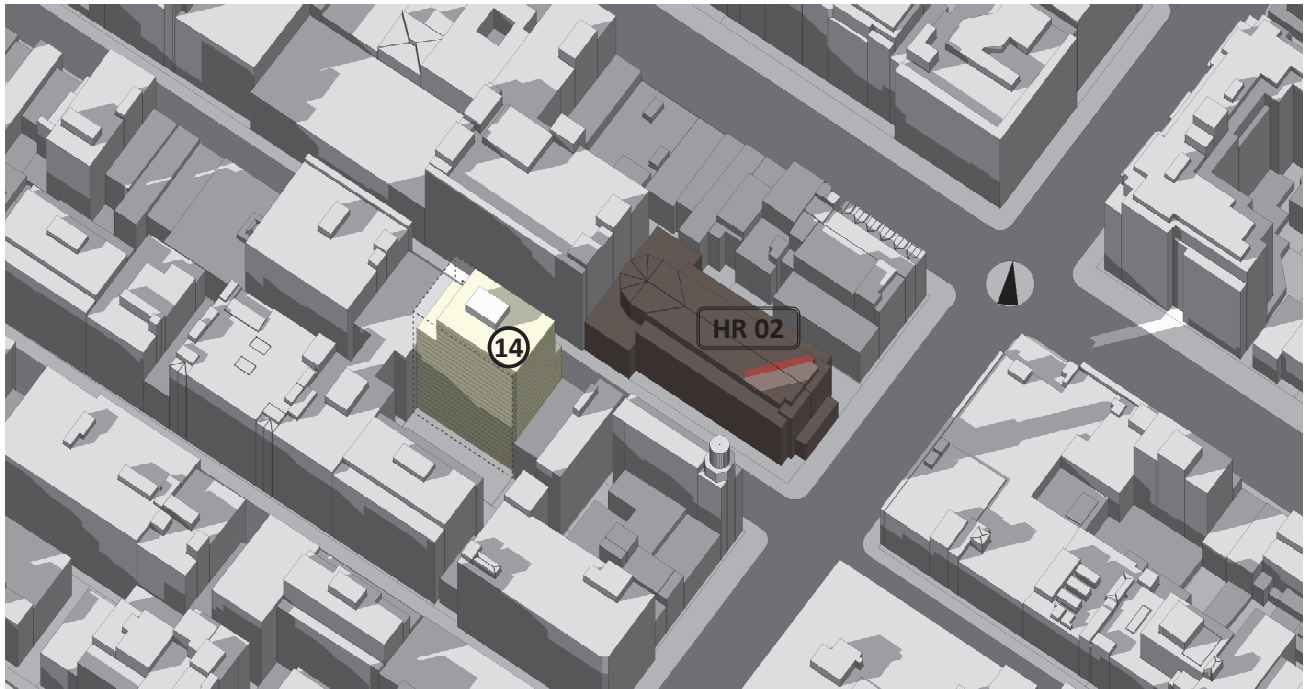


March 21 (September 21)

3:00PM


-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

Analysis Group 5: Prototype 14

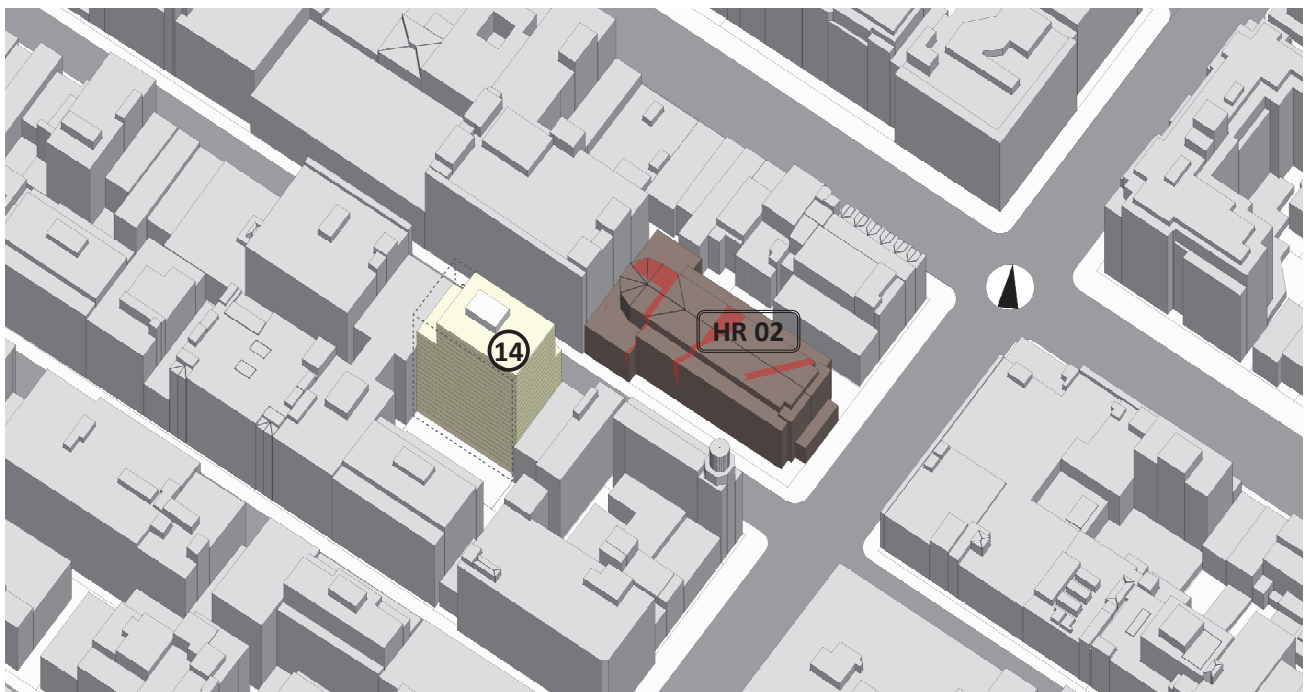


March 21 (September 21)

4:00PM

-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 5: Prototype 14



March 21 (September 21)

Sweep (1:00PM - 4:00PM)

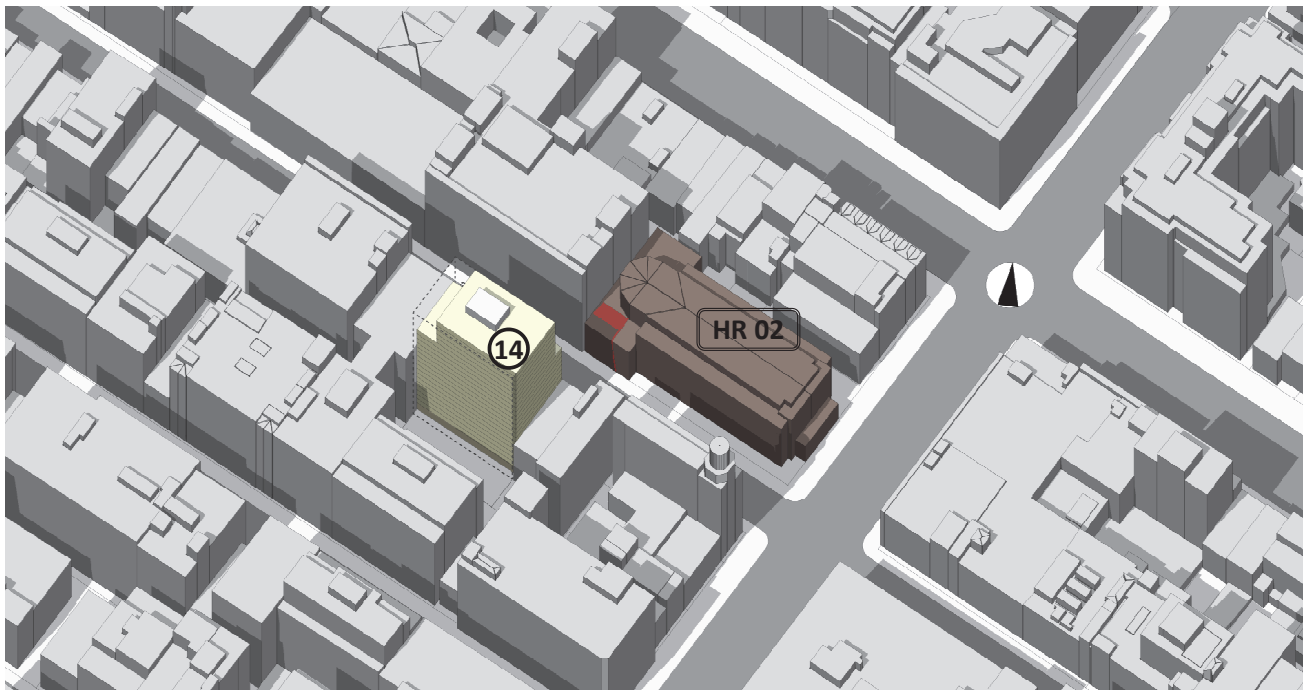
-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 5: Prototype 14

May 6 (August 6)

Incremental Shadow Start and End:  
12:15PM - 4:54PM

Analysis Group 5: Prototype 14



May 6 (August 6)

1:00PM



Potential incremental shadow



Shadow sensitive resource

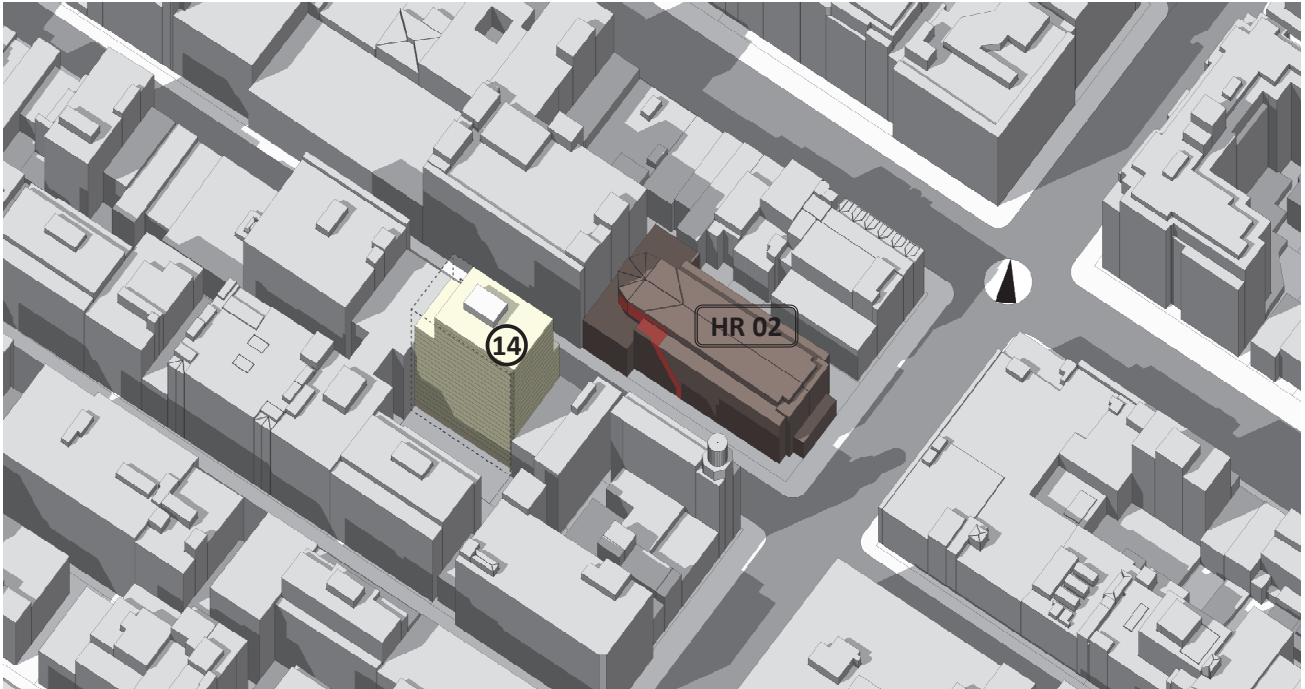


Prototype







Worst case building envelop

Analysis Group 5: Prototype 14



May 6 (August 6)

2:00PM





-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 5: Prototype 14

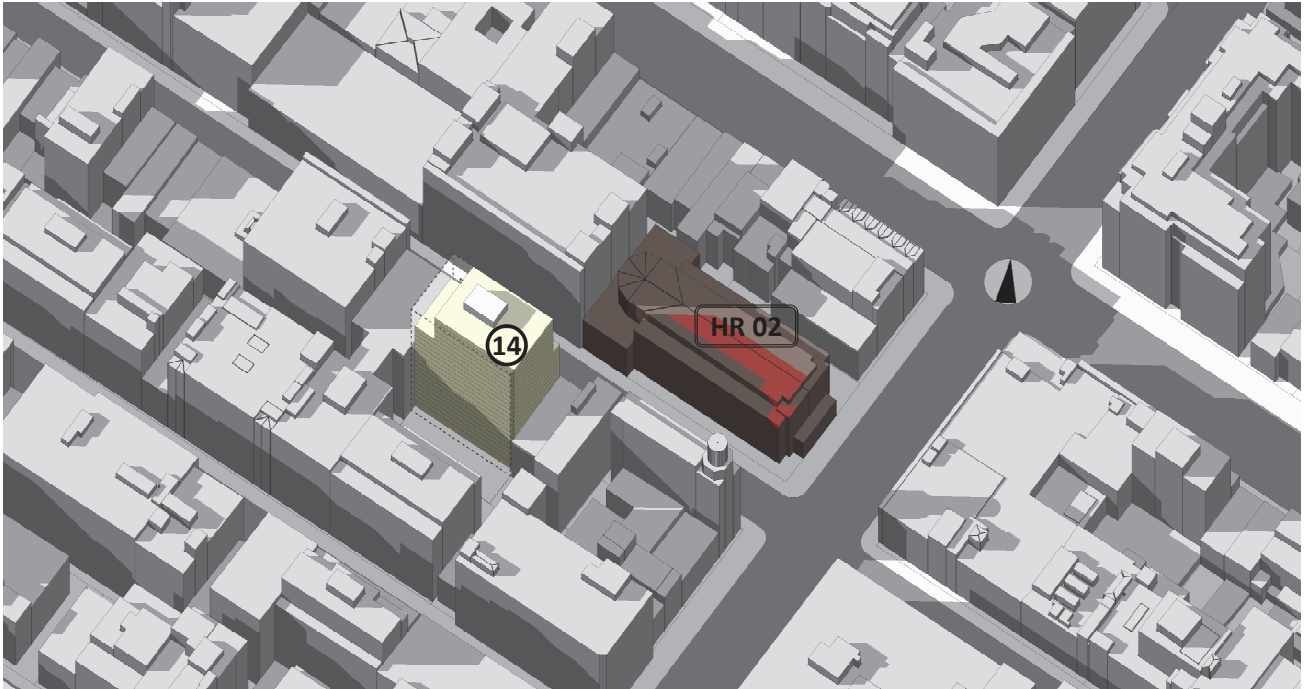


May 6 (August 6)

3:00PM



-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 5: Prototype 14



May 6 (August 6)

4:00PM





-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 5: Prototype 14



May 6 (August 6)

Sweep (1:00PM - 4:00PM)

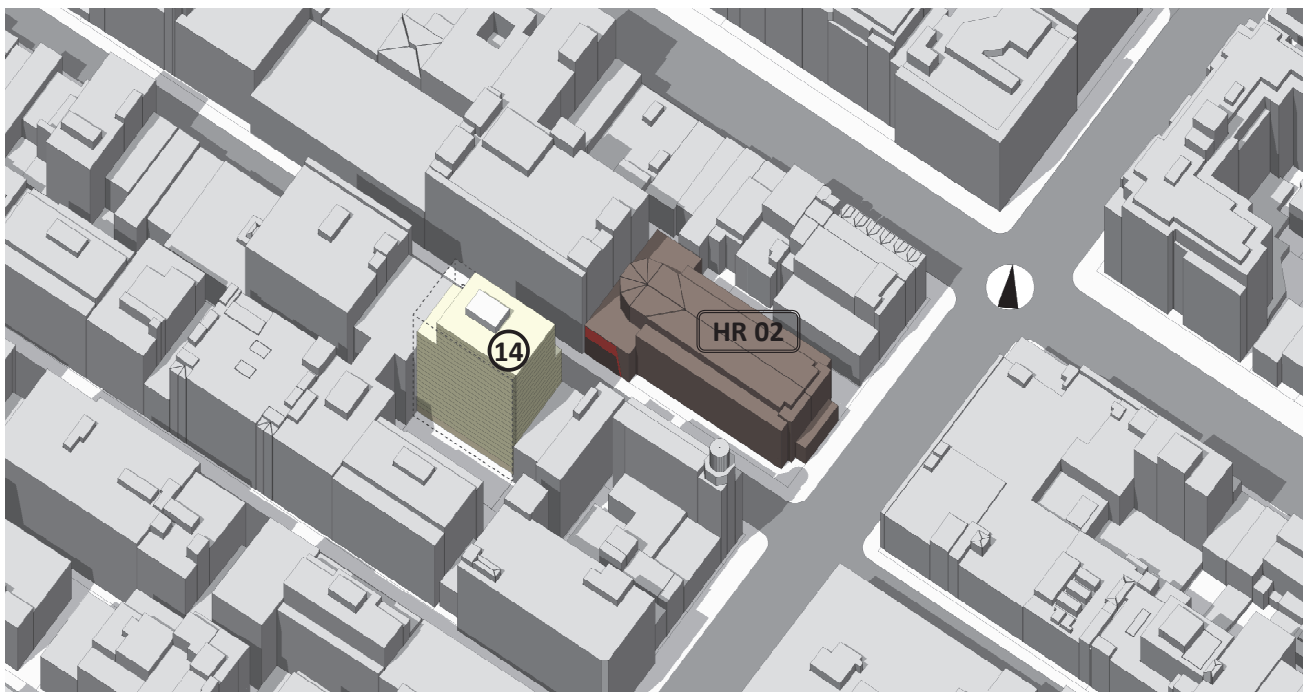
-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 5: Prototype 14

June 21

Incremental Shadow Start and End:  
12:18PM - 5:06PM

Analysis Group 5: Prototype 14



June 21

1:00PM



Potential incremental shadow



Shadow sensitive resource

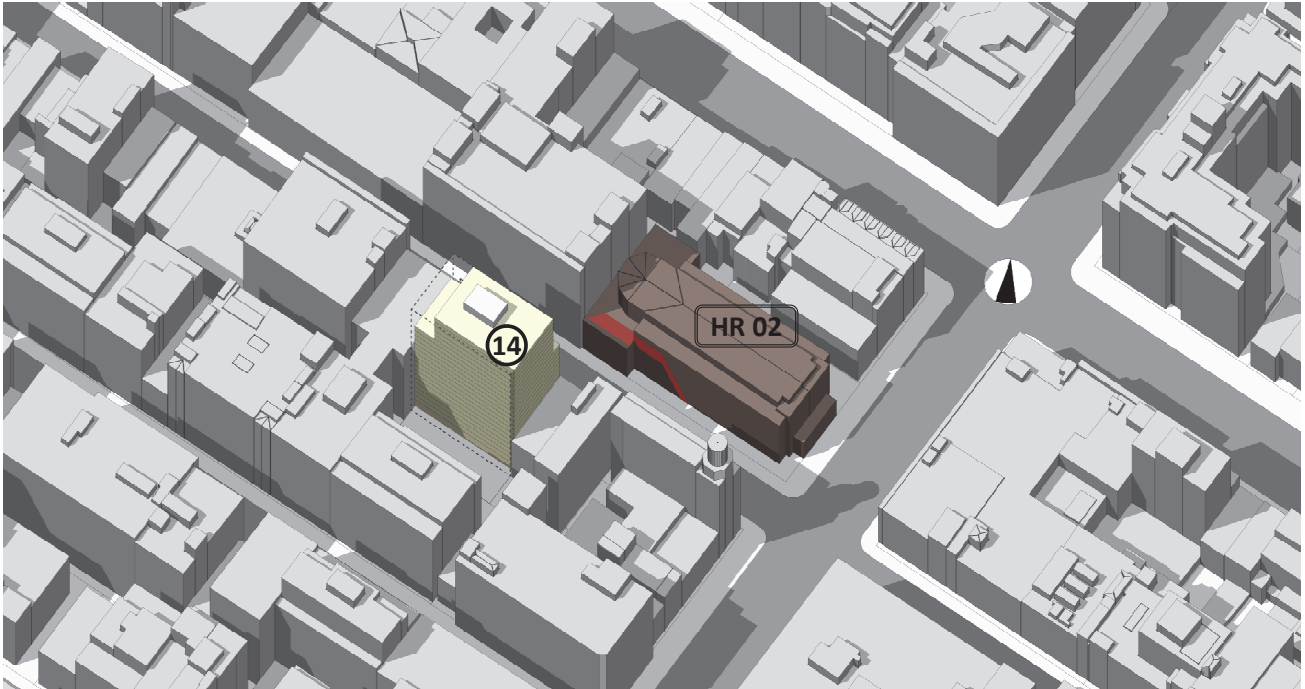


Prototype





Worst case building envelop

Analysis Group 5: Prototype 14

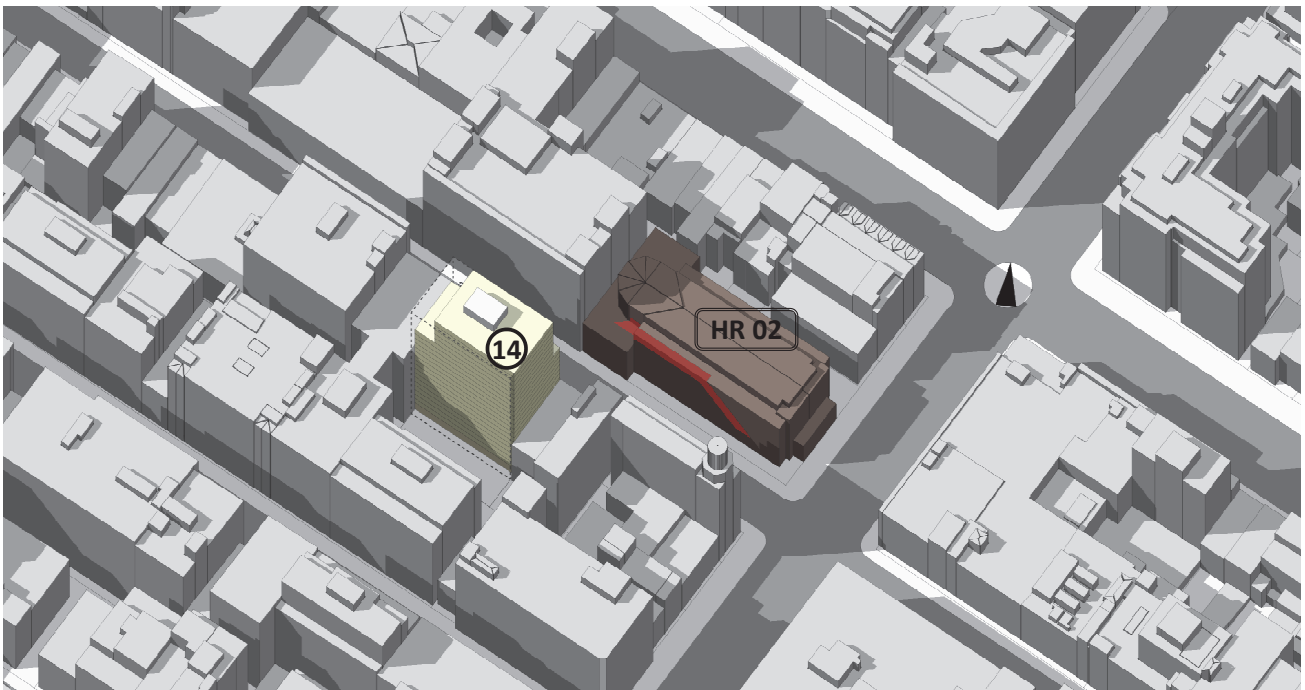


June 21

2:00PM





-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 5: Prototype 14

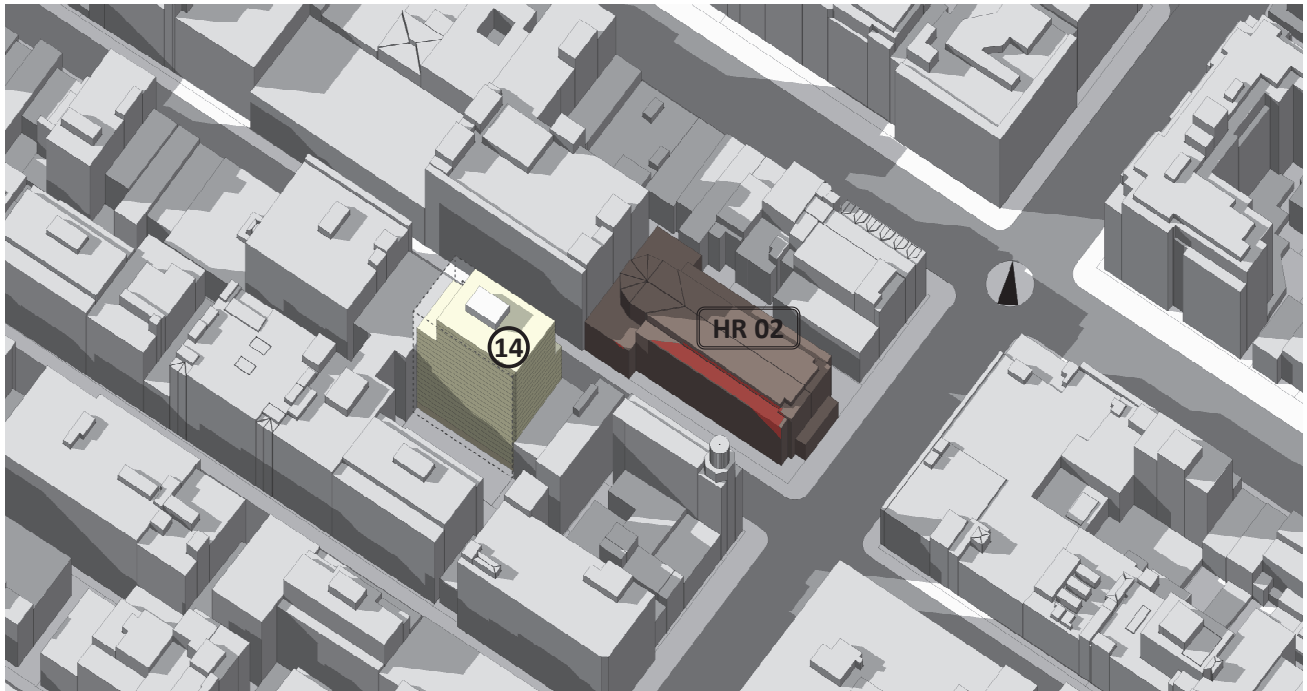


June 21

3:00PM

-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 5: Prototype 14

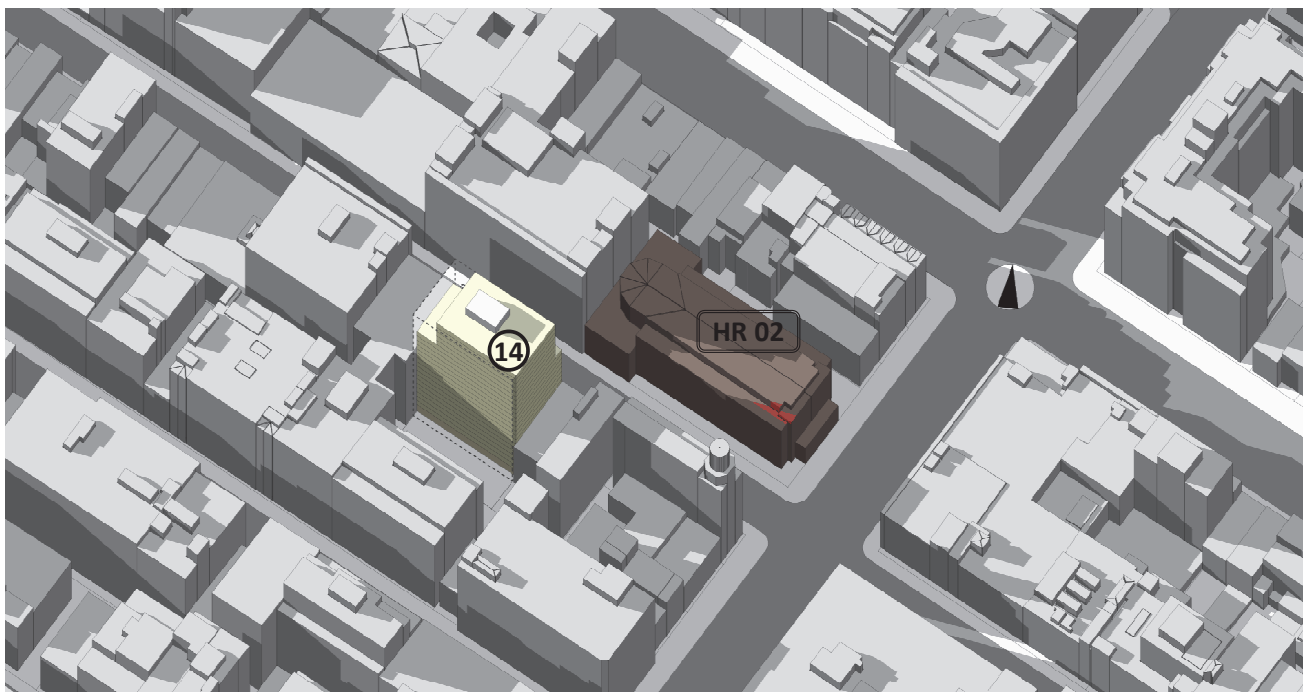


June 21

4:00PM

-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 5: Prototype 14



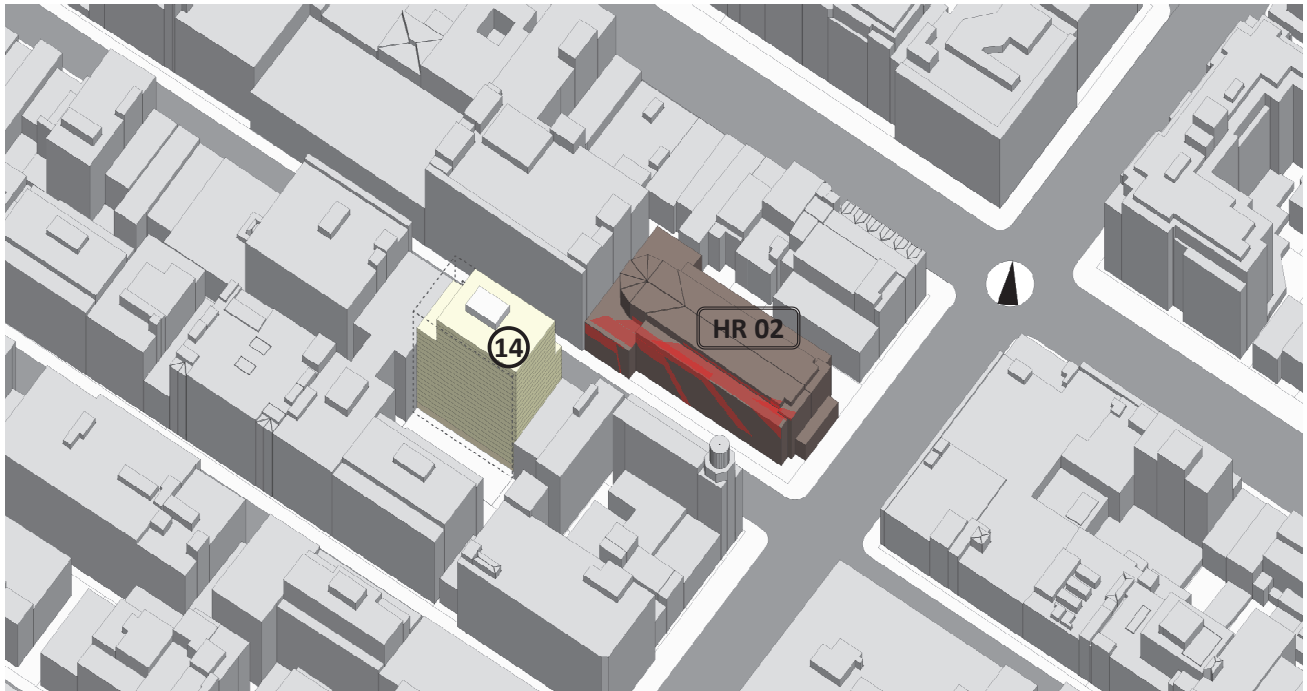
June 21

5:00PM

-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop



Analysis Group 5: Prototype 14



June 21

Sweep (1:00PM - 5:00PM)



Potential incremental shadow



Shadow sensitive resource



Prototype



Worst case building envelop

## Analysis Group 6: Prototype 17

Note: According to CEQR Technical Manual, "worst case" building envelopes, opposed to "reasonable worst case" envelopes modeled and shown in Prototype Chapter, are used to render shadows. These "worst case" massings are generally 10 to 20 percent over-built than permitted FAR.

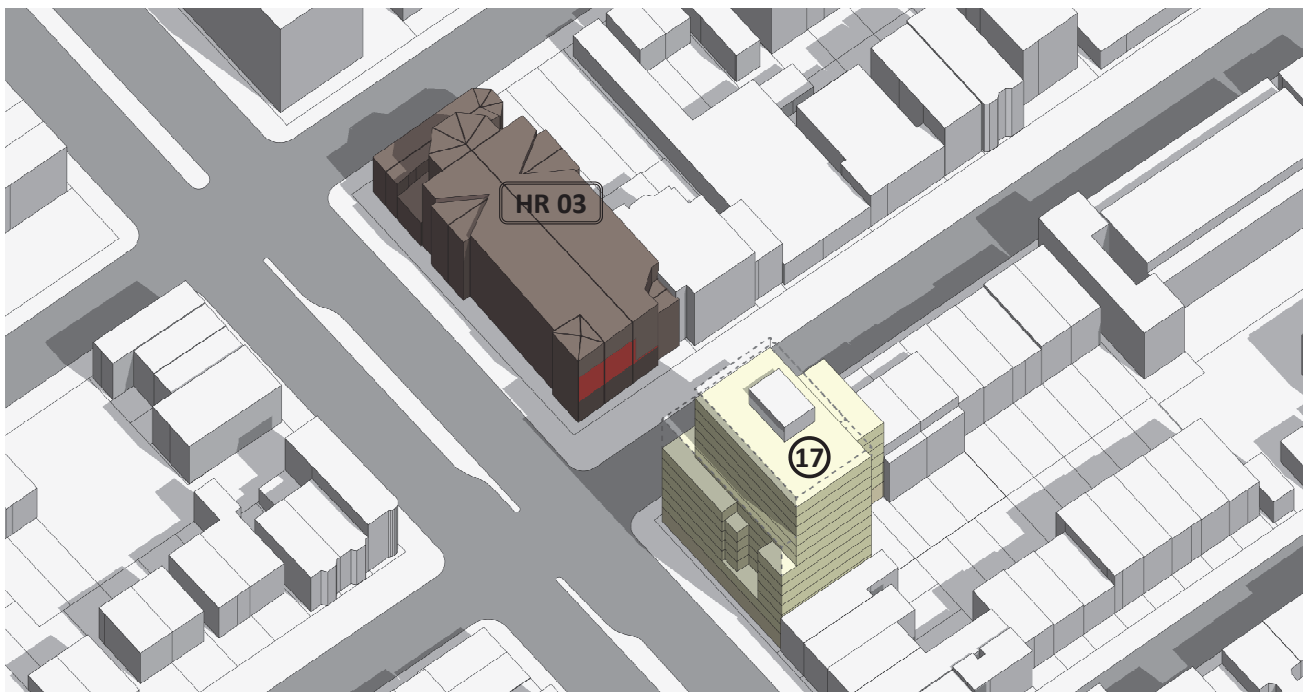
Analysis Group	Prototype	Title	Analysis Day	March 21/Sept. 21	May 6/August 6	June 21	December 21
				7:36 AM – 4:29 PM	6:27 AM – 5:18 PM	5:57 AM – 6:01 PM	8:51 AM – 2:53 PM
Group 6	Prototype 17	R8A District, Inclusionary Housing adjoining R6B District, 100' x 100' corner lot on wide and narrow streets	Shadow enter - exit time	HR03 12:00PM - 4:35PM	HR03 1:40PM - 3:11PM	-	HR03 10:48AM - 2:53PM
			Incremental shadow duration	HR03 4 hrs 35 mins	HR03 1 hr 31 mins	-	HR03 4 hrs 5 mins

Analysis Group 6: Prototype 17

March 21 (September 21)

Incremental Shadow Start and End:  
12:00PM - 4:35PM

Analysis Group 6: Prototype 17



March 21 (September 21)

1:00PM



Potential incremental shadow



Shadow sensitive resource

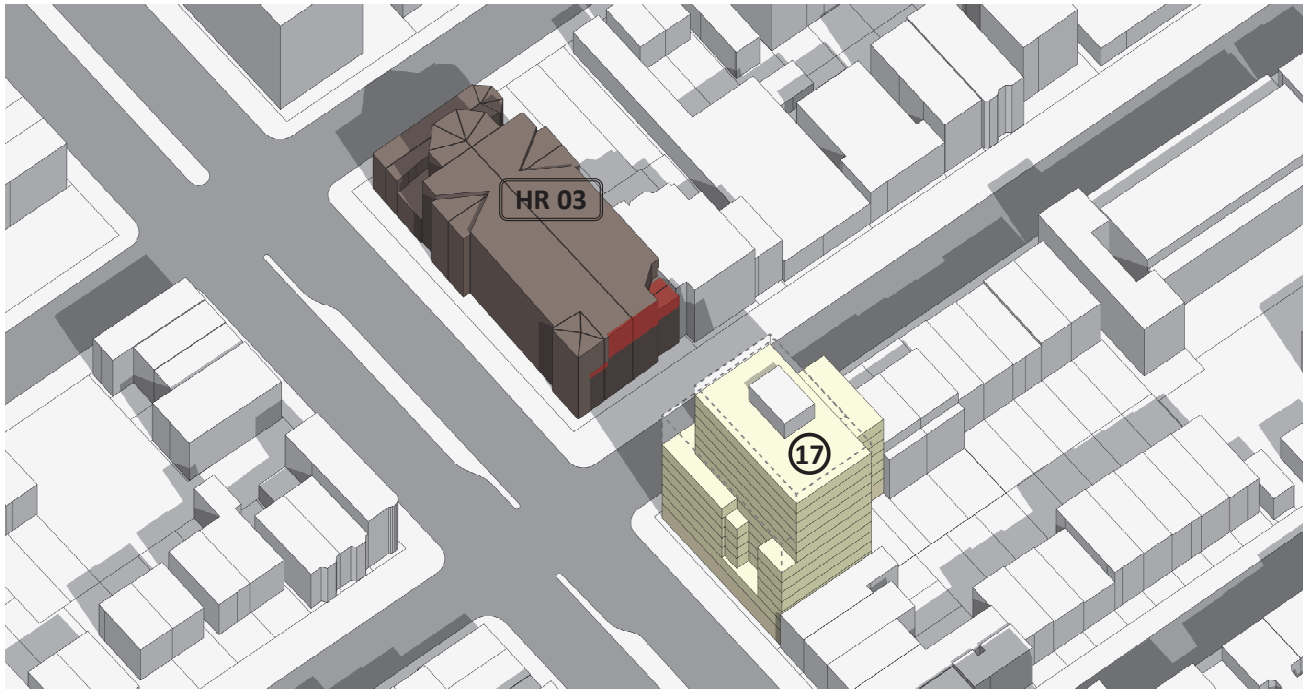


Prototype







Worst case building envelop

Analysis Group 6: Prototype 17

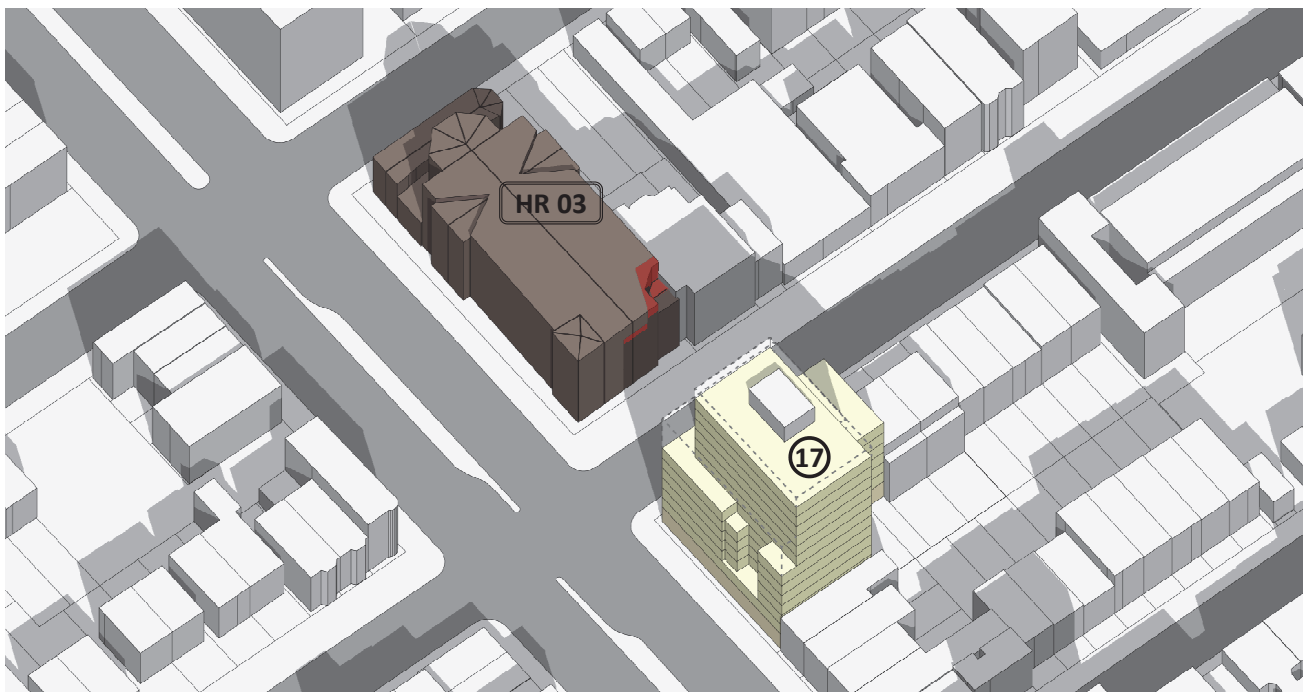


March 21 (September 21)

2:00PM

-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

Analysis Group 6: Prototype 17

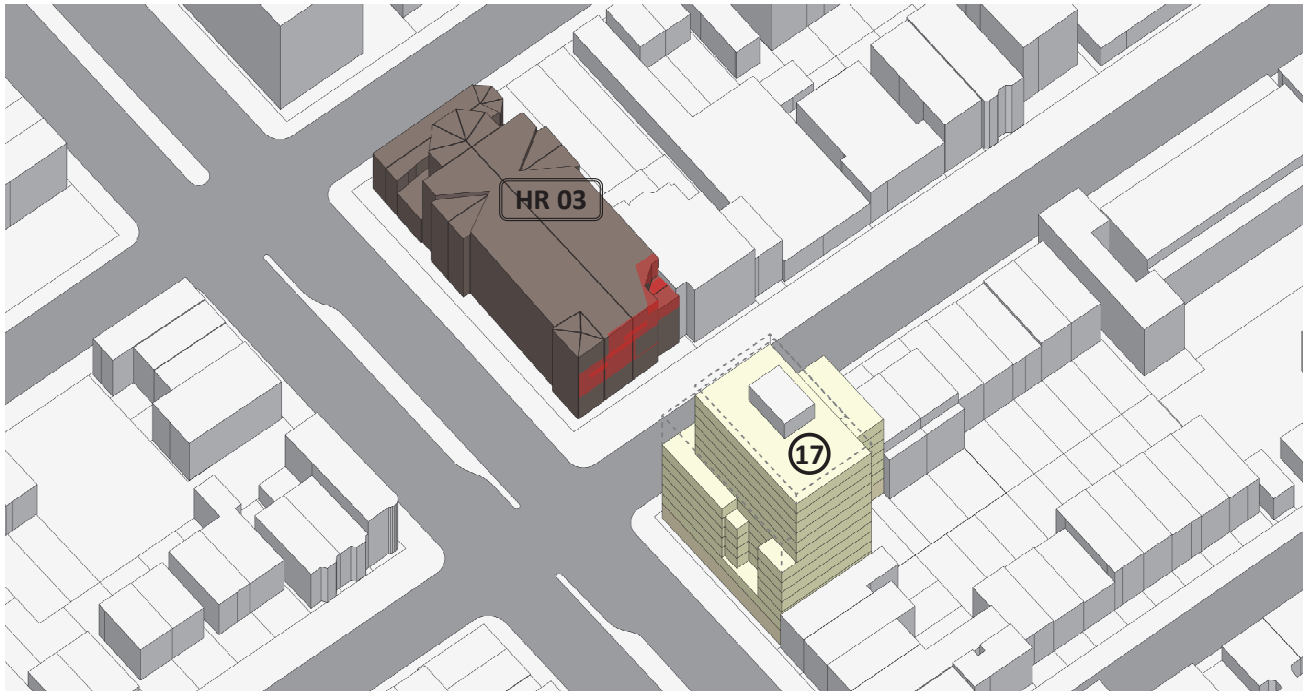


March 21 (September 21)

3:00PM

-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

Analysis Group 6: Prototype 17



March 21 (September 21)

Sweep (1:00PM - 3:00PM)



Potential incremental shadow



Shadow sensitive resource



Prototype



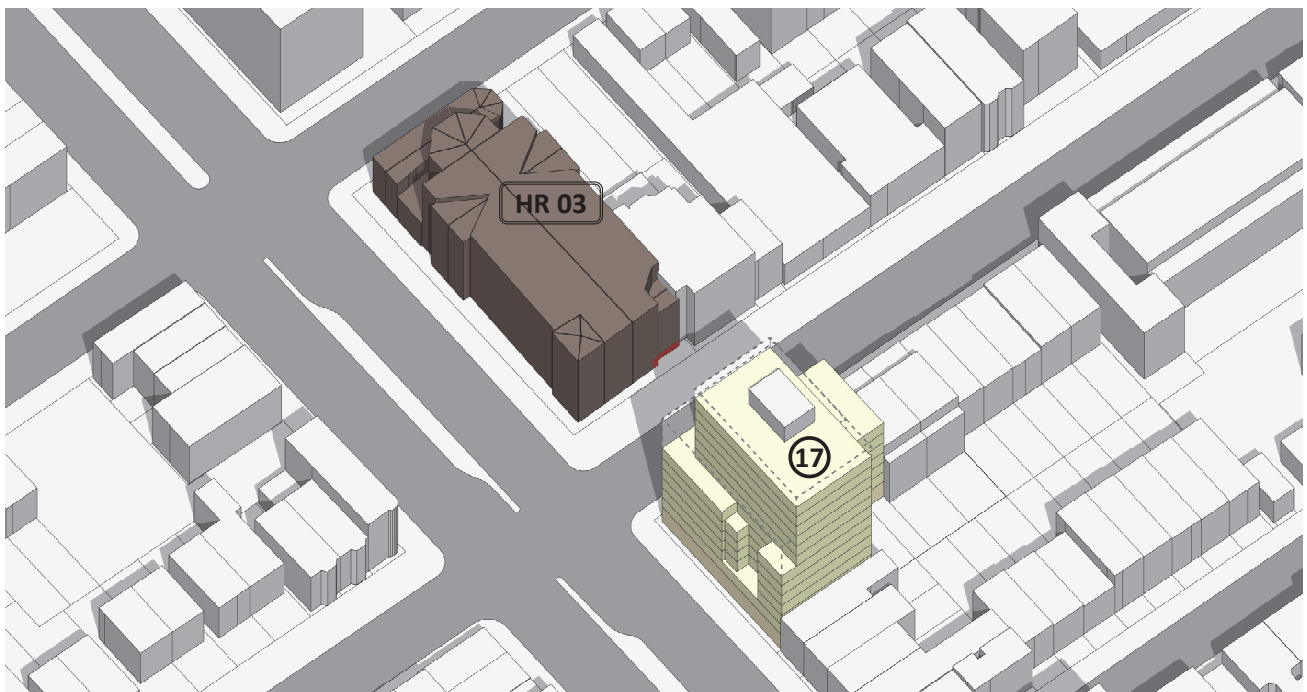
Worst case building envelop

Analysis Group 6: Prototype 17

May 6 (August 6)

Incremental Shadow Start and End:  
1:40PM - 3:11PM

Analysis Group 6: Prototype 17



May 6 (August 6)

2:00PM



Potential incremental shadow



Shadow sensitive resource

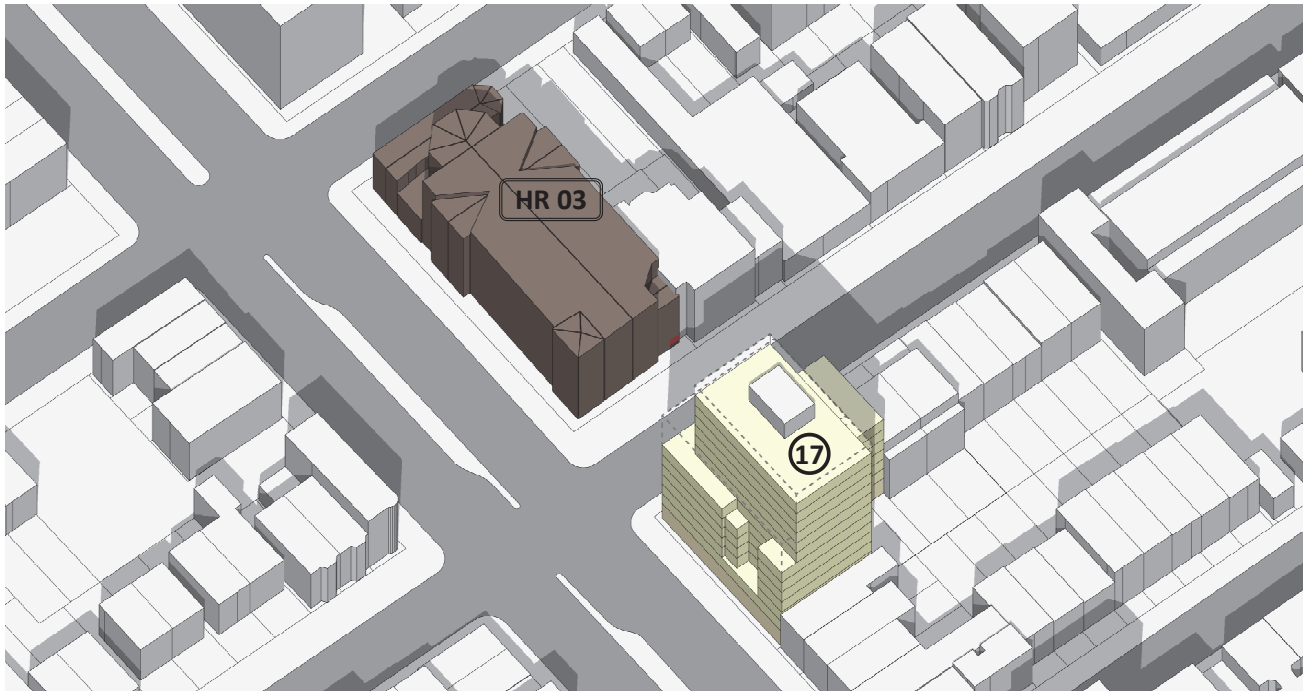


Prototype



Worst case building envelop

Analysis Group 6: Prototype 17

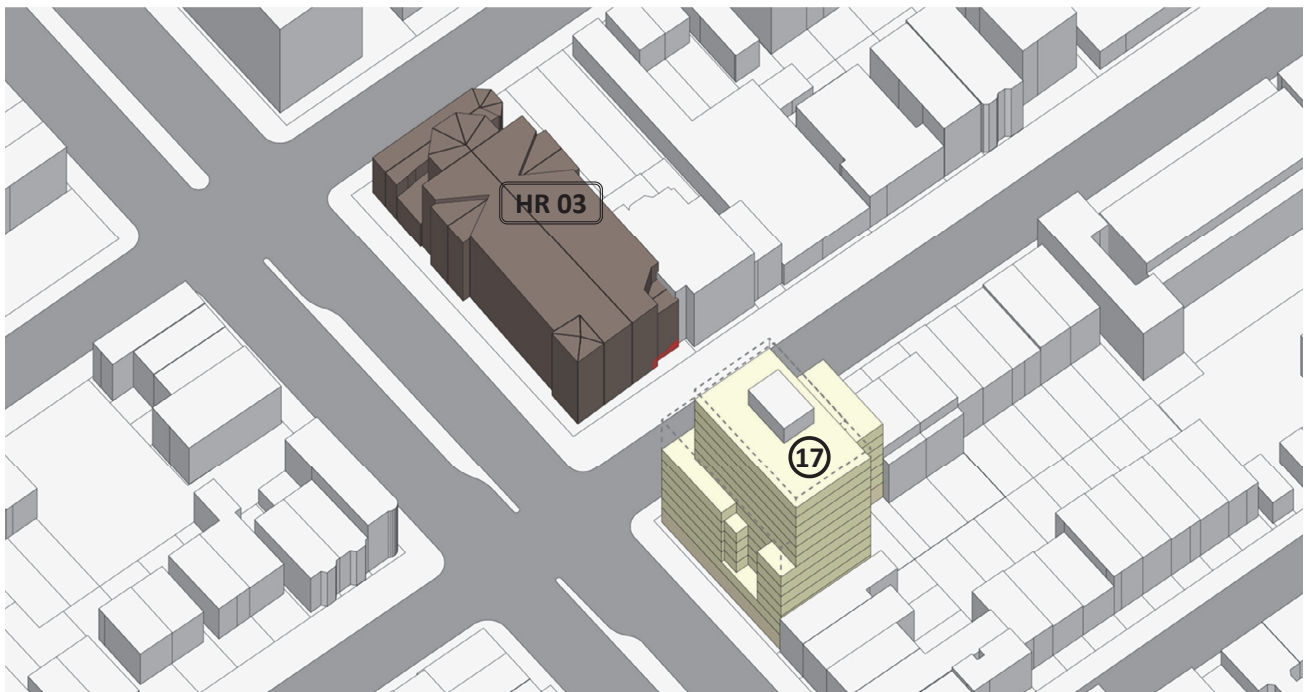


May 6 (August 6)

3:00PM

-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

Analysis Group 6: Prototype 17



May 6 (August 6)

Sweep (2:00PM - 3:00PM)

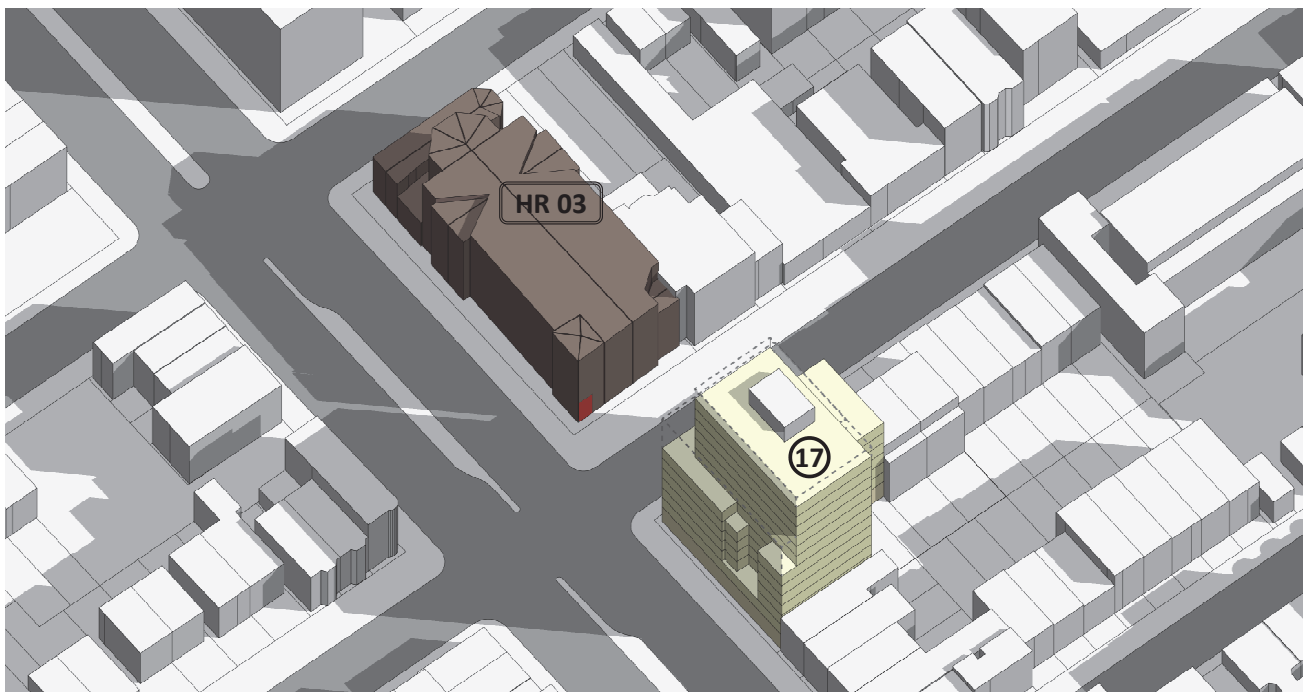
-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

Analysis Group 6: Prototype 17

December 21

Incremental Shadow Start and End:  
10:48AM - 2:53PM

Analysis Group 6: Prototype 17



December 21

11:00AM



Potential incremental shadow



Shadow sensitive resource



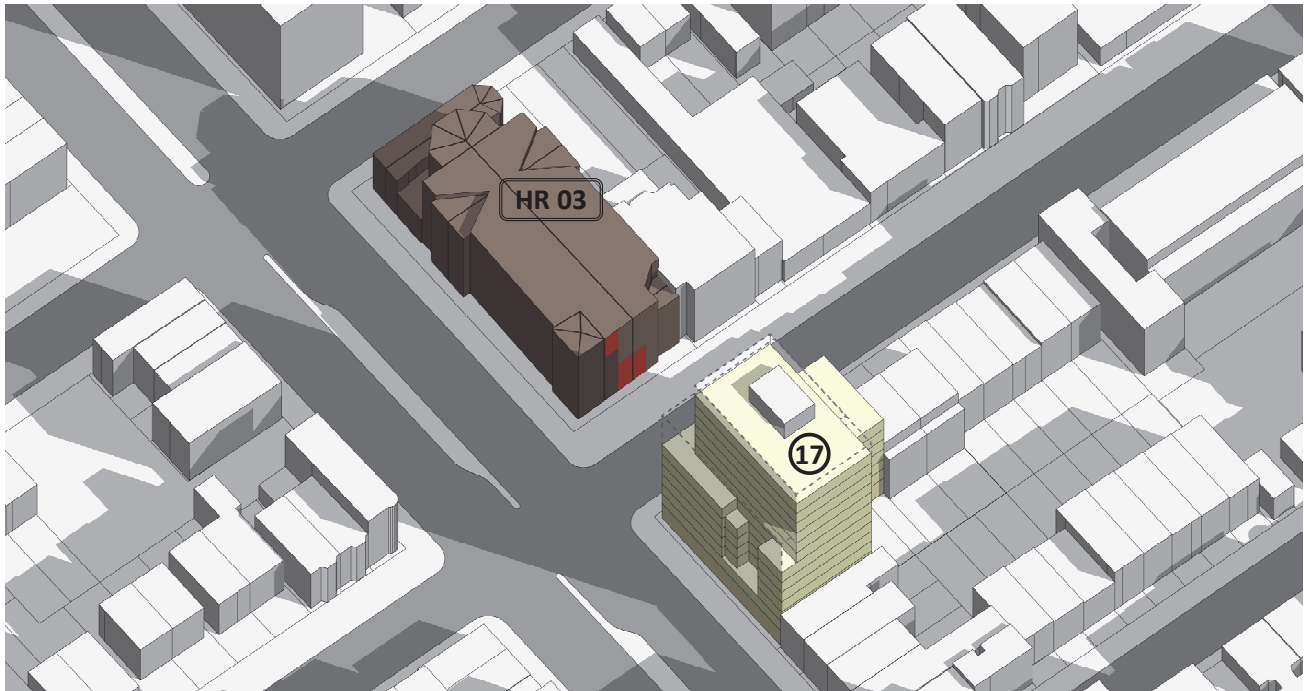
Prototype



Worst case building envelop



Analysis Group 6: Prototype 17

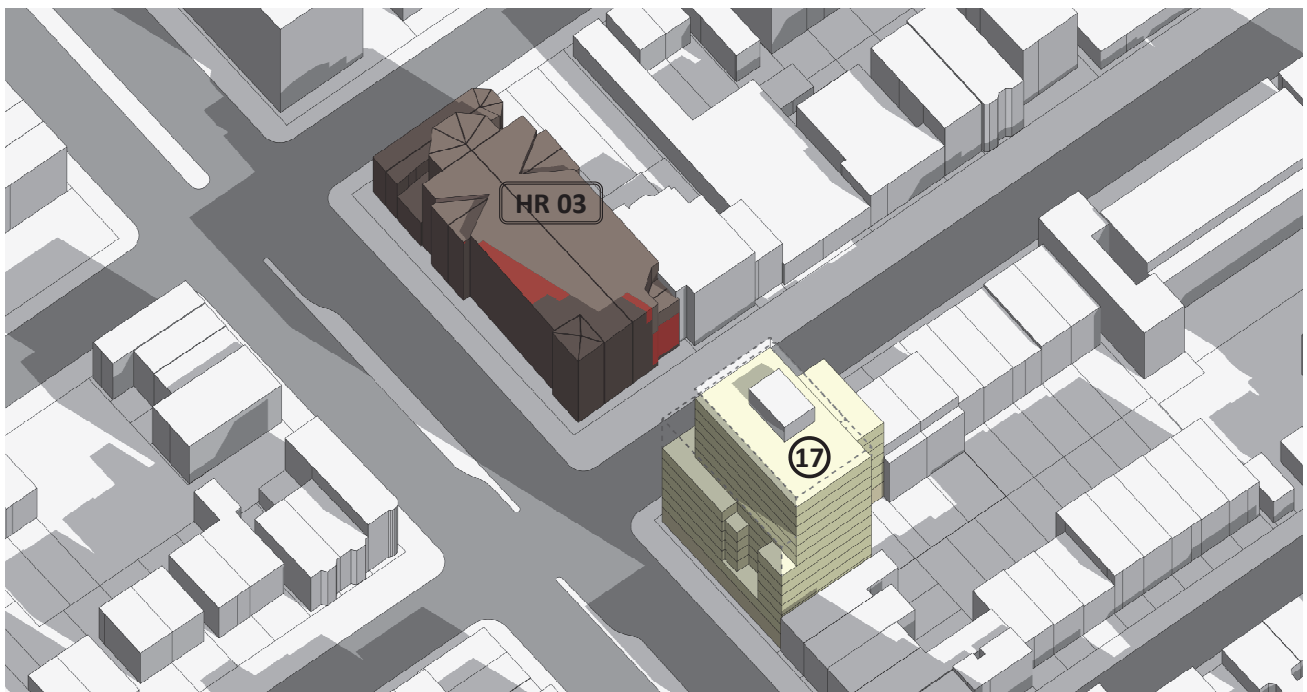


December 21

12:00PM

-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 6: Prototype 17

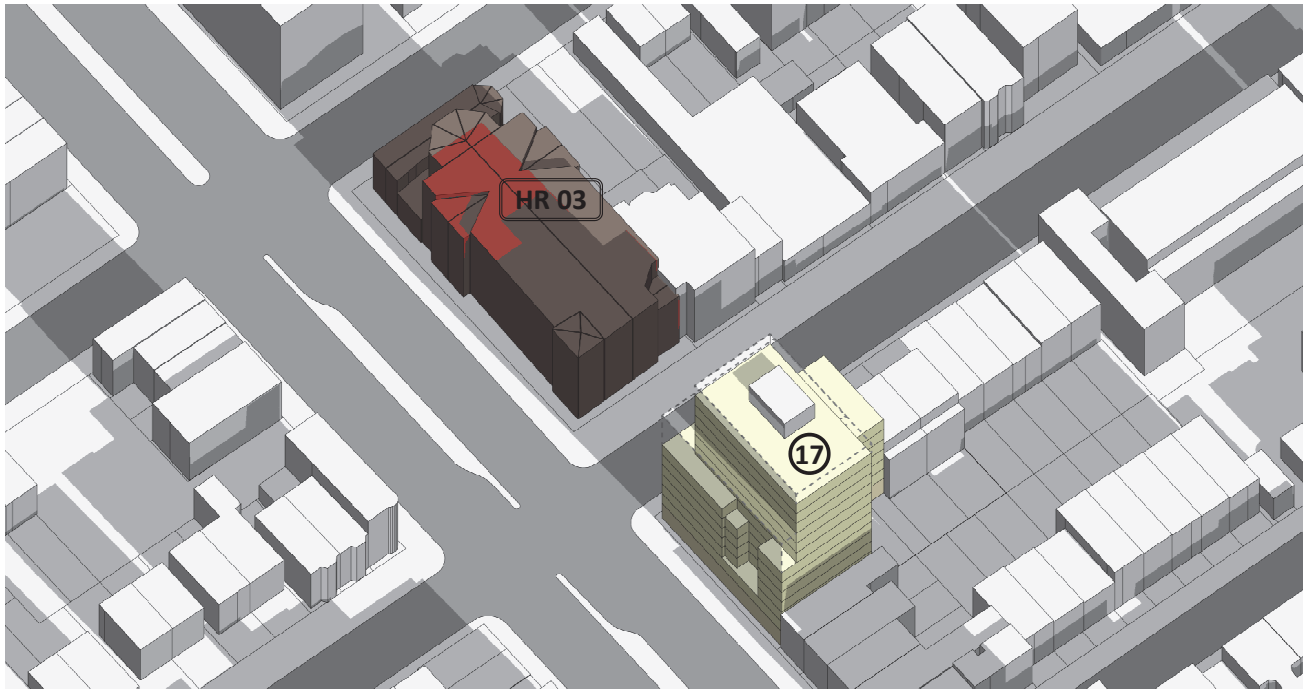


December 21

1:00PM


-  Potential incremental shadow
-  Prototype
-  Shadow sensitive resource
-  Worst case building envelop

Analysis Group 6: Prototype 17

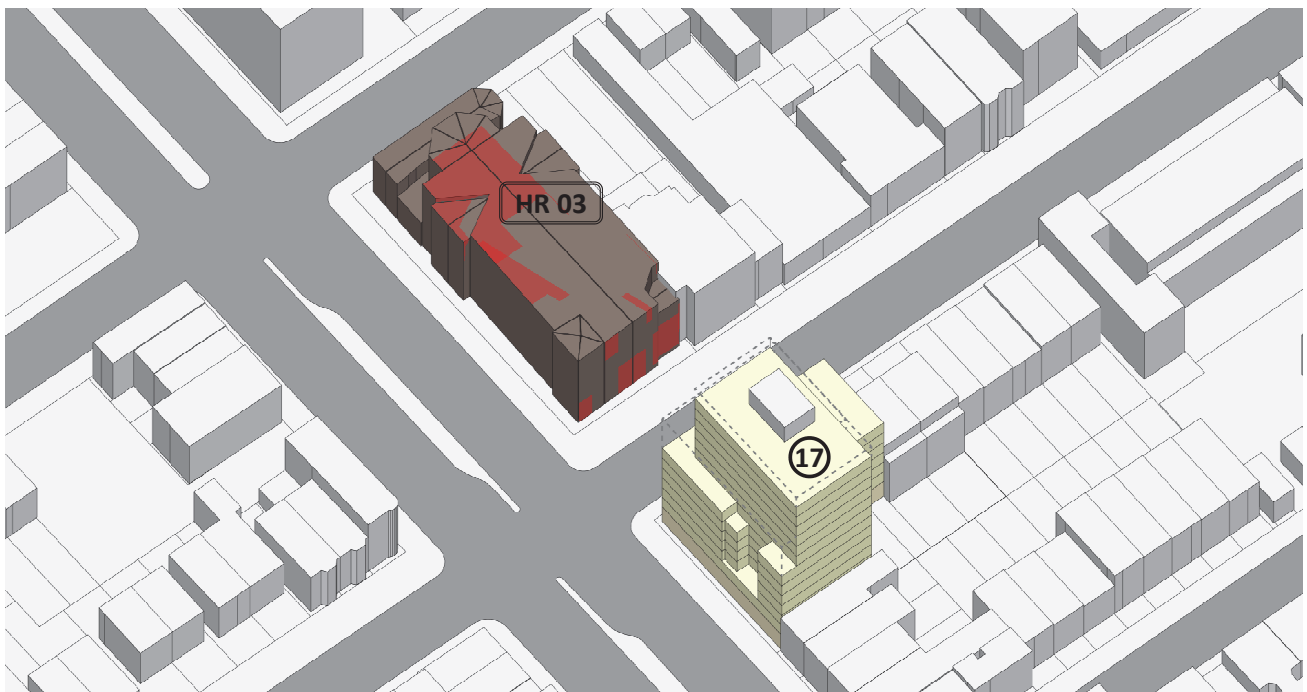


December 21

2:00PM

-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

Analysis Group 6: Prototype 17



December 21

Sweep (11:00PM - 2:00PM)

-  Potential incremental shadow
-  Shadow sensitive resource
-  Prototype
-  Worst case building envelop

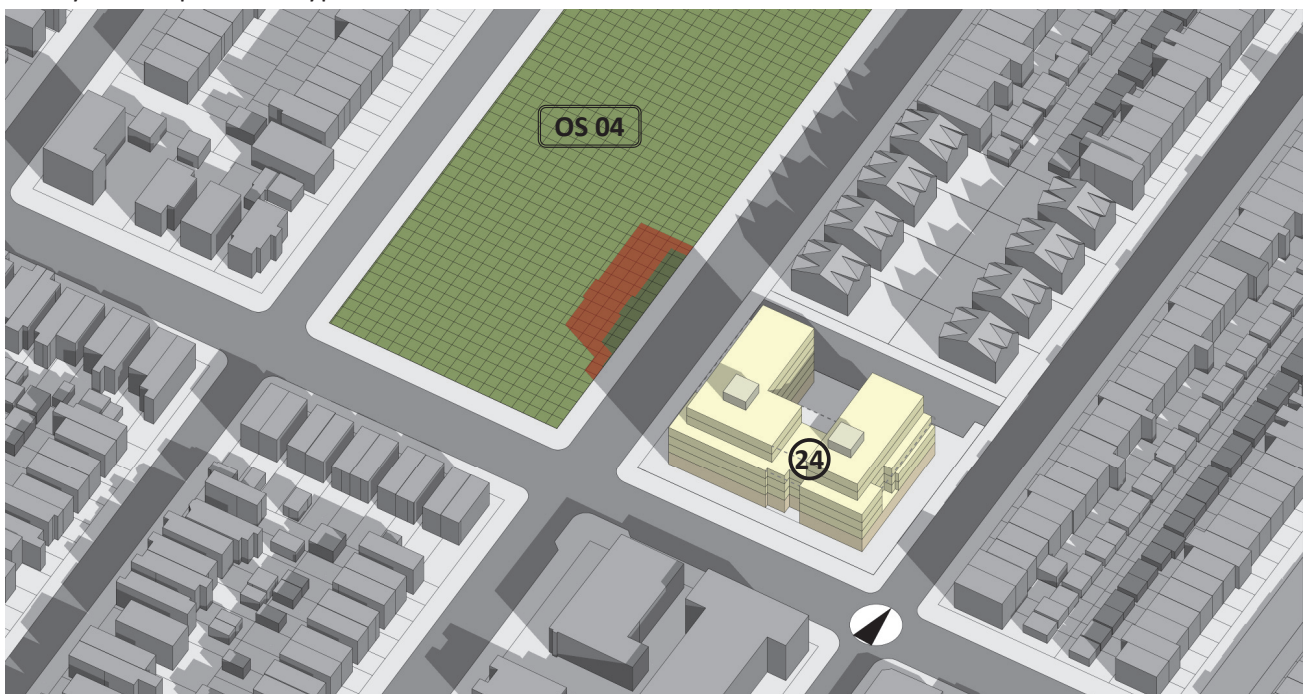
## Analysis Group 7: Prototype 24

Note: According to CEQR Technical Manual, "worst case" building envelopes, opposed to "reasonable worst case" envelopes modeled and shown in Prototype Chapter, are used to render shadows. These "worst case" massings are generally 10 to 20 percent over-built than permitted FAR.

Analysis Group	Prototype	Title	Analysis Day	March 21/Sept. 21	May 6/August 6	June 21	December 21
				7:36 AM – 4:29 PM	6:27 AM – 5:18 PM	5:57 AM – 6:01 PM	8:51 AM – 2:53 PM
Group 7	Prototype 24	R4 District, Affordable Independent Residences for Seniors, 150' x 100' interior lot on narrow street outside the Transit Zone	Shadow enter - exit time	OS04 7:36AM - 8:38AM	OS04 6:27AM - 7:47AM	OS04 5:57AM - 6:59AM	OS04 8:51 - 9:30AM
			Incremental shadow duration	OS04 1 hr 2 mins	OS04 1 hr 20 mins	OS04 1 hr 2 mins	OS04 39 mins

March 21 (September 21)


Incremental Shadow Start and End:  
7:36AM - 8:38AM




March 21 (September 21)

8:00AM

Each grid cell on open space represents  
approximately 10' x 10' land area

 Potential incremental shadow

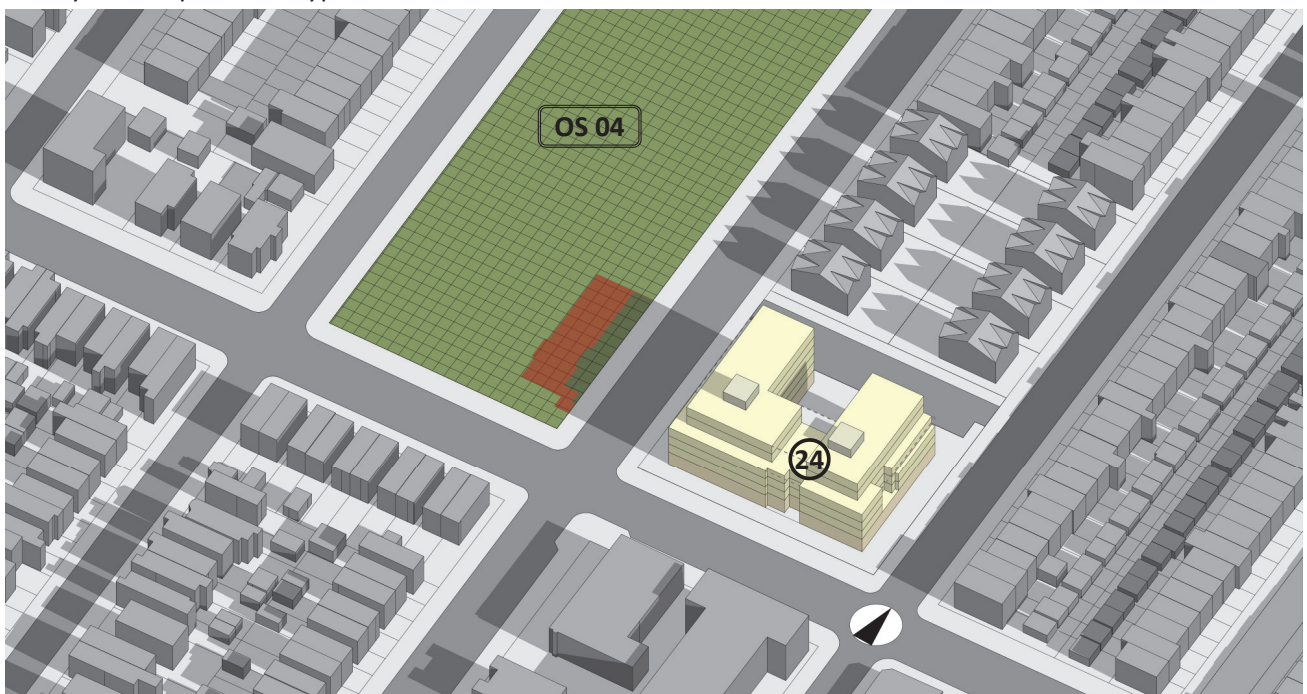
 Shadow sensitive resource

 Prototype

 Worst case building envelop

May 6 (August 6)


Incremental Shadow Start and End:  
6:27AM - 7:47AM




May 6 (August 6)

7:00AM

Each grid cell on open space represents  
approximately 10' x 10' land area

 Potential incremental shadow

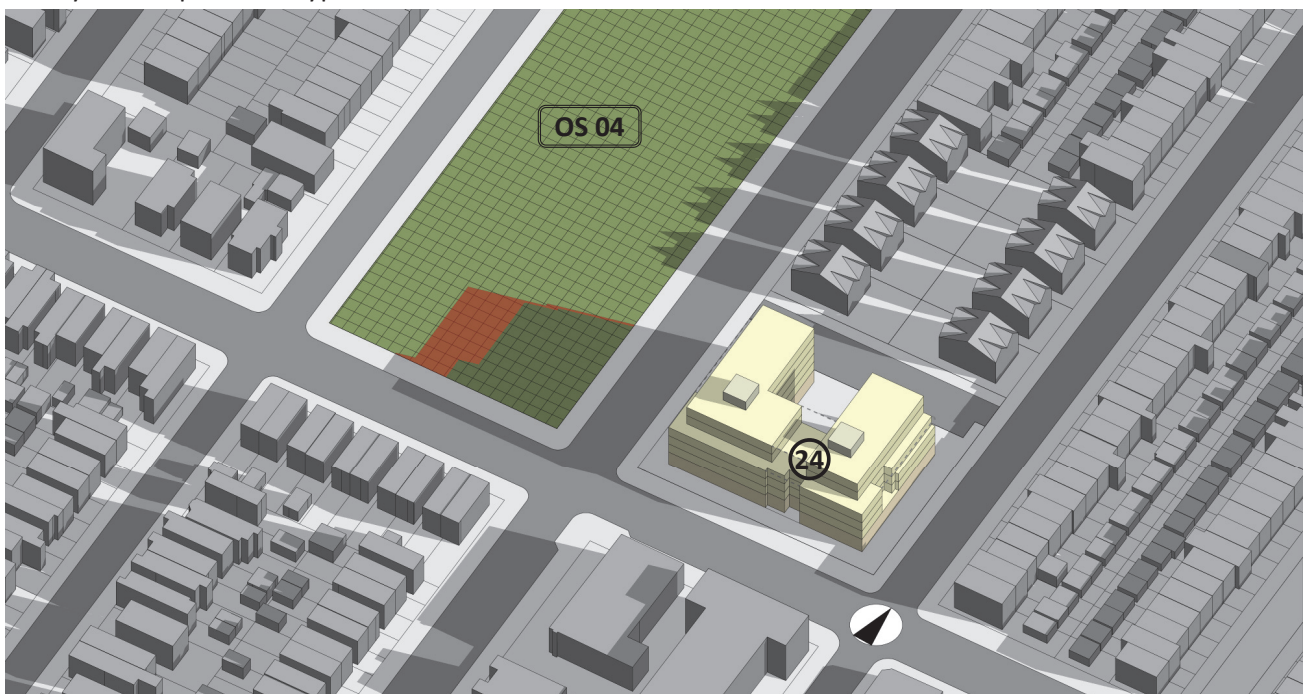
 Shadow sensitive resource

 Prototype

 Worst case building envelop

June 21

Incremental Shadow Start and End:  
5:57AM - 6:59AM



June 21

6:00AM

Each grid cell on open space represents  
approximately 10' x 10' land area



Potential incremental shadow



Shadow sensitive resource



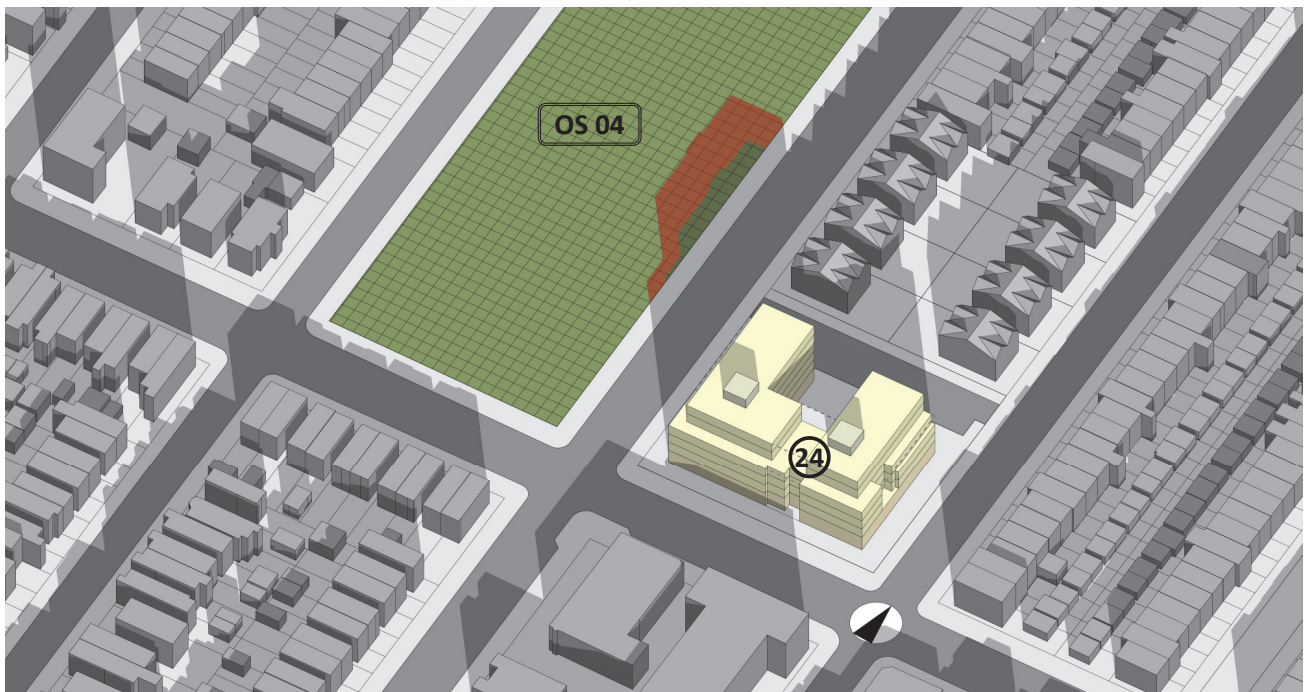
Prototype



Worst case building envelop

December 21


Incremental Shadow Start and End:  
8:51AM - 9:30AM




December 21

9:00AM

Each grid cell on open space represents  
approximately 10' x 10' land area

 Potential incremental shadow

 Shadow sensitive resource

 Prototype

 Worst case building envelop