6

Shadows

A shadow is defined in the *2021 CEQR Technical Manual* as 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. The purpose of this section is to assess whether new structures may cast shadows on sunlight-sensitive publicly accessible resources or other resources of concern such as natural resources, and to assess the significance of their impact.

Introduction

According to the *CEQR Technical Manual*, a shadows assessment is warranted for proposed actions that would result in new structures greater than 50 feet in height or that are located adjacent to, or across the street from, a sunlight-sensitive resource. Such resources include publicly accessible open spaces, important sunlight-sensitive natural features, or historic resources with sun-sensitive features. 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 Actions would facilitate the construction of up to 3.7 million square feet of new construction, with destination entertainment that includes a music hall, hotel, a gaming facility,[1] convention and meeting space, restaurant and retail space, and office and community facility space. The Proposed Project would also include public park space—at least 20 acres of the Development

[1] The inclusion of a gaming facility is contingent upon receiving a gaming license from the New York State Gaming Commission.

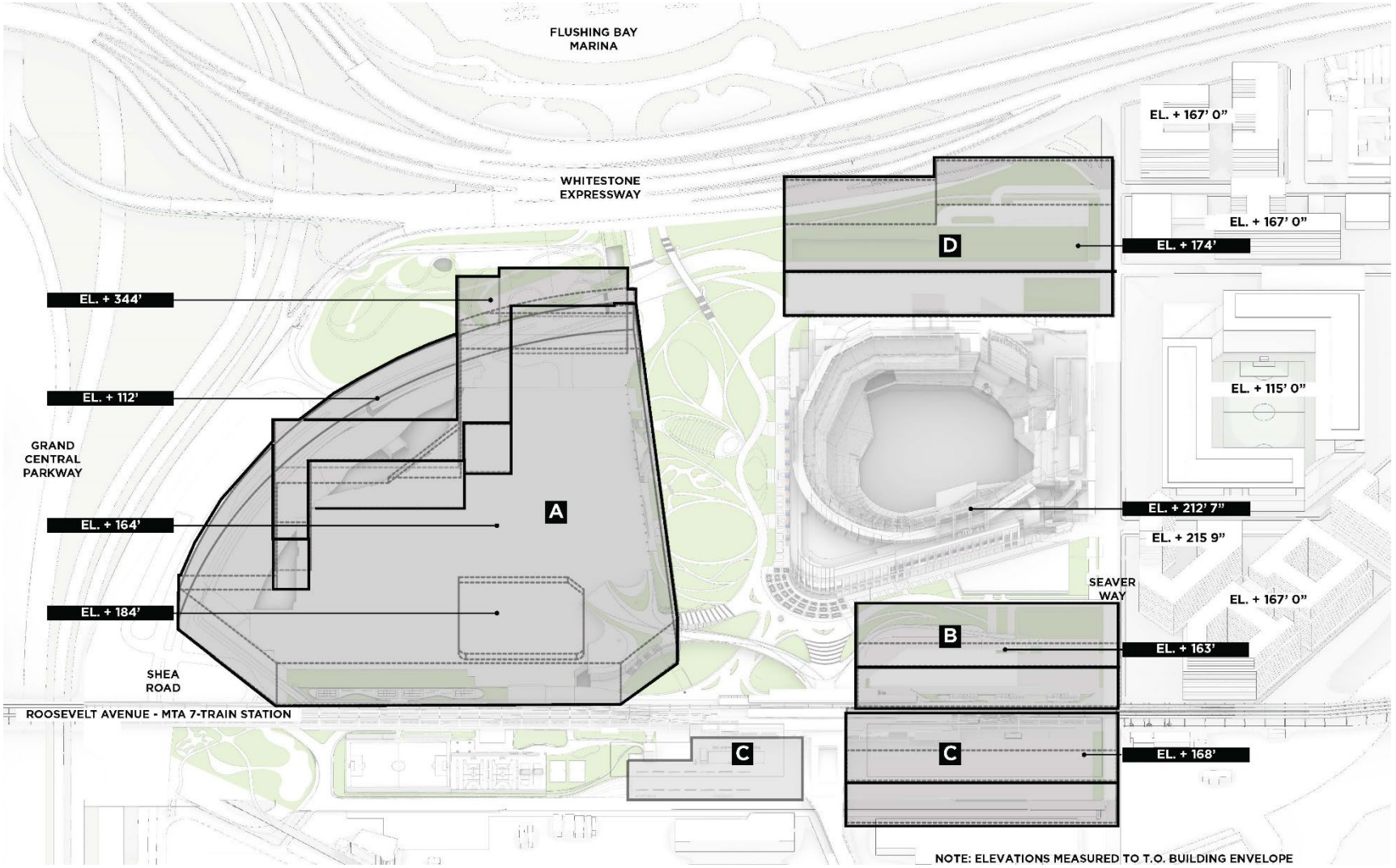
Site would be improved with landscaping and other amenities for public recreation—and other public realm improvements as well as structured parking facilities to accommodate up to 13,750 spaces. The areas of development facilitated by the Proposed Actions would exceed 50 feet in height as described by the maximum building envelope plan, which is illustrated in **Figure 6-1**, and generally would contain the following:

- **Area of Development A**: On the west side of the Development Site, the development would include a hotel with up to 2,300 rooms, gaming, retail, restaurants, amenities for the hotel and gaming facility, a music hall, and convention and meeting space. The first two levels would include parking for cars and buses. The uses above the parking would rise to a range of heights, with the tallest portion of the development, from level 2 to level 25, containing the hotel rooms and reaching a maximum height of 280 to 344 feet, as dictated by the Federal Aviation Administration (FAA) due to the Development Site's proximity to LaGuardia Airport. A section of Area of Development A would also include a six-level parking structure that is assumed for analysis purposes to rise to a maximum height of approximately 184 feet.
- **Area of Development B**: Just south of Citi Field and north of Roosevelt Avenue, the building within Area of Development B would contain restaurant space, including a "Taste of Queens" local food hall, and local retail, community facility, and administrative office space (ancillary offices to support the Area of Development B and stadium uses). The buildings within Area of Development B would be approximately 163 feet tall inclusive of up to nine levels of parking.
- **Area of Development C**: Just south of Roosevelt Avenue, Area of Development C would include one parking structure with up to ten levels of parking rising to a maximum height of approximately 168 feet and one surface lot.
- **Area of Development D**: The area north of Citi Field would include a parking structure with up to twelve levels of parking rising to a height of approximately 174 feet.

The GIS model for the Proposed Project represents a maximum envelope for each of the four development areas. The actual development may be shorter and less voluminous than what is represented by the GIS model used in this analysis. Therefore, the **Detailed Assessment** described in this chapter may overstate the potential for adverse impacts resulting from the Proposed Actions.

Because these areas of development would all exceed 50 feet in height, further assessment of the potential shadows that could be cast is warranted.

Figure 6-1 Maximum Building Envelope Plan



Principal Conclusions

A detailed shadows analysis determined that if the Proposed Actions are approved, the Proposed Project would cast incremental shadows on five resources identified in the Tier 3 analysis. Malcolm X Promenade (O1) and Flushing Bay (N1) would only receive incremental shading on the December 21 analysis day. Incremental shadow cast on Malcolm X Promenade (O1) would be short in duration and would neither detract from the enjoyment of the open space resource by park users nor negatively affect vegetation. Flushing Bay (N1) would receive incremental shadow for only 55 minutes on approximately 0.5 acres of surface waterbody and therefore would not negatively affect fish or wildlife species. The Proposed Project would cast incremental shadows on a small portion of Flushing Meadows Corona Park (O4) to the southwest on three analysis days (not December 21). However, this portion does not contain any active or passive recreation uses, and the affected area of the resource would receive nearly uninterrupted sunlight for the majority of those analysis days. Therefore, no significant adverse impacts are anticipated.

A collection of publicly accessible No-Action open spaces (O5) will be completed as part of Willets Point Phase 1 and Phase 2. These open spaces will serve primarily as landscaped pedestrian connections to facilitate access to the soccer-specific stadium from the Mets-Willets Point NYCT No. 7 Train Subway Station. These open spaces are located on the Northern Parcel, Stadium Parcel, and Triangle Parcel of the Willets Point Development Plan. The Northern Parcel open space, which will include a wide landscaped strip of publicly accessible space, would receive incremental shading from the Proposed Project on the December 21 analysis day only, for a period of 3 hours and 23 minutes from 11:30AM until the end of the analysis period at 2:53PM. During this period, the open space entry plaza to the Stadium Parcel at its southwest corner would be mostly unshaded.

The open spaces that surround the Willets Point Phase 2 stadium building (the Stadium Parcel), which include an entrance plaza at the southwest corner of the stadium and landscaped strips along the west (126th Street/Seaver Way) and south (38th Avenue), would receive shading from the Proposed Project on the May 6/August 6 and June 21 analysis days. The landscaped strip on the east frontage of the stadium on 127th Street would not receive any incremental shading on any of the four analysis days. The Seaver Way frontage and the entrance plaza on the stadium's southwest corner, would receive 48 minutes of incremental shading from 4:30PM until the end of the analysis period at 5:18PM on the May 6/August 6 analysis day. This area would receive one hour and 30 minutes of shading on the June 21 analysis day from 4:31PM until the end of the analysis period at 6:01PM. However, when the Stadium Parcel open spaces would be partially in shadow during these two time periods, the Northern Parcel open space would be unshaded. Additionally, portions of the Triangle Parcel open spaces, described below, would also be unshaded, particularly on the western side of the parcel adjacent to Seaver Way.

The landscaped entry plaza located at the south end of the Triangle Parcel contains the largest open space that will be created in either Willets Point Phase 1 or Phase 2. The entry plaza and connected publicly accessible space on the Triangle Parcel would receive incremental shading on the greatest area at the end of the December 21 analysis day (2:53PM), when approximately 70 percent of this area would be shaded by the Proposed Project. The greatest incremental shadow area on the March 21/September analysis day would similarly occur at the end of the analysis period (4:29PM) when approximately 35 percent of this area of the resource would be shaded by the Proposed Project. However, during periods when the Triangle Parcel would receive incremental shadow from the Proposed Project, portions of open space on the Northern Parcel and Stadium Parcel would remain in sunlight as described above.

The Northern Parcel would only be shaded on the December 21 analysis day and unshaded on the remaining days. During the periods when the Triangle Parcel would receive incremental shading, the landscaped strip of the Stadium Parcel on 127th Street would be unshaded on all four analysis days and the Seaver Way frontage, including the entry plaza on the stadium's southwest corner would be unshaded on the December 21 and March 21/September 21 analysis days. Additionally, the entry plaza would receive direct and unobstructed sunlight from approximately 11:00AM until approximately 12:12PM on the March 21/September 21 analysis day, until approximately 12:46PM on the May 6/August 6 analysis day, and until approximately 1:10PM on the June 21 analysis day.

The Willets Point Phase 1 and Phase 2 open spaces comprise narrow landscaped areas and walking paths that connect to larger open areas such as lawns and entry plazas at the southwest corners of the stadium building and the Triangle Parcel. Features of the open spaces include stepped terraces, stairs, walking paths, paved areas, and a wide flight of steps. The incremental shading from the Proposed Project would be experienced by users of these connective walking paths for brief periods as they traverse the space. According to the Willets Point Phase 2 Development Project Final Second Supplemental Environmental Impact Statement (FSSEIS), dated February 23, 2024, there are no benches planned for the space, where park users might linger for longer periods and thus be affected by incremental shadows for more time.

The shadows analysis in the Willets Point Phase 2 Development FSSEIS notes that, while the specific planting plan for these open spaces have not been planned at this time, it is anticipated that shade-tolerant-plantings would be planned for these open spaces because they would likely thrive best. Incremental shading from the Proposed Project would not affect such shade-tolerant-plantings. In addition, as noted above, when specific portions of the Willets Point Phase 2 Development open spaces are in shadow, substantial portions of the other open spaces would be in sunlight. For these reasons, the Proposed Project would not result in any significant adverse shadow impacts on the Willets Point Development Open Spaces.

Incremental shadow from Area of Development A would reach only a small portion of Flushing Meadows Corona Park (O4) to the southwest that contains no passive or active recreational amenities and would not be of sufficient duration to negatively impact vegetation. Malcolm X Promenade (O1) and Flushing Bay (N1) would only receive incremental shading on the December 21 analysis day and for a short duration, which would not negatively impact sunlight sensitive features like surface waterbody, vegetation or active and passive recreational amenities.

Therefore, no significant adverse impacts resulting from incremental shadows cast by the Proposed Project are anticipated to occur as a result of the Proposed Actions, and no mitigation is required.

Methodology

According to the *CEQR Technical Manual*, the longest shadow a structure will cast in New York City, except for periods close to dawn or dusk, is 4.3 times its height. In accordance with the *CEQR Technical Manual*, a preliminary screening assessment is conducted to ascertain whether shadows resulting from a project could reach any sunlight-sensitive resource at any time of year; if the preliminary assessment indicates that, in the absence of intervening buildings, shadows from a project could reach sunlight-sensitive resources on any of the representative analysis days, a detailed analysis is typically warranted. The representative analysis days are December 21 (winter solstice), June 21 (summer solstice), March 21/September 21 (vernal/autumnal equinox), and May 6/August 6 (halfway between summer solstice and the equinoxes).

Sunlight-Sensitive Resources

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[2]:

- Public open space (e.g., parks, beaches, playgrounds, plazas, schoolyards, greenways, and landscaped medians with seating). Planted areas within unused portions of roadbeds that are part of the Greenstreets program are also considered sunlight-sensitive resources. The uses and vegetation in an open space establish its sensitivity to shadows. This sensitivity is assessed for both (1) warm-weather-dependent features like wading pools and sand boxes, or vegetation that could be affected by 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 uses, such as sitting or sunning; active uses, 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 for most vegetation.
- 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 façades); 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.

Preliminary Assessment

The preliminary screening assessment consists of three tiers of analysis:

- **Tier 1 Screening**: The first tier determines a simple radius around the proposed building representing the longest shadow that could be cast. If there are sunlight-sensitive resources within the radius, the analysis proceeds to the second tier;
- **Tier 2 Screening**: The second-tier analysis 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. According to the *CEQR*

[2] According to the *CEQR Technical Manual*, City streets, sidewalks, and private open spaces (such as private residential front and back yards, stoops, and vacant lots) are not considered to be sunlight-sensitive resources.

Technical Manual, shadows cannot be cast within New York City within 108 degrees from True North. Topographic lines are included to demonstrate the terrain of the area;

› **Tier 3 Screening**: 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. For the Tier 3 screening, three-dimensional modeling software with the capacity to model shadows is used, and the maximum building envelope that could be achieved as a result of the proposed project is modeled and geo-located within the program. Terrain, which has been included in the Tier 1 and Tier 2 Screenings, is also incorporated into the model to account for how changes in elevation throughout the study area can influence shadows that could be cast by the proposed project. The representative days are December 21 (winter solstice), June 21 (summer solstice), March 21/September 21 (vernal/autumnal equinox), and May 6/August 6 (halfway between summer solstice and the equinoxes). The modeling software is also used to approximate times that shadows cast from the proposed project could enter and exit a resource.

Detailed Assessment

If the Tier 3 screening indicates that, in the absence of intervening buildings, shadows from a proposed project would reach a sunlight-sensitive resource on any of the representative analysis days, a detailed shadow analysis would be warranted. Because existing buildings (or No-Action buildings) may already cast shadows on a sun-sensitive resource, a proposed project may not result in additional (incremental) shadows upon that resource. The detailed shadows analysis models a baseline condition (future No-Action) that is compared to the future condition resulting from a proposed project (future With-Action) to illustrate the shadows cast by the No-Action development and distinguish the additional (incremental) shadow cast by the project. The detailed shadows analysis uses a combination of Geographic Information Systems (GIS) 3D modeling and modeling in Sketchup, as well as GIS data provided publicly.

The GIS model for the Proposed Project represents a maximum envelope for each of the four development areas. The actual development may be shorter and less voluminous than what is represented by the GIS model used in this analysis. Therefore, the **Detailed Assessment** described below may overstate the potential for adverse impacts resulting from the Proposed Actions.

Determination of Significance

As described in the *CEQR Technical Manual*, an incremental shadow is generally not considered significant when its duration is no longer than 10 minutes at any time of year and the resource continues to receive substantial direct sunlight. A significant shadow impact can occur when an incremental shadow of 10 minutes or longer falls on a sunlight-sensitive resource and results in one of the following:

› Vegetation: a substantial reduction in sunlight available to a sunlight-sensitive feature of the resource to less than the minimum time necessary for its survival (when there was 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, with consideration given to anticipated new users and the open space's utilization rates throughout the affected time periods as well as to the inventory of available open space resources in the study area.
- 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.

Preliminary Assessment

Tier 1 and 2 Screening

As described previously, the hotel portion of Area of Development A would rise in places to a maximum height of 344 feet, which results in a 1,479-foot maximum shadow screening radius drawn from the proposed building footprint. Although the building would have setbacks and would not reach its maximum height throughout the entirety of the development footprint, the shadow screening radius was based off the highest point to be conservative and for the sake of simplicity. On the east side of the Development Site on the north side of Roosevelt Avenue, Area of Development B could reach a maximum height of 163 feet. Area of Development C on the south side of Roosevelt Avenue could reach a maximum height of 168 feet. A 701-foot radius and a 722-foot radius, respectively, were drawn from these development areas and are incorporated into the maximum shadow screening radius on the east side because they exceed the boundary of the radius for Area of Development A. North of Citi Field, Area of Development D could reach a maximum height of 174 feet, with a maximum shadow screening radius of 748-feet, which also extends beyond the radius for Development A to the east. The area that cannot be shaded by the Proposed Project was drawn from the southernmost point of the southernmost proposed building footprint. **Table 6-1** lists and **Figure 6-2** shows the potential sunlight-sensitive resources identified in the Tier 1 and Tier 2 screening assessment. The figure also shows the current topographic elevation of the Development Site and surrounding area, which ranges from approximately 10 feet to 20 feet of elevation above sea level.

Table 6-1 Sunlight-Sensitive Resources in the Study Area

Map ID	Resource Name	Potential Resource Summary	Sunlight-Sensitive Elements
Open Space Resources			
O1	**Malcolm X Promenade**	1.4-mile waterfront park with benches and bicycle and pedestrian paths	Active and passive recreation, vegetation
O2	**Hinton Park**	3.73-acre neighborhood park with baseball fields	Active and passive recreation, vegetation
O3	**Louis Armstrong Playground**	1.9-acre park with a playground and basketball and handball courts	Active and passive recreation
O4	**Flushing Meadows Corona Park**	898-acre flagship park containing US Tennis Center, fields, paths, skate park, courts, water-based recreation and more	Active and passive recreation, vegetation
O5	**Willets Point – Phases 1 and 2 Open Space**	3.64 acres of No-Action open space that would be completed as part of the Willets Point Project by 2030	Passive recreation and vegetation
Natural Resources			
N1	**Flushing Bay**	Tidal embankment connected to the East River	Surface waterbody
N2	**Flushing Creek**	2-mile-long waterway connecting to Flushing Bay	Surface waterbody
Historic Resources			
H1	**Candela Structures**	Two pavilions credited to Peter Schlandermundt	Fiberglass shells

Source: New York City Department of Parks and Recreation open space database, NYC Capital Planning Platform POPS map, New York Cultural Resource Information System, New York City Landmarks Preservation Commission map, Willets Point FSSEIS February, 2024.

There are four open space resources that are contained fully within or intersect with the maximum shadow screening radius and are therefore included in the study area for this shadows analysis: Malcolm X Promenade (O1), Hinton Park (O2), Louis Armstrong Playground (O3), and Flushing Meadows Corona Park (O4). There are two natural resources within the study area: Flushing Bay (N1) and Flushing Creek and Wetlands (N2). One open space that would be created in the future No-Action Condition, Willets Point – Phase 2 Open Space (O5), would also intersect with the maximum shadow screening radius and is therefore included in the study area for this shadows analysis.

There is one historic resource that intersects with the shadow screening area—The Candela Structures (H1) located within Malcolm X Promenade. Portions of Flushing Meadows Corona Park were determined to be eligible for listing on the State and/or National Register of Historic Places (S/NR) as the Flushing Meadows Corona Park Historic District. The potential effects of shading from the Proposed Project on its sunlight sensitive features is considered as an open space resource (O4). Similarly, the potential effects of the shading from the Proposed Project on the Candela Structures

(H1) will be considered along with the Malcolm X Promenade (O1) where they are located. There are two other historic resources that intersect with the shadow screening area—the Passerelle Bridge and the Willets Point Subway Station, which are contributing resources to the S/NR-eligible Flushing Meadows Corona Park Historic District. However, neither of these resources contain sunlight sensitive architectural features or passive recreational features as defined by the *CEQR Technical Manual* and therefore were not included in the shadows analysis.

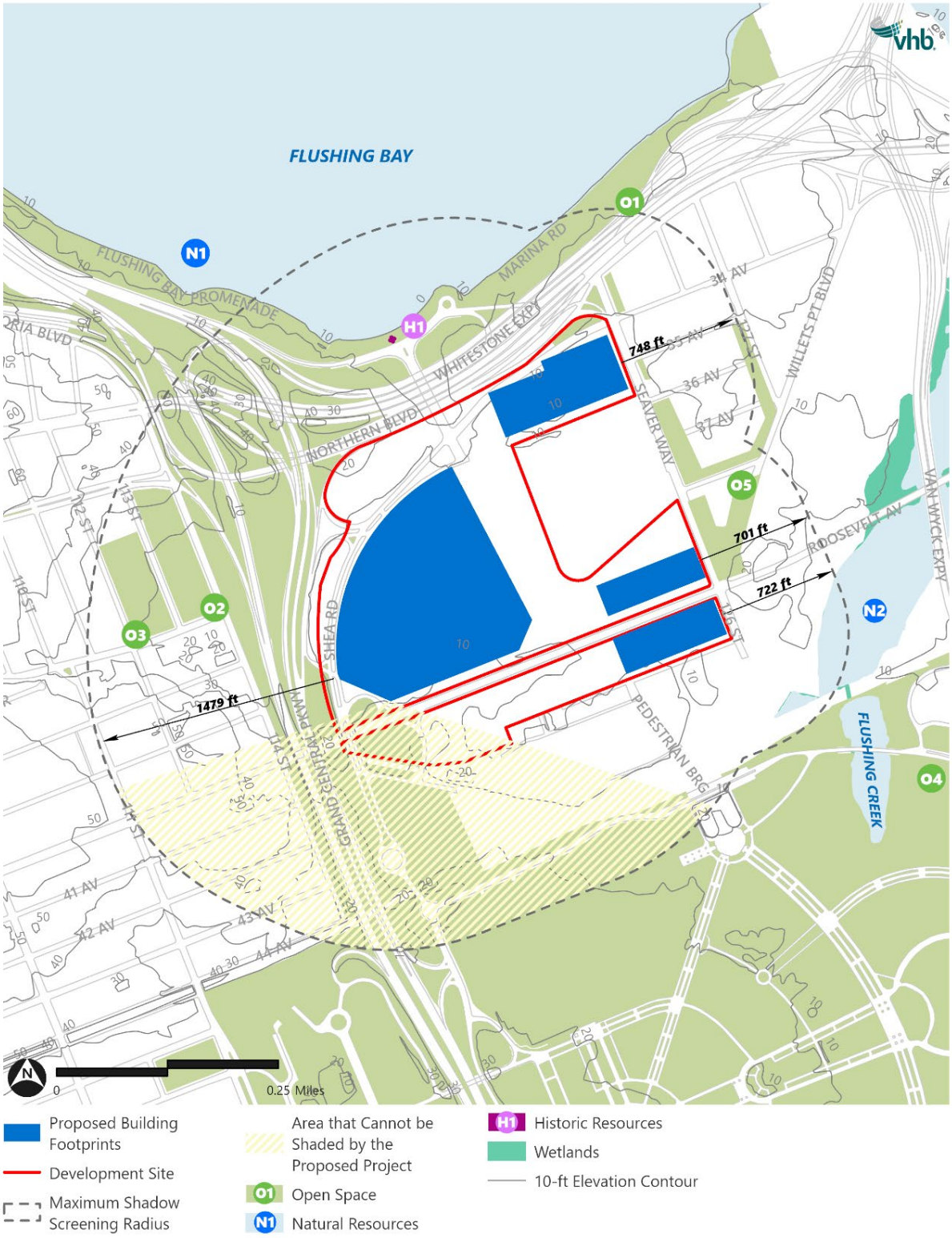
There are several open spaces to the west of the Development Site that are interspersed with the Grand Central Parkway, Shea Road, Northern Boulevard, and assorted entrance and exit ramps to and from those roadways. In the area west of Shea Road and north of the entrance ramp to the Grand Central Parkway from Shea Road, the open spaces are comprised of vegetation and are not publicly accessible. There are no sidewalks or crosswalks along the high-speed roads that separate them from pedestrian areas and from each other. Further, there are no active or passive recreational facilities in these open spaces, and several are surrounded by metal collision barriers typical of the edges of highways, parkways and other unsignalized roadways. While these open spaces do contain vegetation, they are not publicly accessible and therefore were excluded from analysis in this shadows study.

South of the entrance ramp to the Grand Central Parkway from Shea Road, in the area of the NYC Parks Department's Olmsted Center, open spaces that are not cut-off by high-speed roads can be accessed on foot via sidewalks and pathways. These open spaces have some lawns, planted areas, and benches, which are included as part of Flushing Meadows Corona Park (O4) just to the south for the purposes of this shadows analysis. However, much of this area including the passive recreational amenities are located within the area that cannot be shaded by the Proposed Project as shown in **Figure 6-2**.

Just beyond the northeast corner of the Development Site within the shadow study area is a small open space that is carved out of exit ramps from the Grand Central Parkway and Northern Boulevard and is adjacent to Seaver Way, which becomes a one way arterial in that area. While there is some vegetation on these narrow strips bounded by highway ramps, they are not usable by the public and therefore were excluded from analysis in this shadows study.

As described in **Chapter 1, Project Description** and **Chapter 5, Open Space**, the Proposed Actions would result in the development of at least 20 acres of new public park space that would surround the proposed buildings and extend along the western edge of Citi Field. Under the *CEQR Technical Manual*, shadows on project-generated or on-site open space are not considered in the impact analysis. A qualitative description of shadow conditions on the new open space is provided at the end of the chapter.

Figure 6-2 Tier 1 and Tier 2 Screening



Tier 3 Screening Assessment

In accordance with the *CEQR Technical Manual*, a Tier 3 screening assessment was performed because the Tier 1 and Tier 2 assessments identified several sunlight-sensitive resources within ±108 degrees of True North and within the area of the longest shadow that could be cast by the proposed project.

The Tier 3 screening assessment was performed for the four representative days of the year set forth in the *CEQR Technical Manual*—December 21, the winter solstice and shortest day of the year; March 21/September 21, the equinoxes; May 6/August 6, the midpoints between the summer solstice and the equinoxes; and June 21, the summer solstice and the longest day of the year.

In accordance with the *CEQR Technical Manual*, a model of the buildings in the With-Action condition, assuming the maximum building envelopes, was developed in three-dimensional computer programs (Rhino and ArcGIS). The model was geolocated and the surrounding terrain was imported into the model to account for differences in topography. As noted above, the Tier 3 shadow screening shows the shadows that could be cast as a result of the Proposed Actions but does not account for existing buildings which may already cast shadows on the identified resources. **Figure 6-3**, **Figure 6-4**, **Figure 6-5**, and **Figure 6-6** below show Tier 3 screening results.

The Tier 3 shadows analysis found that two resources (listed in **Table 6-2**) would not be affected by incremental shadow from the Proposed Project in any of the four analysis periods, Louis Armstrong Playground (O3) and the Candela Structures (H1).

- Louis Armstrong Playground (O3) would receive no incremental shading on any of the four analysis days. Therefore, no adverse impacts are anticipated and no further analysis is required.
- The Candela Structures (H1) would not be shaded during any of the four analysis periods by the Proposed Project.

Therefore, these resources are screened out at the Tier 3 level and no further analysis is warranted.

Table 6-2 Resources Not Affected by Incremental Shadow (Screened at Tier 3)

Map ID #	Name/Location
O3	Louis Armstrong Playground
H1	Candela Structures

Source: New York City Department of Parks and Recreation open space database, NYC Capital Planning Platform POPS map

The Tier 3 screening assessment found that six resources identified in the Tier 1 and 2 screening would receive incremental shading from the Proposed Project on at least one of the four analysis days (**Table 6-3**). Malcolm X Promenade (O1) and Flushing Bay (N1) would receive shading on the December 21 analysis day. Flushing Creek (N2) would receive shading on the June 21 analysis day. Hinton Park (O2) would receive shading on the March 21/September 21 analysis days. Flushing Meadows Corona Park (O4) would receive shading on the March 21/September 21, May 6/August 6, and June 21 analysis days. The Willets Point – Phase 2 Open Space (O5) would receive incremental shading on all four analysis days. Therefore, these resources were advanced to the detailed assessment described below for further analysis of the potential for incremental shadow from the Proposed Project to adversely impact sunlight sensitive resources.

Table 6-3 Resources Advanced to Detailed Assessment Based on Tier 3 Results

Map ID #	Name/Location
O1	Malcolm X Promenade
O2	Hinton Park
O4	Flushing Meadows Corona Park
O5	Willets Point Development Open Space
N1	Flushing Bay
N2	Flushing Creek

Source: New York City Department of Parks and Recreation open space database, NYC Capital Planning Platform POPS map

Figure 6-3 Tier 3 Screening December 21 Analysis Day

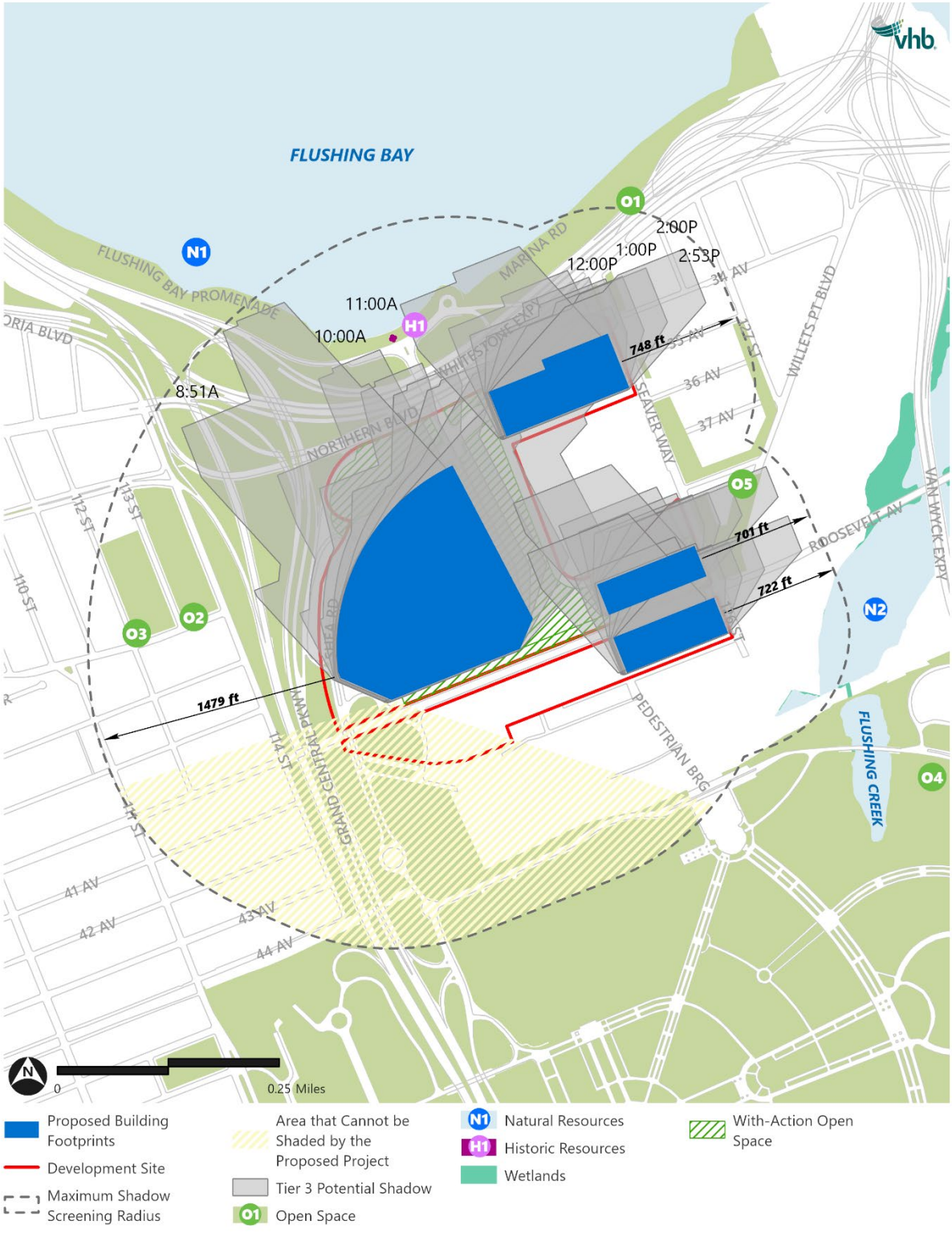


Figure 6-4 Tier 3 Screening March 21 Analysis Day

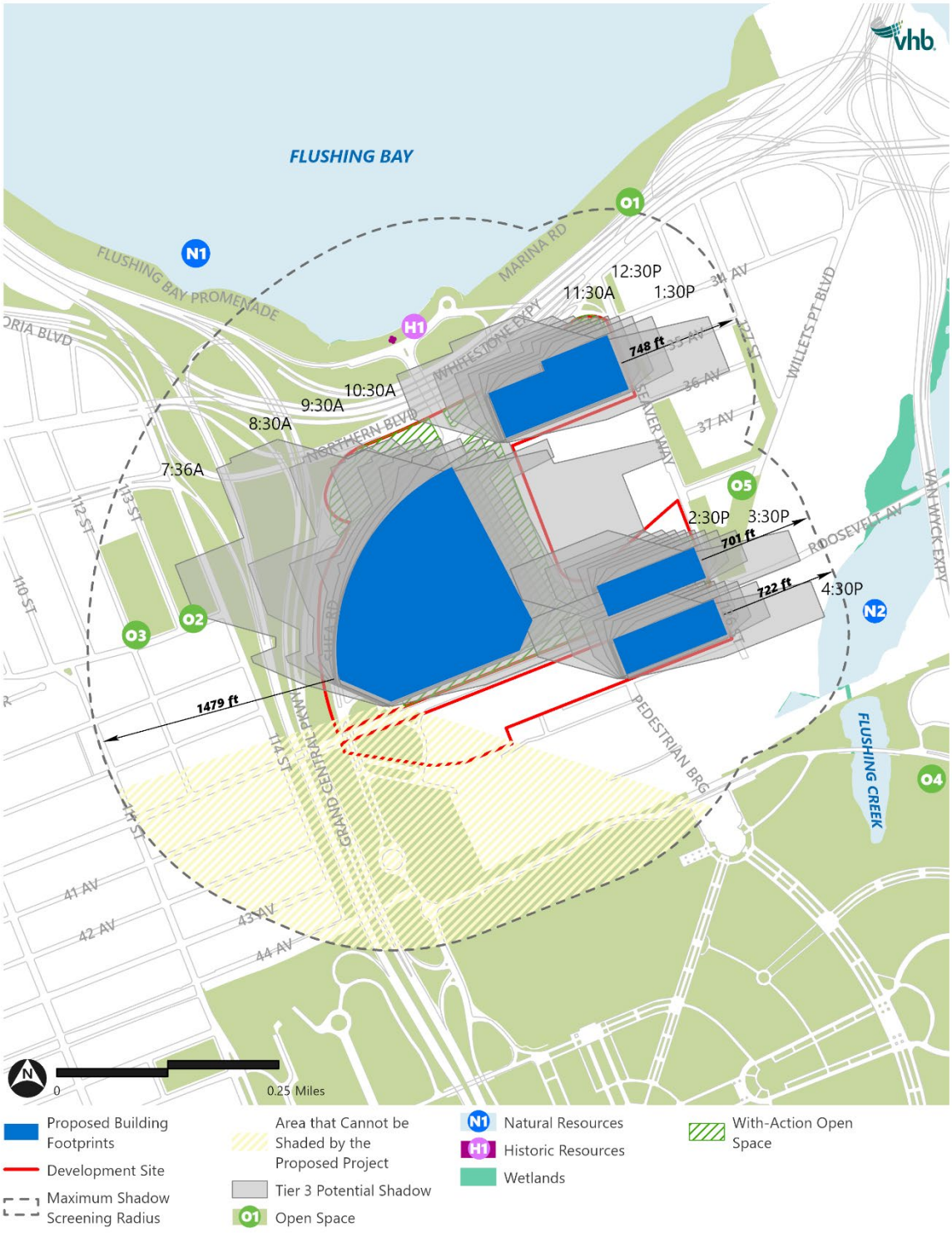


Figure 6-5 Tier 3 Screening May 6 Analysis Day

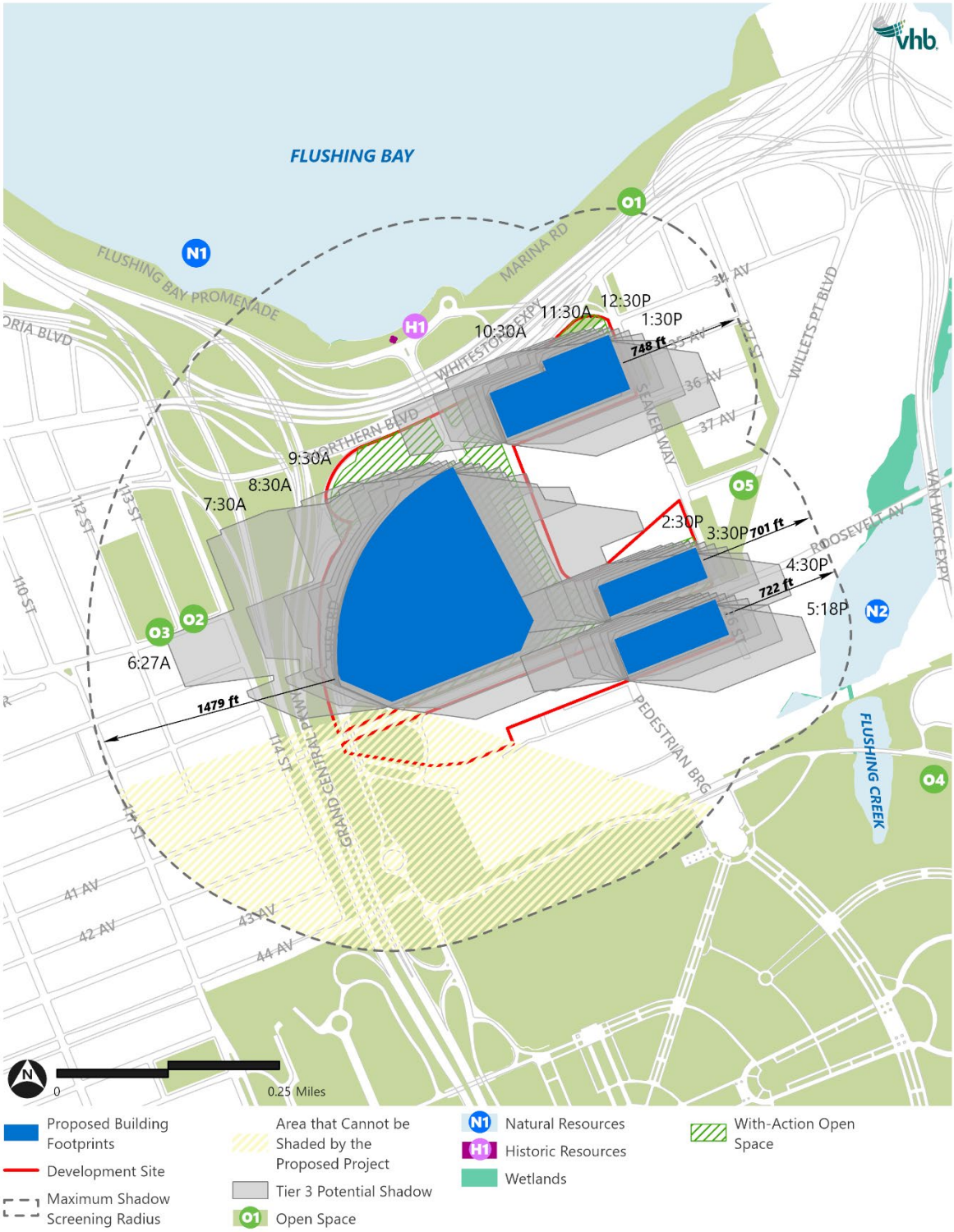
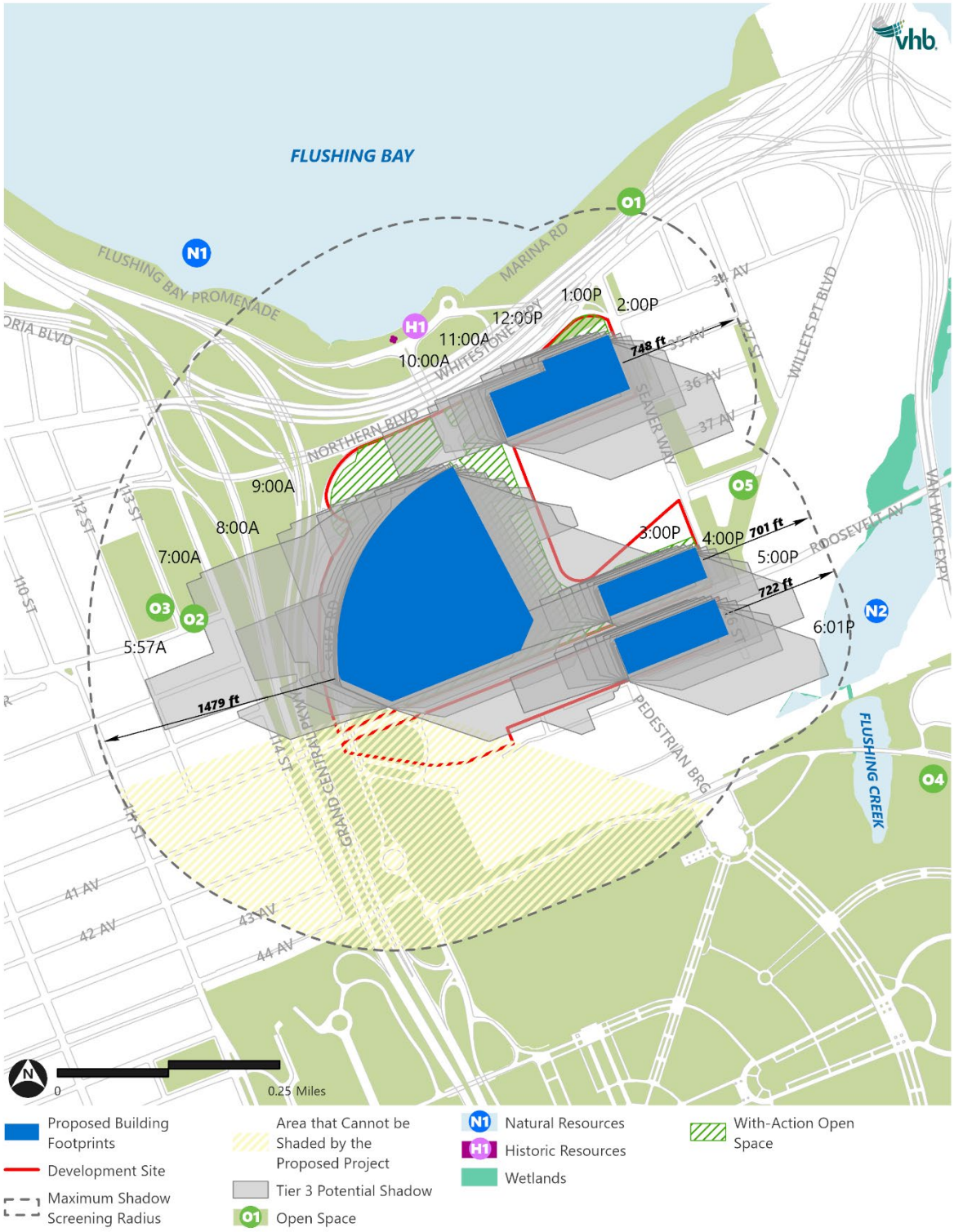


Figure 6-6 Tier 3 Screening June 21 Analysis Day



Detailed Assessment

No-Action Condition

Absent the Proposed Actions, it is assumed that the Development Site would continue operating under existing conditions; it would remain as a paved parking area for Citi Field, which is under the jurisdiction of Parks, per the current lease agreement with the City.

With-Action Condition

As described above, in the With-Action condition, the Proposed Actions are expected to facilitate the construction of four development areas that would exceed 50-feet in height:

- Area of Development A, on the west side of the Development Site, would contain between 15-25 levels and have a maximum height of 344. A section of Area of Development A would also include a nine-level parking structure which would rise to a height of approximately 184 feet.
- Area of Development B, just south of Citi Field and north of Roosevelt Avenue, would contain a building that rises to a maximum height of 163 feet inclusive of nine levels of parking.
- Area of Development C, just south of Roosevelt Avenue, would contain a standalone elevated parking structure with up to ten levels of parking rising to a maximum height of 168 feet.
- Area of Development D, north of Citi Field, includes a parking structure with up to twelve levels of parking rising to a height of approximately 174 feet.

Modeling Results

The detailed shadow assessment builds on the three-dimensional modeling used in the Tier 3 analysis to identify whether the With-Action development that would be constructed on the project site could cast shadows on the identified resources of concern. The detailed shadows assessment also takes into account shadows that are cast by existing buildings by incorporating a three-dimensional model of the surrounding area. Any new shadows projected to be cast onto the identified resources from the proposed project are considered "incremental shadows." The increment in this case would be between a surface parking lot in the No-Action Condition (which is the same as existing conditions) and the Proposed Project.

Table 6-4 provides the modeled incremental shadow entry/exit times for the sunlight sensitive resources.

Table 6-4 Detailed Analysis Summary of Incremental Shadow Entry/Exit Times

	Analysis Day			
Resource	**December 21 8:51AM- 02:53PM**	**March 21/ September 21 7:36AM-4:29PM**	**May 6/Aug 6 6:27AM-5:18PM**	**June 21 5:57AM-6:01PM**
Open Space Resources				
O1 - Malcolm X Promenade	8:51AM – 10:42AM (1 hour and 51 minutes)	-	-	-
O2 – Hinton Park	-	7:36AM – 7:42AM (6 minutes)	-	5:57AM – 5:59AM (2 minutes)
O4 – Flushing Meadows Corona Park	-	7:36AM – 9:01AM (1 hour and 25 minutes)	6:27AM – 9:22AM (2 hours and 55 minutes)	5:57AM – 9:55AM (3 hours and 58 minutes)
O5 – Willets Point Development Open Space (No-Action)	11:12AM – 2:53PM (3 hours and 41 minutes)	12:12PM – 4:29PM (4 hours and 17 minutes)	12:46PM – 5:18PM (4 hours and 32 minutes)	1:10PM – 6:01PM (4 hours and 51 minutes)
Northern Parcel	11:30AM – 2:53PM (3 hours and 23 minutes)	-	-	-
Stadium Parcel	-	-	4:30PM – 5:18PM (48 minutes)	4:31PM – 6:01PM (1 hour and 30 minutes)
Triangle Parcel	11:12AM – 2:53PM (3 hours and 41 minutes)	12:12PM – 4:29PM (4 hours and 17 minutes)	12:46PM – 5:18PM (4 hours and 32 minutes)	1:10PM – 6:01PM (4 hours and 51 minutes)
Natural Resources				
N1 – Flushing Bay	8:51AM – 9:46AM (55 minutes)	-	-	-
N2 – Flushing Creek	-	-	-	5:55PM – 6:01PM (6 minutes)

Detailed shadow analyses are discussed for each resource in the relevant sub-sections below.

O1 - Malcolm X Promenade

Malcolm X Promenade is a linear open space resource located on the shore of Flushing Bay and comprises an active recreation path along the waterfront, vegetation in the form of trees, small grass lawns and bushes, and surface parking lots. Marina Road runs through the middle of the resource from east to west, separating park amenities like the walking path from the surface parking lots to the south, which are closer to the Grand Central Parkway overpass that forms the park's southern border. As mentioned previously, a historic resource, the Candela Structures (H1), is located within Malcolm X Promenade at the end of Boat Basin Place. However, as the Tier 3 shadows analysis

demonstrated, this resource would not receive any incremental shading during any of the four analysis periods.

The Proposed Project would only cast incremental shadow on the Malcolm X Promenade for 1 hour and 51 minutes from the start of the December 21 analysis day at 8:51AM until 10:42AM, as shown in **Figure 6-7** and **Figure 6-8**. The area of this resource that is most sunlight sensitive is located at its northern edge along the shore of Flushing Bay, where there is a walking path and vegetation such as deciduous trees, grass lawns, and bushes. The December 21 analysis day is representative of non-growing season winter conditions, when most vegetative species that occur within the deciduous woodland community that occupies the affected portion of the resource are dormant, and sunlight requirements for photosynthesis is low or non-existent. Further, the recreational path would be affected by incremental shadows for only a little over an hour. The size of the new shadow would be very small relative to the remaining sunlit portion of this linear Promenade, particularly after the first 60 minutes. There would be plenty of sunlit areas available to users adjacent to the affected area. This portion of the resource would receive shading until approximately 10:00AM, at which point incremental shadow would touch its southern part only, which is comprised of a surface parking lot that is not sunlight sensitive. Therefore, due to the limited extent and duration of incremental shading that the sunlight sensitive resources within Malcolm X Promenade are projected to receive as a result of the Proposed Actions during the December 21 analysis period, and the remaining ample areas of sun, no significant adverse impacts as a result of shadows are anticipated and no further analysis is required.

O2 – Hinton Park

Hinton Park is a rectangular 3.73-acre park located across the Grand Central Parkway from the Development Site. It contains sunlight-sensitive resources for active and passive recreation, including a turf athletic field, benches, and walking paths as well as vegetation in the form of trees, grasses, and bushes. The resource could receive incremental shading from the Proposed Project from 7:36AM to 7:42AM on the March 21/September 21 analysis day, a period of 6 minutes, and from 5:57AM to 5:59AM on the June 21 analysis day, a period of 2-minutes. Per the *CEQR Technical Manual*, because the resource would receive less than 10 minutes of incremental shading on any one analysis day and would continue to receive substantial direct sunlight, no significant adverse impacts to sunlight sensitive resources are anticipated and no further analysis is required.

O4 - Flushing Meadows Corona Park

Flushing Meadows Corona Park is an 898-acre flagship park that contains dozens of amenities such as greenways, baseball fields, basketball courts, golf courses, and barbecuing areas. The park also contains unique amenities such as the Billie Jean King National Tennis center and the Queens Museum as well as remnants from the 1969 World's Fair, for which the park was developed, including the Unisphere and Fountain of the Planets. While the Development Site is mapped as Flushing Meadows Corona Park, the public open space portion of the park is located on the south side of the MTA's Corona Yard and Maintenance Shop, a minimum of 700 feet from the Project's southernmost structures (Area of Development C). Due to its location relative to where new buildings would be constructed as part of the Proposed Actions, much of the portion of the park within the maximum

shadow screen radius is located within the area that cannot be shaded by the Proposed Project. [3] The Tier 3 and Detailed Shadows analyses found that the only portion of the park that could receive incremental shading is a wide planted median at the park's northwest extent, which is located north of Roosevelt Avenue, and bounded to the west by the Grand Central Parkway, Stadium Place North to the east, and an access road to the Grand Central Parkway from Shea Road to the north.

While this area is a mapped portion of Flushing Meadows-Corona Park, it is not usable park space and consists of a wide planted median between several roadways. There are no pathways to access this part of the park and there are no passive recreational amenities like benches or walking paths as are found elsewhere in the park. This portion of the park is located at a distance from the publicly accessible portion of Flushing Meadows Corona Park south of Roosevelt Avenue. Sunlight-sensitive resources in this area of Flushing Meadows Corona Park that could receive incremental shading include vegetation in the form of deciduous trees and grass lawns.

The park would not receive any incremental shading on the December 21 analysis day. On the March 21/September 21 analysis day, this area of the resource could receive shading for a period of 1 hour and 25 minutes from the start of the analysis period at 7:36AM until 9:01AM, as shown in **Figure 6-9** and **Figure 6-10**. On the May 6/August 6 analysis day, this area of the resource could receive shading for a period of 2 hours and 55 minutes from 6:27AM at the start of the analysis period until 9:22AM, as shown in **Figure 6-11** through **Figure 6-13**. On the June 21 analysis day, this area of the resource could receive shading for a period of 3 hours and 58 minutes from the start of the analysis period at 5:57AM until 9:55AM, as shown in **Figure 6-14** through **Figure 6-17**.

Relative to the size of the resource overall, the shading that could occur on the northwest corner adjacent to the Project Area would be small and would occur only in the morning of three of the analysis periods. The area of the park that could be shaded is approximately 1.5 acres or approximately 0.17 percent of the total size of the resource. On the March 21/September 21 analysis day, this portion of the park would receive mostly unobstructed sunlight and no shading from the Proposed Project for a period of 7 hours and 30 minutes. On the May 6/August 6 analysis day, the period during which this portion of the park would be unshaded by the Proposed Project and would receive mostly unobstructed direct sunlight is 7 hours and 56 minutes. Lastly, on the June 21 analysis day, the period during which this portion of the park would be unshaded by the Proposed Project and would receive mostly unobstructed direct sunlight is 8 hours and 6 minutes or more than two thirds of the analysis window. The affected portion of the park would not receive any incremental shading after 9:55AM on any of the four analysis days and would therefore receive direct sunlight when the sun's light is most intense in the middle of the day and early afternoon. The incremental shading that the deciduous trees and grass lawns would receive at the start of each analysis period would not significantly impact the health or growth of this vegetation. The incremental shading would also not substantially detract from the experience of park users because there is no access available to this portion of the park and there are no passive recreational amenities within it. Therefore, no significant adverse impacts are anticipated as a result of incremental shading from the Proposed Project.

[3] As described above and in the *CEQR Technical Manual*, the area that could be affected by project-generated shadows does not include areas within 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. Shadows cannot be cast within New York City within 108 degrees from True North. This is further demonstrated in the Tier 1 and 2 and Tier 3 graphics above.

O5 - Willets Point Development Open Space

The detailed shadows analysis included a collection of publicly accessible No-Action open spaces that will be completed Project by 2030, the build year for the Proposed Project, as part of the Willets Point Development. According to the Willets Point Phase 2 Development Project FSSEIS, approximately 3.64 acres of privately owned public open space would be created as part of Willets Point Phases 1 and 2. This open space would be largely comprised of a completed pedestrian plaza at the corner of 126th Street/Seaver Way and Northern Boulevard as well as linear and plaza spaces throughout Willets Point Phase 2. These open spaces will serve primarily as landscaped pedestrian connections to facilitate access to the stadium from the Mets-Willets Point NYCT No. 7 Train Subway Station. All of these open spaces are expected to include raised planting beds containing grasses, shrubs, and trees. However, the specific planting plan is not finalized. According to the Willets Point Phase 2 Development Project FSSEIS, the following open spaces would be completed up through Phase 2, which are grouped by parcel from north to south:

- Northern Parcel
  - Landscaped strip of public space adjacent to the east sidewalk of 126th Street/Seaver Way and a narrow, landscaped strip of public space adjacent to the south sidewalk of Northern Boulevard. The open space along 126th Street/Seaver Way will be elevated approximately 5 feet above the sidewalk adjacent to the Willets Point Phase 2 residential building on the Northern Parcel, and it will transition down to the sidewalk with raised terraces, stairs, and a sloped path.
- Stadium Parcel
  - An entrance plaza at the southwest corner of the stadium and landscaped strips along the west (126th Street/Seaver Way), south (38th Avenue), and east (127th Street) frontages of the stadium. The open spaces along 126th Street/Seaver Way and 38th Avenue will be designed with grade changes and raised transition zones. There would be wide flights of stairs from the open space on 126th Street/Seaver Way to the entrance at the southwest corner of the stadium.
- Triangle Parcel
  - A landscaped entry plaza at the southern end of the Triangle Parcel, adjacent to the intersection of Roosevelt Avenue and 126th Street/Seaver Way, that is expected to include a paved area, a lawn, and raised planting beds.
  - A landscaped strip of publicly accessible space adjacent to the east sidewalk of 126th Street/Seaver Way on the Triangle Parcel from the entry plaza to 38th Avenue. This open space will be elevated approximately 7 feet above the sidewalk adjacent to the Willets Point Phase 2 building, and it would transition down to the sidewalk with stepped terraces, stairs, and a sloped path.
  - A landscaped pedestrian connection along the east side of the building on the Triangle parcel. This open space will be integrated with the open space that will have been constructed along the west side of the Phase 1 site to create a 75-foot-wide open space between the 126th Street/Seaver Way and Roosevelt Avenue intersection and 38th Avenue, where the pedestrian connection will widen to create a landscaped plaza at the northeast corner of the building on the Triangle Parcel.

The following details shadow durations more specifically on these open spaces (shown in **Figure 6-18** through **Figure 6-36**), as described by parcel from north to south:

- The Northern Parcel open space, which will include a wide landscaped strip of publicly accessible space, would receive incremental shading on the December 21 analysis day only, as shown in **Figure 6-18** through **Figure 6-21**. It would receive incremental shading for a period of 3 hours and 23 minutes from 11:30AM until the end of the analysis period at 2:53PM, and the area of the incremental shadow could cover up to 85 percent of the area. During this period, the entry plaza to the Stadium Parcel at its southwest corner would be mostly unshaded, as noted below.
- The open spaces that surround the Willets Point Phase 2 Stadium Parcel, which include an entrance plaza at the southwest corner of the stadium and landscaped strips along the west (126th Street/Seaver Way) and south (38th Avenue) would receive shading on the May 6/August 6 and June 21 analysis days. The landscaped strip on the east frontage of the stadium on 127th Street would not receive any incremental shading on any of the four analysis days. The Seaver Way frontage, including the entrance plaza on the stadium's southwest corner, would receive 48 minutes of incremental shading from 4:30PM until the end of the analysis period at 5:18PM (see **Figure 6-31**), and incremental shading would cover a maximum of 18 percent of its area. This area would receive one hour and 30 minutes of shading on the June 21 analysis day from 4:31PM until the end of the analysis period at 6:01PM (see **Figure 6-32** and **Figure 6-36**), and incremental shading would cover a maximum of approximately 20 percent of its area. However, when the Stadium Parcel open spaces would be partially in shadow during these two time periods, the Northern Parcel open space would be unshaded. Additionally, portions of the Triangle Parcel open spaces, described below, would be unshaded, particularly on the western side of the parcel adjacent to Seaver Way.
- The landscaped entry plaza located at the south end of the Triangle Parcel contains the largest open space that will be created in Willets Point Phase 1 and Phase 2. The entry plaza and connected publicly accessible space on the Triangle Parcel would receive incremental shading on the greatest area at the end of the December 21 analysis day (2:53PM), shown in **Figure 6-21**, when approximately 70 percent of this area would be shaded by the Proposed Project. The greatest incremental shadow area on the March 21/September analysis day would similarly occur at the end of the analysis period (4:29PM), as shown in **Figure 6-26**, when approximately 35 percent of this area of the resource would be shaded by the Proposed Project. However, during periods when the Triangle Parcel would receive incremental shadow from the Proposed Project, portions of open space on the Northern Parcel and Stadium Parcel would remain in sunlight as described above. The Northern Parcel would only be shaded on the December 21 analysis day and unshaded on the remaining days. During the periods when the Triangle Parcel would receive incremental shading, the landscaped strip of the Stadium Parcel on 127th Street would be unshaded on all four analysis days, and the Seaver Way frontage, including the entry plaza on the stadium's southwest corner, would be unshaded on the December 21 and March 21/September 21 analysis days. Additionally, the entry plaza would receive direct and unobstructed sunlight from approximately 11:00AM until approximately 12:12PM on the March 21/September 21 analysis day, until approximately 12:46PM on the May 6/August 6 analysis day, and until approximately 1:10PM on the June 21 analysis day.

As noted, the Willets Point Phase 1 and Phase 2 open spaces are comprised of narrow landscaped areas and walking paths that connect to larger open areas, such as lawns and entry plazas at the southwest corners of the stadium building and the Triangle Parcel. The incremental shading from the Proposed Project described above would be experienced by users of these connective walking paths for brief periods as they traverse the space. According to the Willets Point Phase 2 Development

Project FSSEIS, there are no benches planned for the spaces, where park users might linger and thus be affected by incremental shadows for more time.

The Willets Point Phase 2 Development FSSEIS also notes while the specific planting plan for these open spaces has not been established at this time, it's anticipated that shade-tolerant plantings would be used for the open spaces because they'd likely thrive best. Incremental shading from the Proposed Project would not affect such shade-tolerant plantings. In addition, as noted above, when specific portions of the Willets Point open spaces are in shadow, substantial portions of the other open spaces would be in sunlight. For these reasons, the Proposed Project would not result in any significant adverse shadow impacts on the Willets Point Phase 1 and Phase 2 open spaces.

N1 – Flushing Bay

Flushing Bay is an approximately 660-acre waterbody located south of the northeastern extent of the East River and bounded to the west by LaGuardia Airport and to the east by the neighborhood of College Point. Its sunlight sensitive properties include surface waterbody. This natural resource could receive incremental shading from the Proposed Project for a period of approximately 55 minutes from the start of the December 21 analysis period at 8:51AM until 9:46AM, as shown in **Figure 6-7**. The incremental shadow that Flushing Bay would receive from the Proposed Project would encompass an area of approximately 0.5 acres at its maximum extent, which is less than 0.1 percent of the resource's total area. The shadows that Flushing Bay could receive are short in duration and diffuse. Diffuse shadows are not considered a significant change to habitat conditions, as they are temporary and unlikely to change the habitat condition. Further, the aquatic life of the bay is continuously carried by strong and tidal currents and would be exposed to these shadows for short durations. The shadows cast on the bay would not create adverse impacts on fish and wildlife species. Therefore, no adverse impacts to Flushing Bay are anticipated from incremental shadows cast by the Proposed Project.

N2 – Flushing Creek

Flushing Creek is a one-mile-long open channel that flows north from its head located 300 yards south of the Van Wyck Expressway and discharges into the southern end of Flushing Bay just downstream of its crossing under the Whitestone Expressway. Sunlight sensitive resources include surface waterbody. The resource would receive approximately six minutes of incremental shading from the Proposed Project at the end of the June 21 analysis period from 5:55PM until 6:01PM. Per the *CEQR Technical Manual*, because the resource would receive less than 10 minutes of incremental shading on one analysis day and would continue to receive substantial direct sunlight, no impacts to sunlight sensitive resources are anticipated and no further analysis is required.

With-Action Open Space

According to the *CEQR Technical Manual*, shadows on project-generated open space are not considered significant under CEQR. However, a qualitative discussion of how shadows could affect With-Action open space is provided here.

As described in **Chapter 1, Project Description** and **Chapter 5, Open Space**, the Proposed Actions would result in the development of at least 20 acres of new public park space that would surround the proposed buildings and Citi Field. The amenities proposed to be included in the park space are outdoor event space; gardens; moveable seating; picnic areas; open lawns; promenades; landscaped

pathways; playgrounds; fitness areas; and active recreational spaces for sports such as basketball, racket sports, and soccer. The open spaces are divided into six distinct areas that range in size from 10.50 to 1.20 acres.

The With-Action open space is bordered by and interspersed with the four Areas of Development that would occur under the Proposed Actions. Therefore, it could receive shading from the buildings that comprise the Proposed Project on each of the four analysis days used in the assessment of the potential impacts of incremental shadows. The section below describes the shading each open space area that would be created by the Proposed Actions could receive.

- Open Space 1, which would be located in the center of the Development Site and comprises approximately half of the With-Action open space that would be created, could receive shading on each of the four analysis days. Most of the shading would occur from Area of Development A, where the largest building would be located, in the afternoon of the March 21/September 21, May 6/August 6, and June 21 analysis days. Open Space 1 would be mostly unshaded by the Proposed Project during the late morning and midday period (10AM to 2PM) in those three analysis periods.
- Open Space 2, which would be located north of Area of Development A, could receive shading during each analysis day—primarily during the December 21 analysis day and in the morning of the March 21/September 21 analysis day.
- Open Space 3, which would be located north of Area of Development B and south of Citi Field, could receive shading from the Proposed Project on each of the four analysis days. Due to its location north of Area of Development B, that development would shade Open Space primarily in the midday period of the December 21 and March 21/September 21 analysis days.
- Open Space 4 would be located directly south of Open Space 1 and would experience similar amounts of shading.
- Open Space 5 would be located north of Area of Development D and would receive shading primarily during the December 21 analysis day, with small amounts and short periods of shading during the other three analysis days.
- Open Space 6, which would be located west of Area of Development C south of Roosevelt Avenue, is partially located in the area that cannot be shaded by the Proposed Project. The remaining portion would receive shading in the morning of the March 21/September 21, May 6/August 6, and June 21 analysis days.

As described in **Chapter 5, Open Space**, the Proposed Actions would add 20 acres of public park space to an area that is currently not used for recreation by the public. Because the With-Action open spaces are located between and around the four areas of development evaluated in this shadows assessment, the six open space areas could receive shading from the Proposed Project on each of the four analysis days, with some exceptions as described previously. However, the six With-Action open spaces would also not all receive some incremental shading at the same time, providing the public with sunlit areas throughout the four analysis periods.

Given that the Development Site is in partial shade or portions of the Development Site are entirely shaded throughout the day, a planting approach would be developed to ensure thriving of shade-tolerant species, including:

- Selecting species and locations according to specific site conditions based on the amount and duration of shade (as well as soil type, moisture levels, and any other critical environmental factors that may influence plant growth).
- Using diverse selection of NY-native and shade-tolerant plants that are well-suited to the specific site conditions, considering factors such as height, spread, bloom time, and form.
- Layering planting design to maximize the use of available light and space—placing taller species towards the back or center of shaded areas, with progressively shorter plants towards the front or edges to create depth and dimension.
- Selecting understory plants that thrive in low-light conditions and can tolerate shade from larger trees or shrubs.

Detailed Shadows Images

Malcolm X Promenade (O1)/Flushing Bay (N1)

Figure 6-7 O1/N1 December 21- 9:00AM



Figure 6-8 O1/N1 December 21- 10:00AM



Flushing Meadows Corona Park (O4)

Figure 6-9 O4 March 21/September 21 – 7:45AM

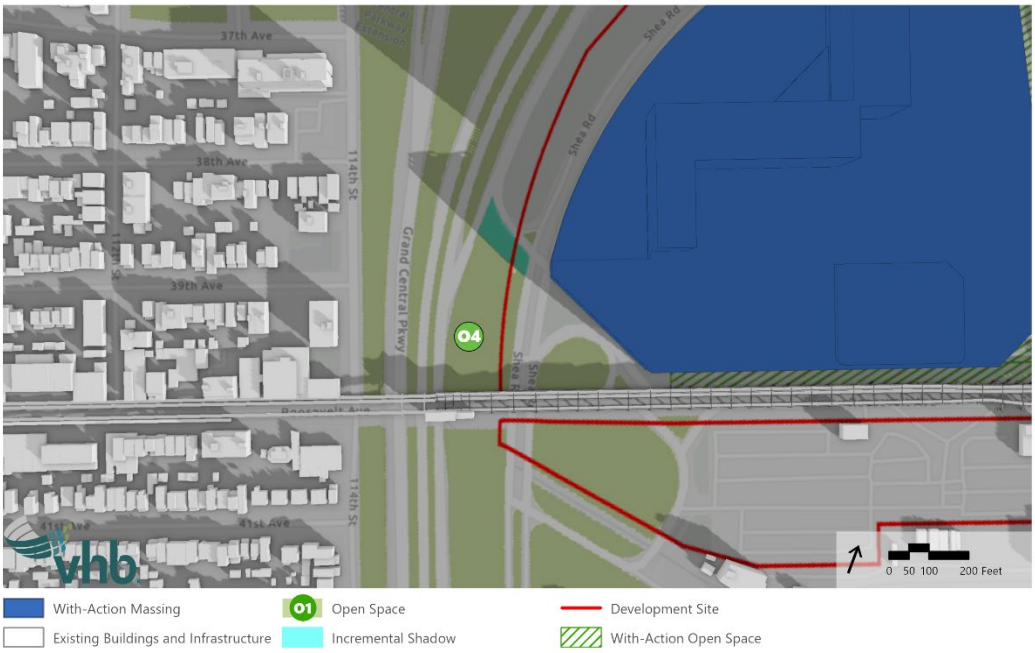


Figure 6-10 O4 March 21/September 21 – 8:45AM

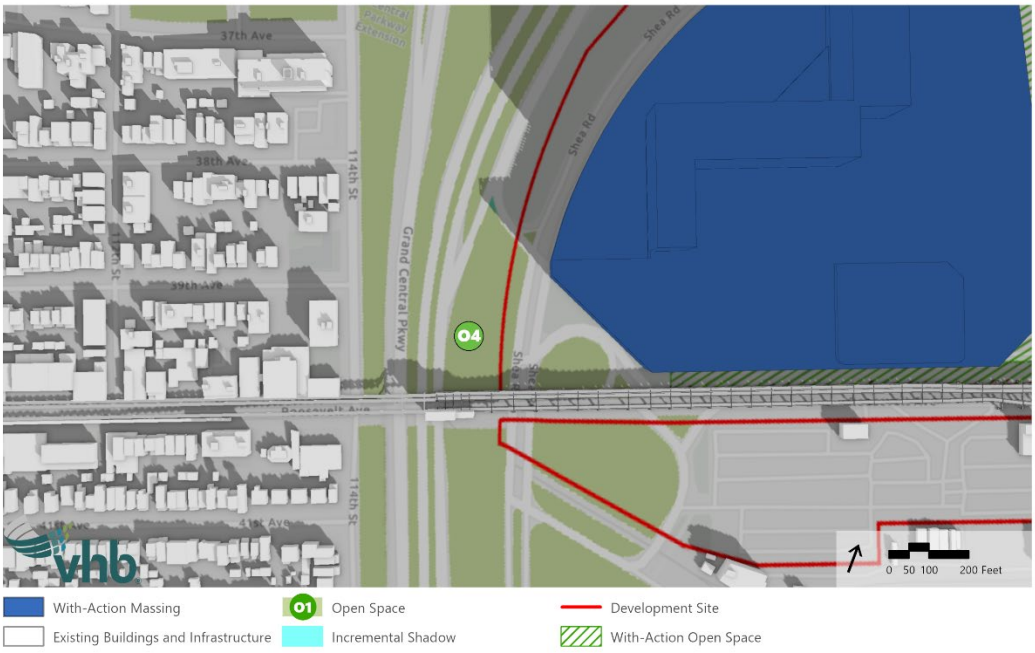


Figure 6-11 O4 May 6/August 6 – 6:30AM



Figure 6-12 O4 May 6/August 6 – 7:30AM



Figure 6-13 O4 May 6/August 6 – 8:30AM

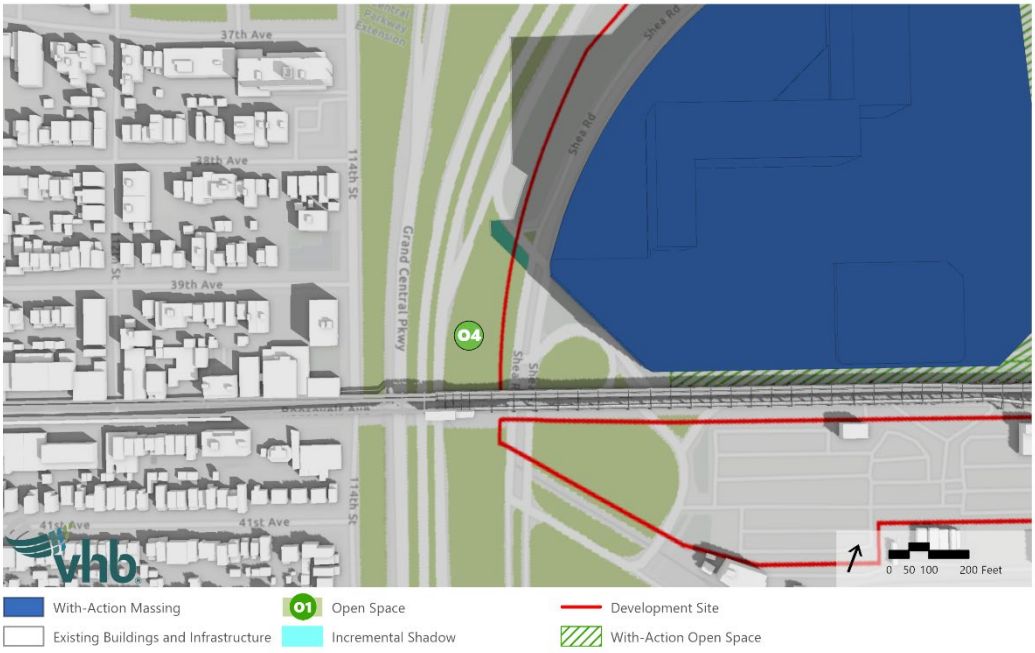


Figure 6-14 O4 June 21 – 6:00AM



Figure 6-15 O4 June 21 – 7:00AM

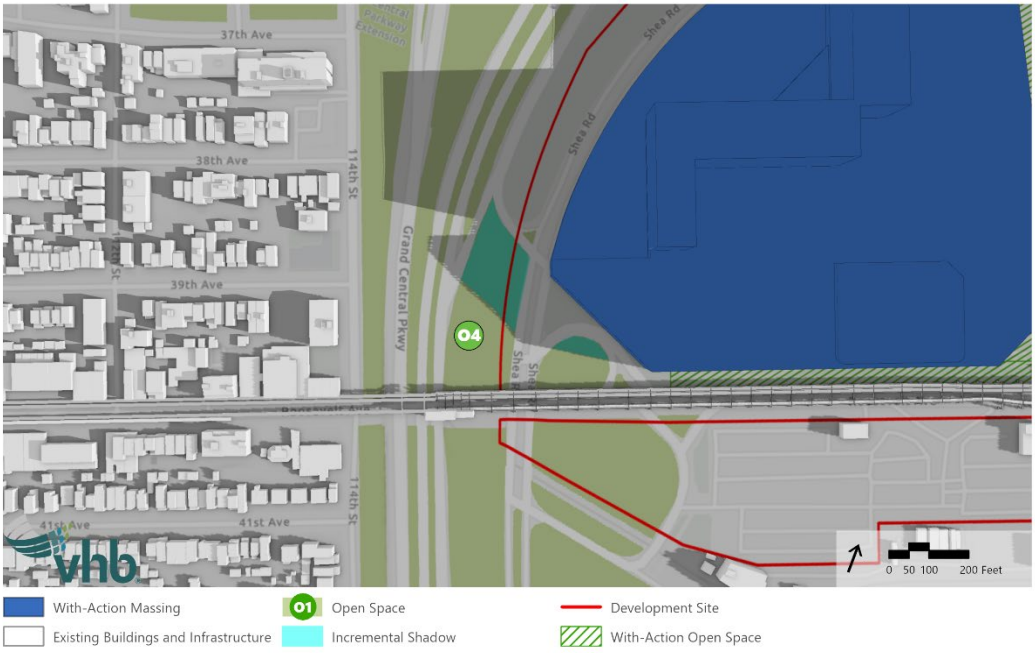


Figure 6-16 O4 June 21 – 8:00AM

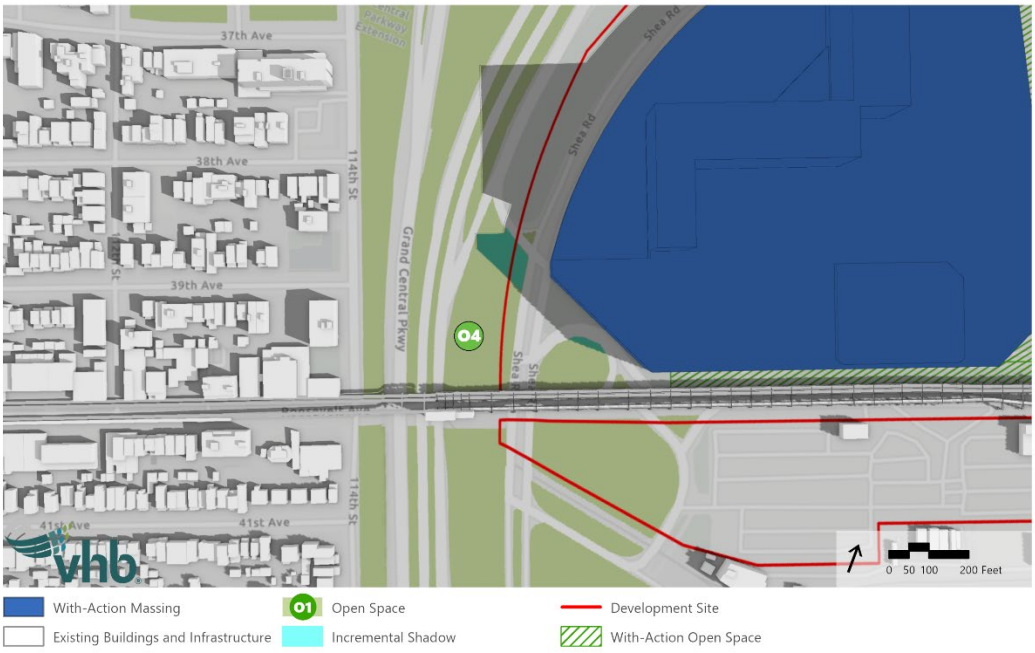
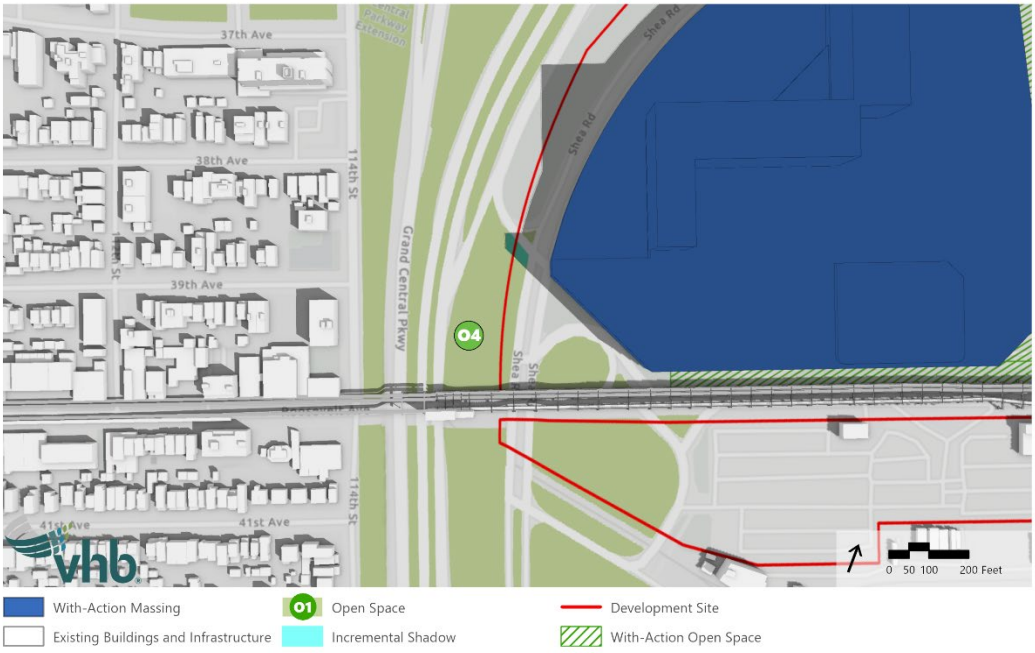


Figure 6-17 O4 June 21 – 9:00AM



Willets Point Development Open Space (O5)

Figure 6-18 O5 December 21- 11:30AM

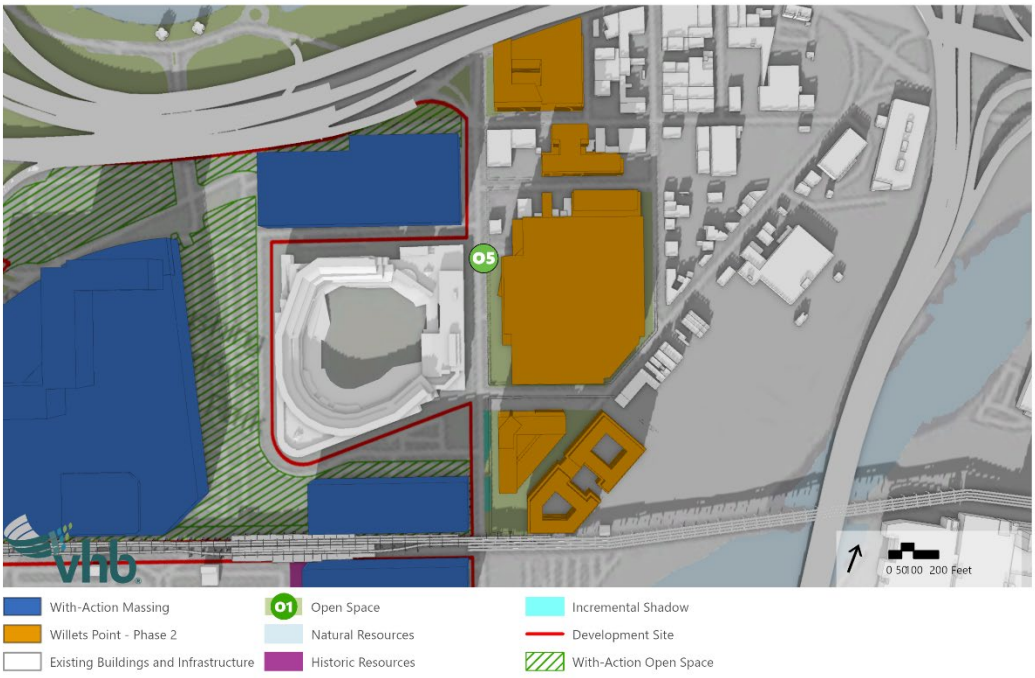


Figure 6-19 O5 December 21- 12:30PM

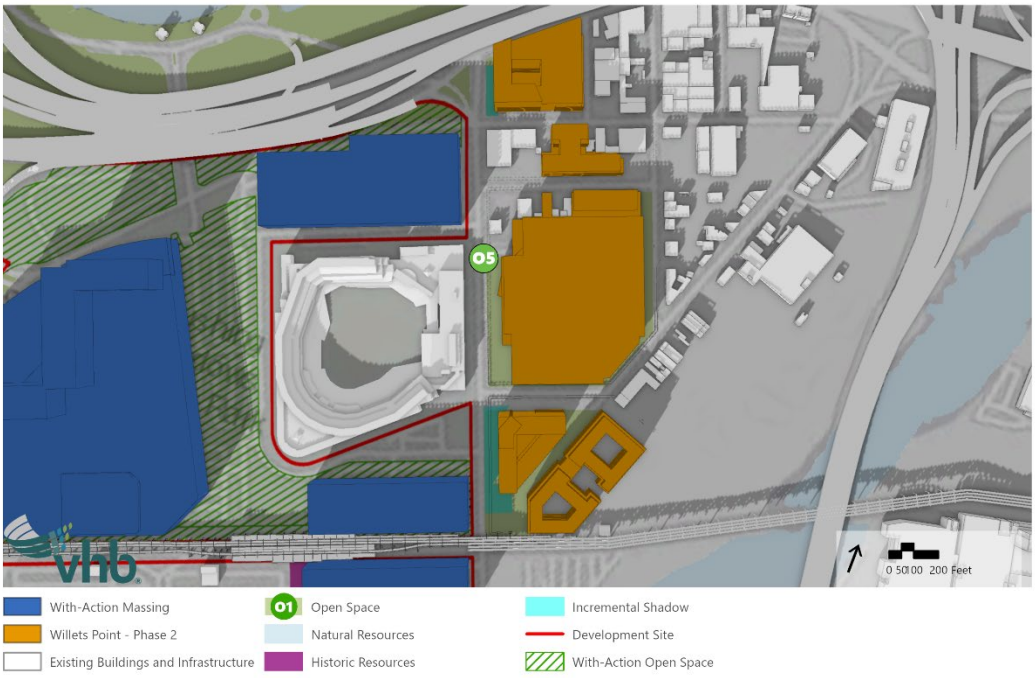


Figure 6-20 O5 December 21- 1:30PM

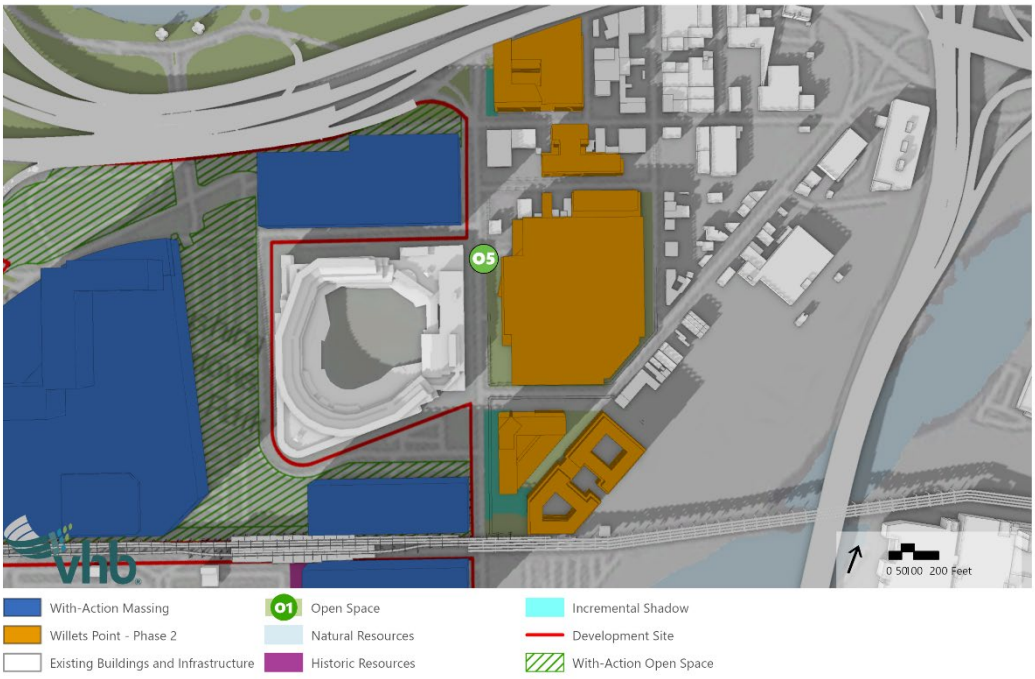


Figure 6-21 O5 December 21- 2:30PM

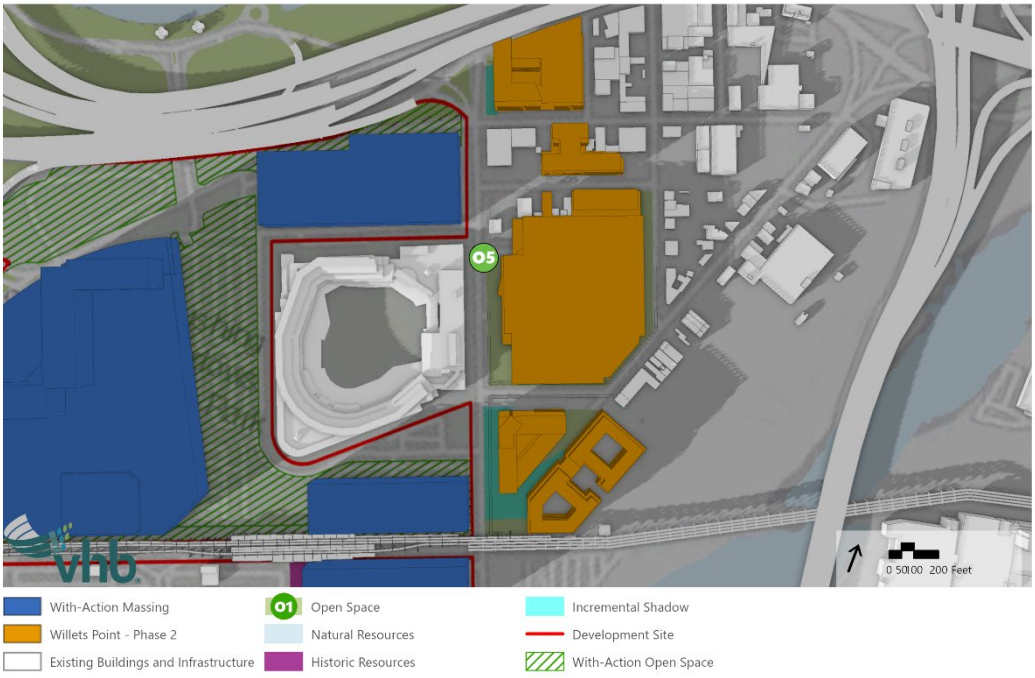


Figure 6-22 O5 March 21/September 21- 12:30PM

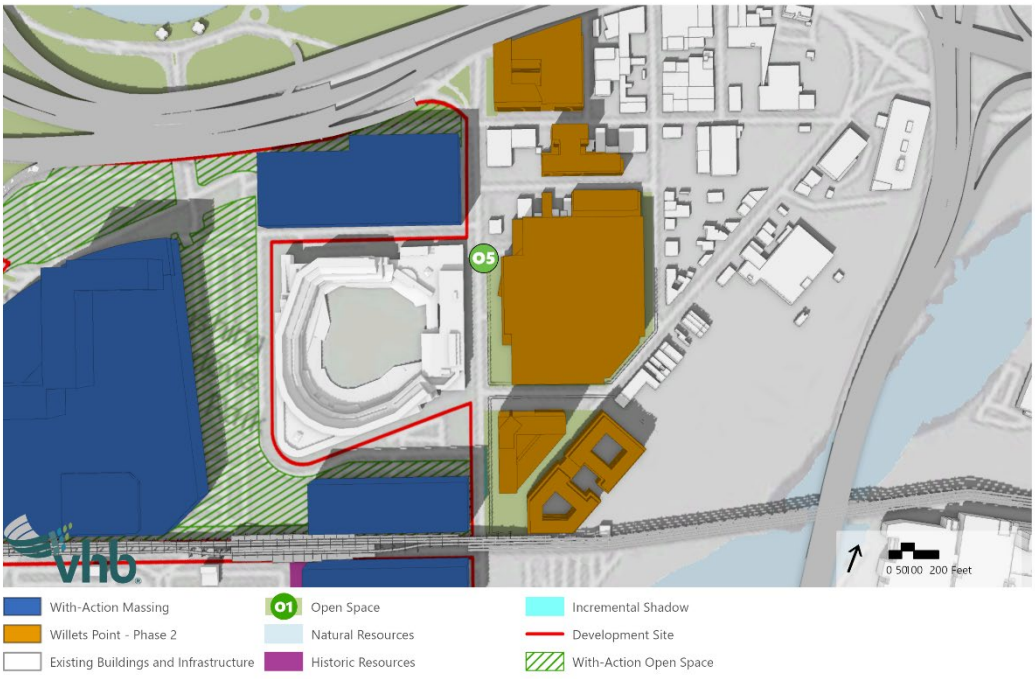


Figure 6-23 O5 March 21/September 21- 1:30PM

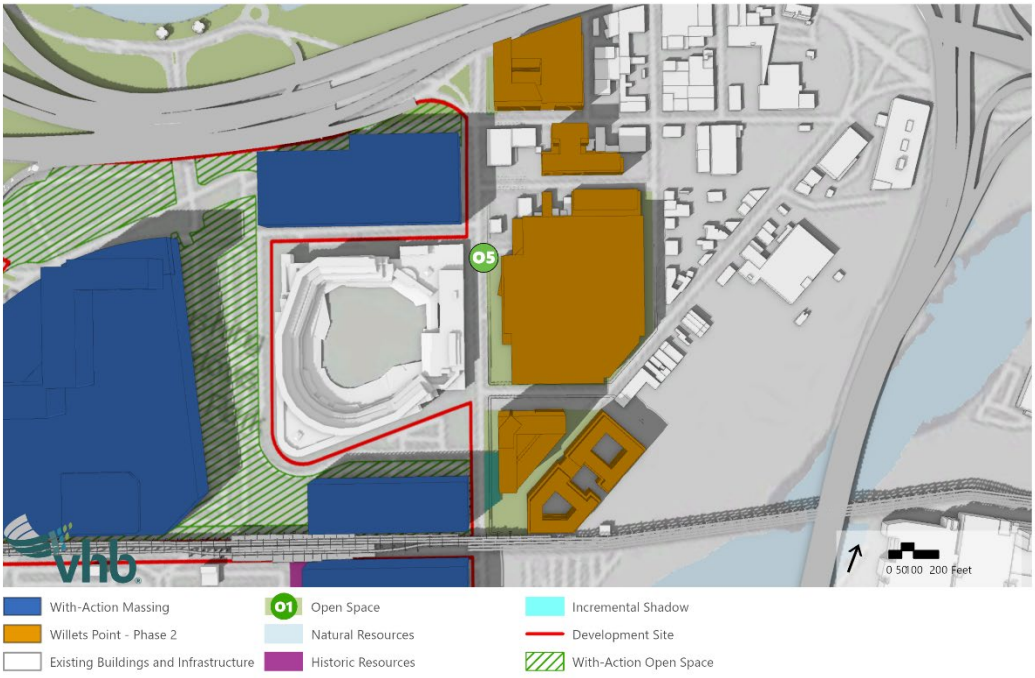


Figure 6-24 O5 March 21/September 21 – 2:30PM

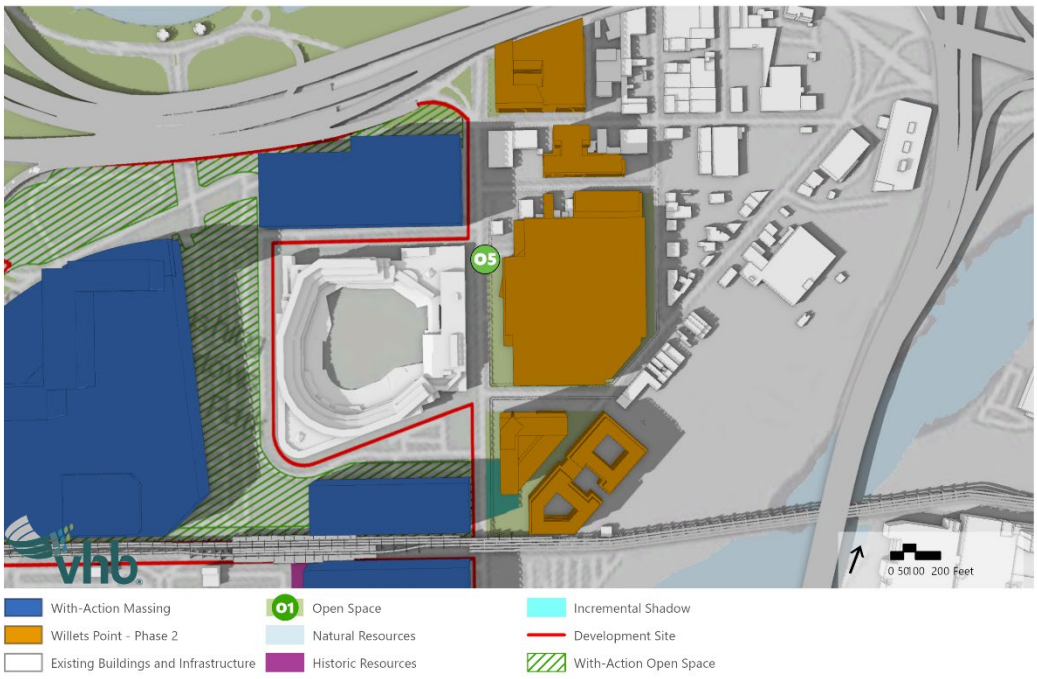


Figure 6-25 O5 March 21/September 21 – 3:30PM

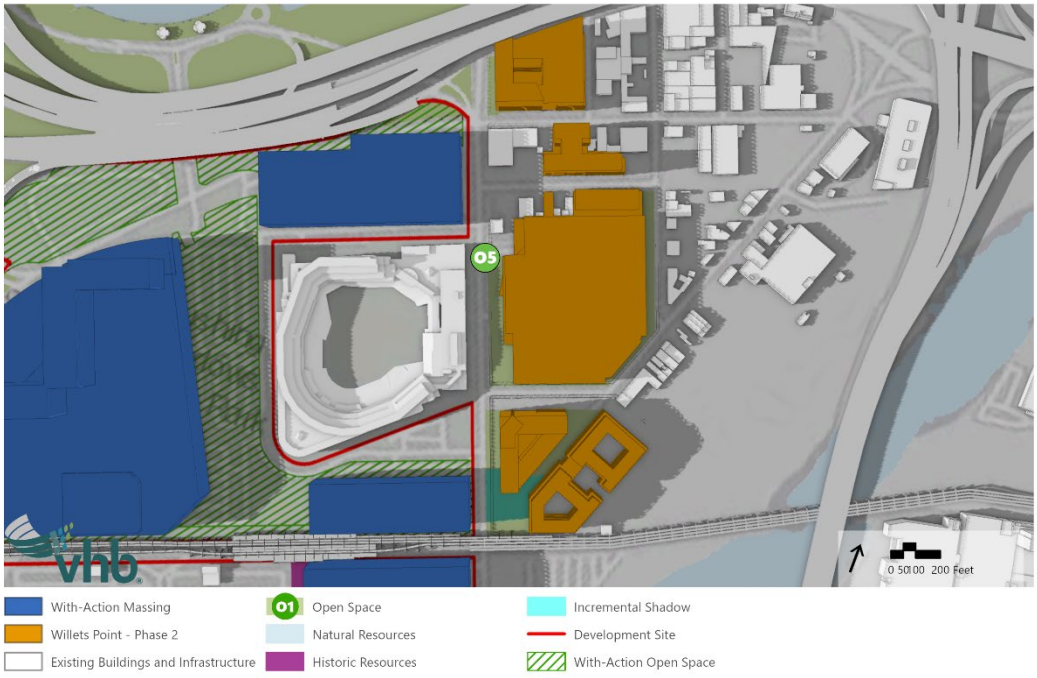


Figure 6-26 O5 March 21/September 21 – 4:29PM

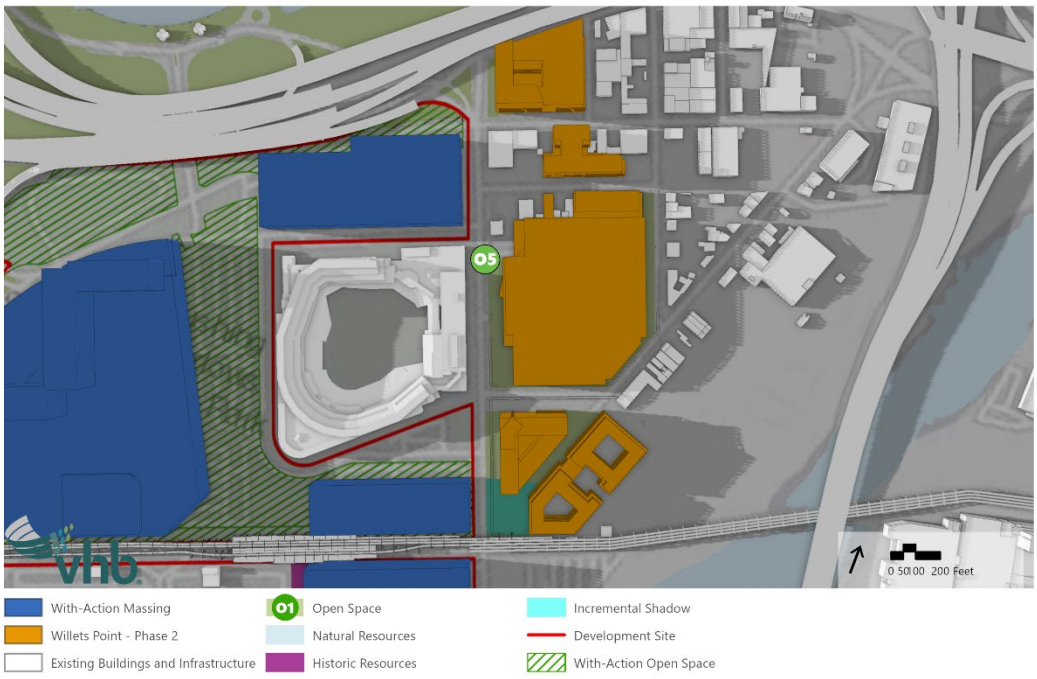


Figure 6-27 O5 May 6/August 6 – 1:00PM

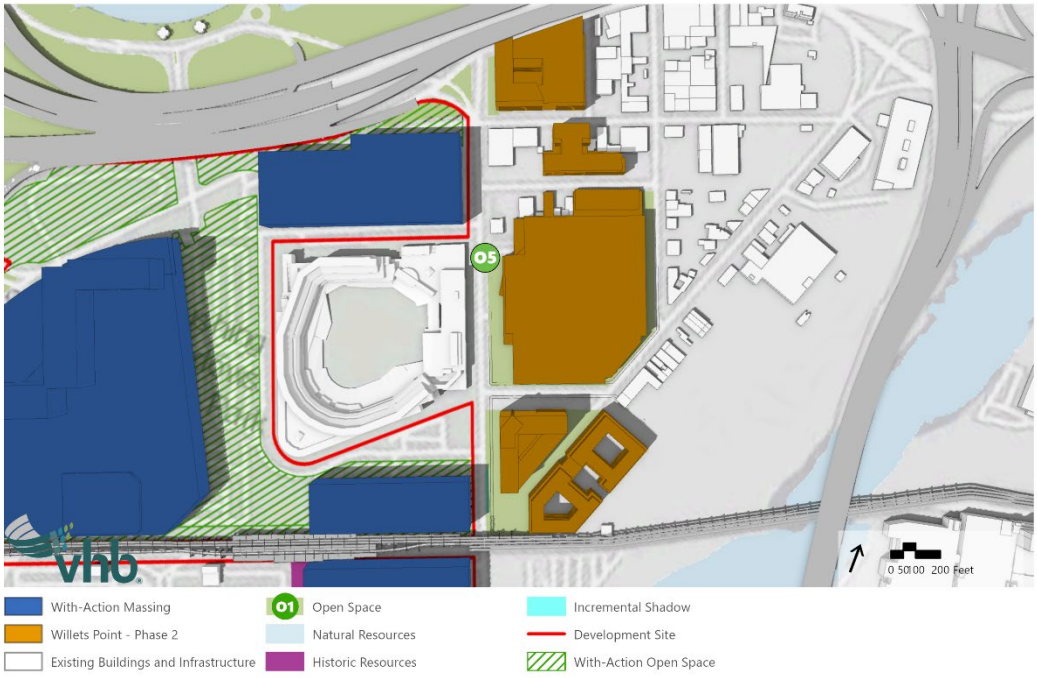


Figure 6-28 O5 May 6/August 6 – 2:00PM

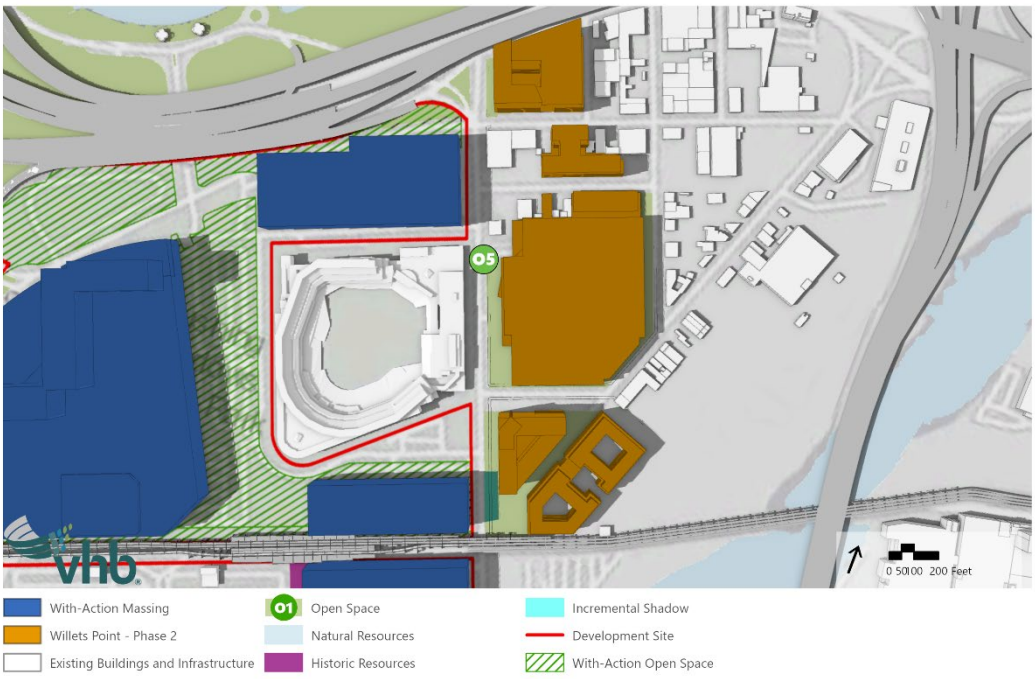


Figure 6-29 O5 May 6/August 6 – 3:00PM

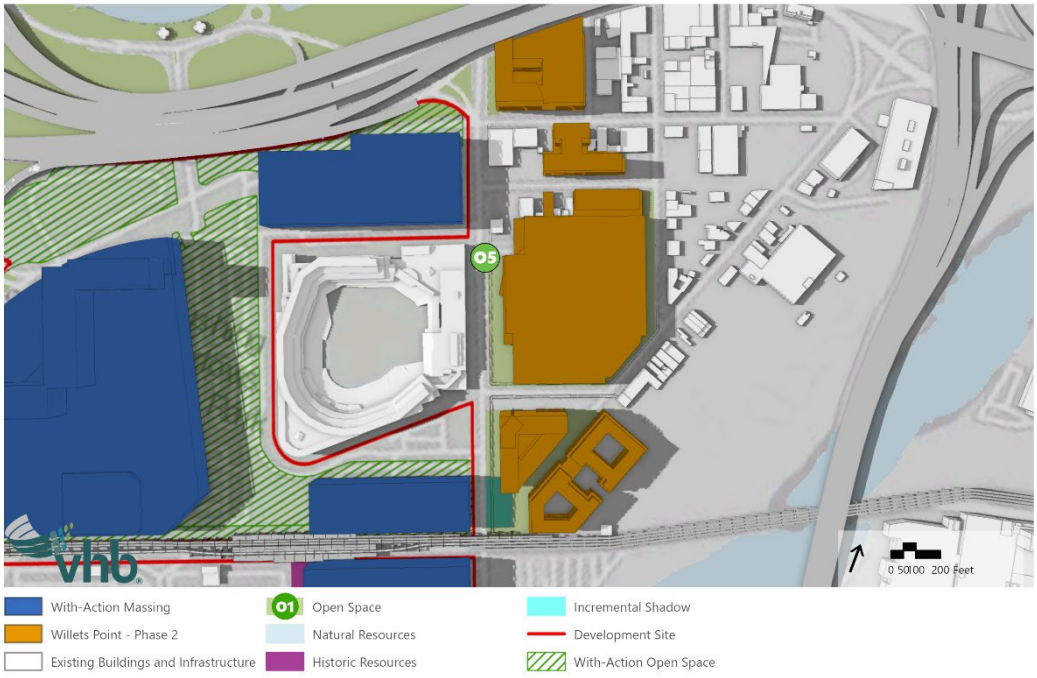


Figure 6-30 O5 May 6/August 6 – 4:00PM

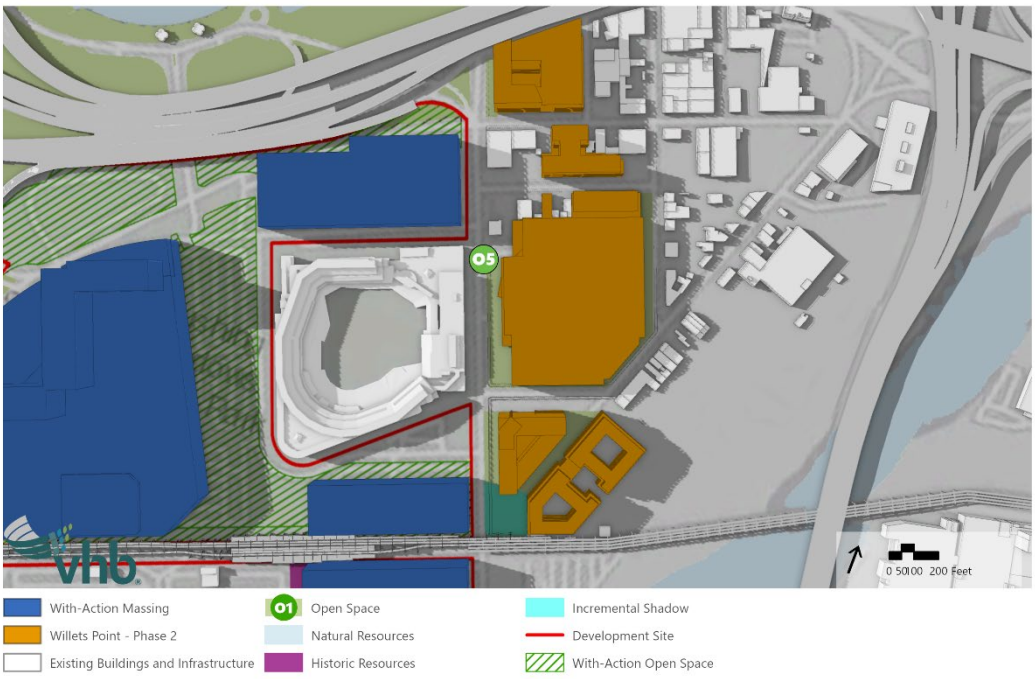


Figure 6-31 O5 May 6/August 6 – 5:00PM

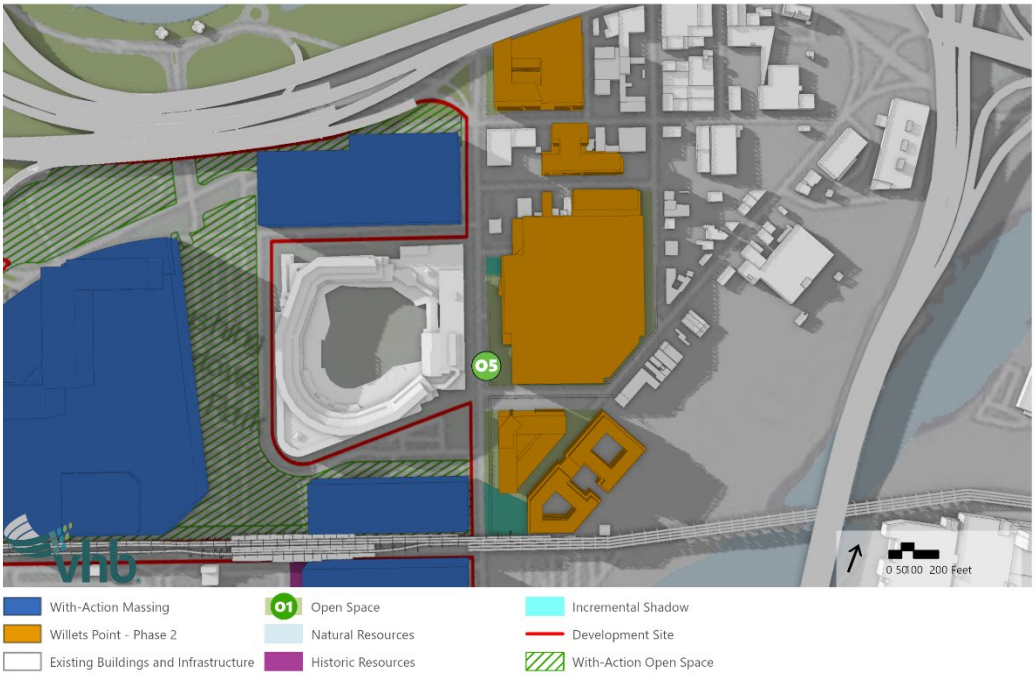


Figure 6-32 O5 June 21 – 1:30PM

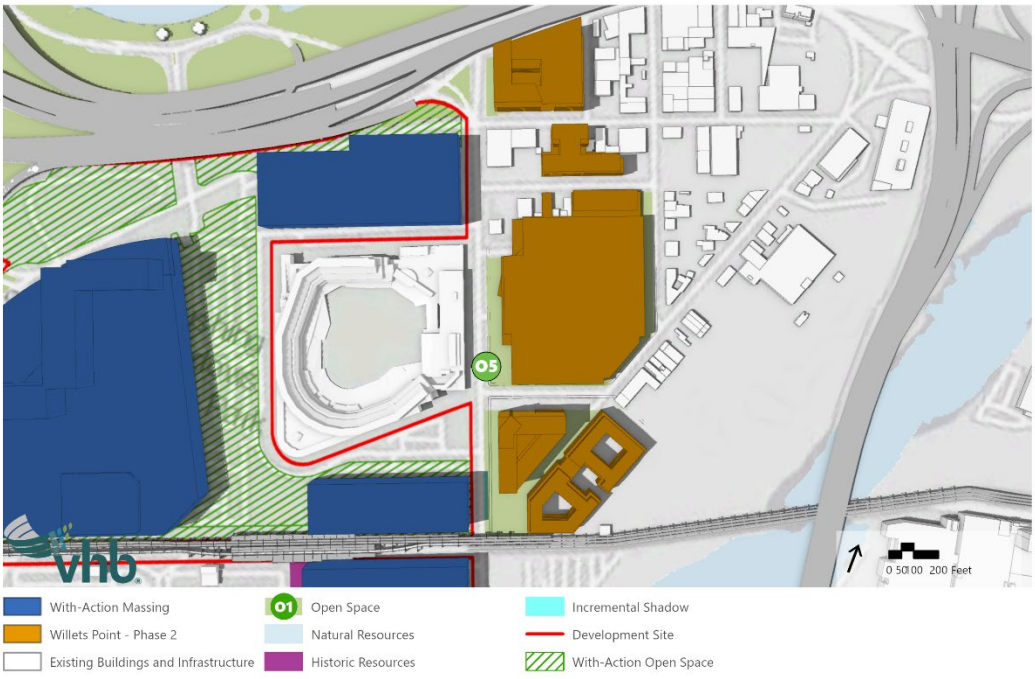


Figure 6-33 O5 June 21 – 2:30PM

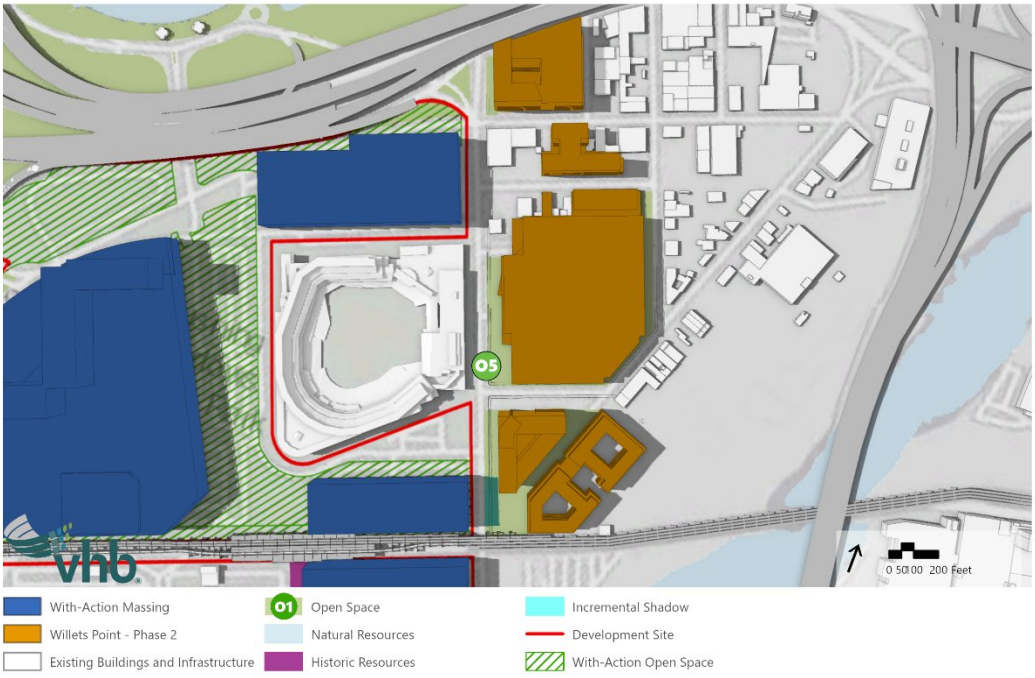


Figure 6-34 O5 June 21 – 3:30PM

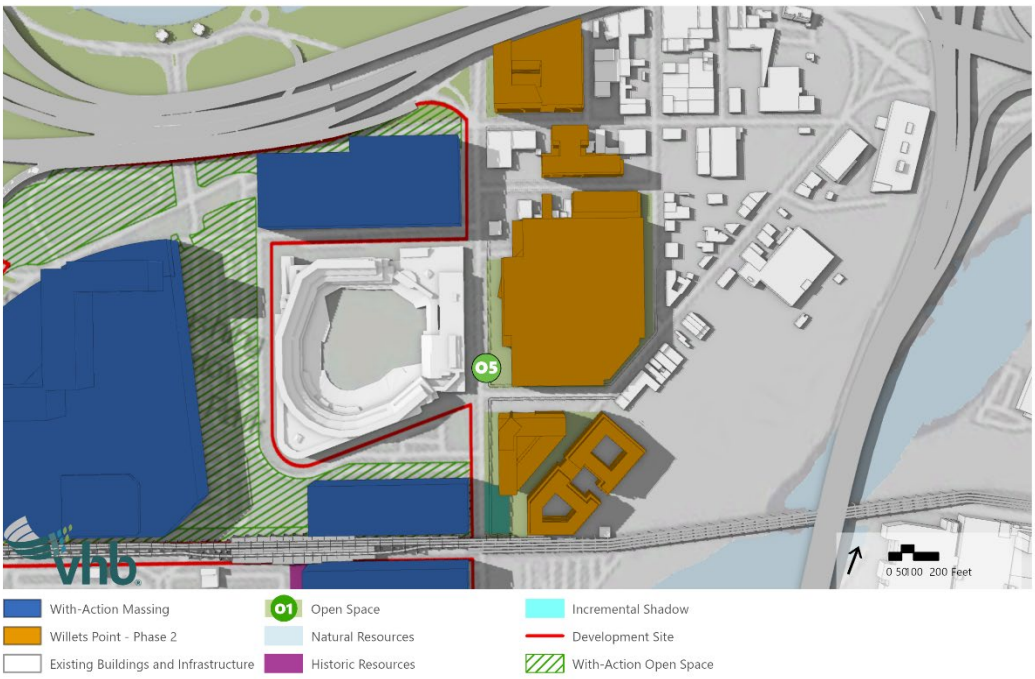


Figure 6-35 O5 June 21- 4:30PM

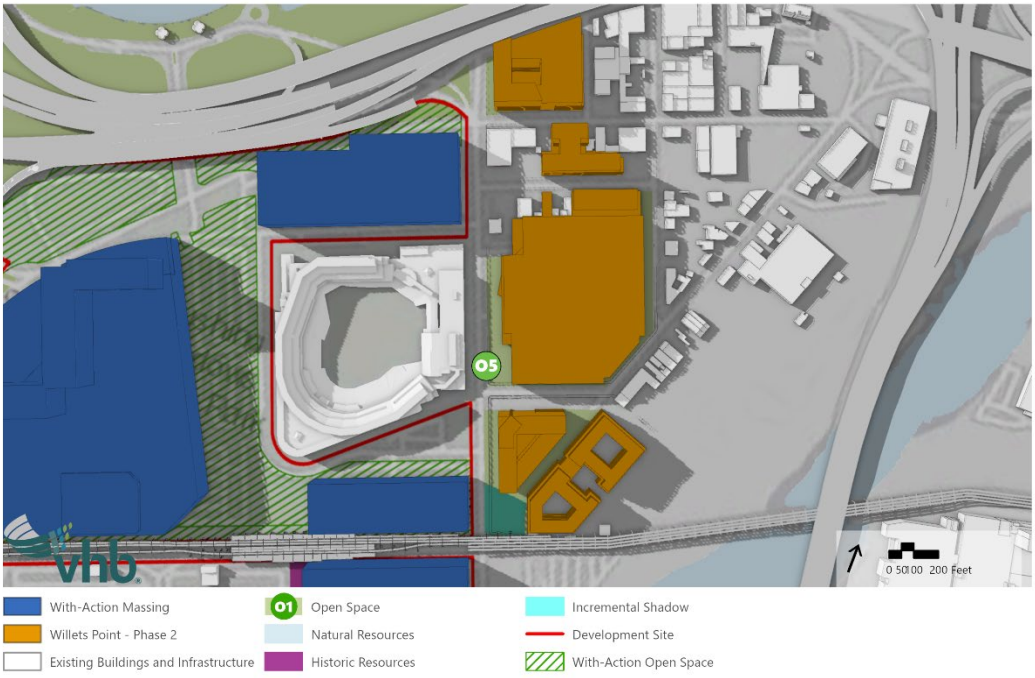


Figure 6-36 O5 June 21- 5:30PM

