

**A. INTRODUCTION**

Under the 2012 *City Environmental Quality Review (CEQR) Technical Manual* guidelines, a shadows assessment is required if the project would result in structures (or additions to existing structures) of 50 feet or more, or if the project site is located adjacent to, or across the street from, a sunlight-sensitive resource. Publicly-accessible open spaces, sunlight-dependent features of historic resources, and natural resources are all potentially sunlight-sensitive resources.

The USTA Billie Jean King National Tennis Center (NTC) Strategic Vision (the proposed project) would result in a series of improvements on the project site, as described in Chapter 1, “Project Description.” The proposed project would result in several new structures or additions to existing structures; only one would be greater than 50 feet in height, but the project site is located within Flushing Meadows Corona Park, and is adjacent to park land. Therefore, a preliminary shadows assessment was required. This chapter considers whether the proposed project could result in new shadows on any sunlight-sensitive resources, and assesses the potential effects of any such new shadows.

**PRINCIPAL CONCLUSIONS**

The proposed project would not result in any significant adverse shadows impacts. The proposed project could result in new shadows on several small areas containing sunlight-sensitive features adjacent to the project site within Flushing Meadows Corona Park. All but one of the affected areas contain a mix of paved road or walkways, grass and mature trees, but no other user amenities, and, as noted in Chapter 3, “Open Space and Recreational Resources,” are lightly used, primarily for walking, running, and bicycling on the perimeter paths. These areas are therefore only minimally sensitive to effects of incremental shadows. Further, the areas west and south of the project site would continue to receive direct sun for more than six hours throughout the spring, summer and fall, since there are virtually no structures to the south or west. The final area that could be affected by project-generated shadow, the portion of the circular plaza to the east of the project site, would receive between approximately five minutes and an hour and 50 minutes of incremental shadow in the spring, summer, and fall. Only a small portion of this plaza would be affected by the new shadow, and even this small area would receive direct sun for most of the remaining day in those seasons due to the lack of structures to the south and east. Overall, the proposed project’s incremental shadows would not be substantial enough to significantly impact Flushing Meadows Corona Park or its users.

**B. DEFINITIONS AND METHODOLOGY**

This analysis has been prepared in accordance with New York City Environmental Quality Review (CEQR) procedures and follows the guidelines of the 2012 *CEQR Technical Manual*.

## DEFINITIONS

**Incremental shadow** is the additional, or new, shadow that a structure resulting from a proposed project would cast on a sunlight-sensitive resource.

**Sunlight-sensitive resources** 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:

- *Public open space* (e.g., parks, beaches, playgrounds, plazas, schoolyards, greenways, landscaped medians with seating). Planted areas within unused portions of roadbeds that are part of the Greenstreets program are also considered sunlight-sensitive resources;
- *Features of architectural resources that depend on sunlight for their enjoyment by the public*. Only the sunlight-sensitive features need be considered, as opposed to the entire resource. Such sunlight-sensitive features might include: design elements that depend on the contrast between light and dark (e.g., recessed balconies, arcades, deep window reveals); elaborate, highly carved ornamentation; stained glass windows; historic landscapes and scenic landmarks; and features for which the effect of direct sunlight is described as playing a significant role in the structure's importance as a historic landmark; and
- *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.

**Non-sunlight-sensitive resources** include, for the purposes of CEQR:

- *City streets and sidewalks* (except Greenstreets);
- *Private open space* (e.g., front and back yards, stoops, vacant lots, and any private, non-publicly-accessible open space); and
- *Project-generated open space* cannot experience a significant adverse shadow impact from the project, according to CEQR, because without the project the open space would not exist. However, a qualitative discussion of shadows on the project-generated open space may be included in the analysis.

**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, thereby significantly altering the public's use of the resource or threatening the viability of vegetation or other resources. Each case must be considered on its own merits based on the extent and duration of new shadow and an analysis of the resource's sensitivity to reduced sunlight.

## METHODOLOGY

Following the guidelines of the *CEQR Technical Manual*, a preliminary screening assessment must first be conducted to ascertain whether shadow from the proposed project could reach any sunlight-sensitive resources at any time of year. The preliminary screening assessment consists of three tiers of analysis. The first tier determines a simple radius around the proposed project that represents the longest shadow that could be cast. If there are sunlight-sensitive resources within this radius, the analysis proceeds to the second tier, which reduces the area that could be affected by project-generated shadow by accounting for the fact that shadows can never be cast

between a certain range of angles south of the project site due to the path of the sun through the sky at the latitude of New York City.

If the second tier of analysis does not eliminate the possibility of new shadows on sunlight-sensitive resources, a third tier of screening analysis further refines the area that could be reached by project-generated shadow by looking at specific representative days in each season 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, taking into account existing buildings and their shadows. The detailed analysis provides the data needed to assess the shadow impacts. The effects of the new shadows on the sunlight-sensitive resources are described, and their degree of significance is considered. The results of the analysis and assessment are documented with graphics, a table of incremental shadow durations, and narrative text.

### C. PRELIMINARY SCREENING ASSESSMENT





The proposed project would result in a number of new structures and additions to existing structures. One new stadium and two parking garages would be built at locations where no structures currently exist. In addition, the existing Louis Armstrong and Grandstand Stadiums would be demolished and replaced by a stadium of similar height and a retail and administrative building of lower height, respectively. Arthur Ashe stadium would remain, and an approximately 57-foot high expansion would be added to the base on the north side of the stadium. As noted in Chapter 1, “Project Description,” USTA is analyzing possible engineering solutions for a canopy system that would attach along the upper edge of the stadium. Therefore, for the purposes of this analysis, a roof canopy structure is conservatively assumed to be added to the top of the stadium, increasing the stadium’s total height by potentially as much as 22 feet. In the west side of the site, existing courts would be reconfigured and a viewing platform and canopy added. In the center and southern portions of the site, courts and seating structures would be reconfigured. Only two of the new structures would be over 50 feet in incremental height: the relocated Grandstand Stadium, and the north expansion to Arthur Ashe Stadium. All six structures are adjacent to the perimeter of the site and all were assessed for potential shadow effects. **Table 4-1** lists the six proposed structures and their maximum heights (please refer to Chapter 1, “Project Description,” Figure 1-5 for locations of map numbers).

A base map was developed using Geographic Information Systems (GIS)<sup>1</sup> showing the proposed project plan and the surrounding parkland and street layout (see **Figure 4-1**). In coordination with the information regarding open space, historic, and natural resources presented in other sections of this Draft Environmental Impact Statement (DEIS), potentially sunlight-sensitive resources were identified and shown on the map.

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<sup>1</sup> Software: Esri ArcGIS 10; Data: New York City Department of Information Technology and Telecommunications (DoITT) and other City agencies, and AKRF site visits.



-  Project site boundary
-  Proposed new structures for analysis (see Table 4-1 for number key)
-  Perimeter representing longest shadow from each structure
-  Publicly-Accessible open space

0 200 400 600 800 Feet

**Table 4-1  
Proposed New Structures or Additions**

Map No. <sup>1</sup>	Name	Description	Incremental height in feet <sup>2</sup>
1	Grandstand Stadium (Stadium 3)	New stadium in southwest corner of NTC site	55'
2	Louis Armstrong Stadium (Stadium 2)	Demolition of existing stadium and replacement with new stadium of similar height in place	+14' <sup>3</sup>
3	Arthur Ashe Stadium expansion (Stadium 1)	Addition on north side of stadium base	57'
3	Arthur Ashe Stadium roof canopy	Canopy above center court	+22' <sup>4</sup>
4	Northwest tournament courts	Replacement of existing courts with five practice courts, three tournament courts, viewing platform, and canopy above platform	40' (canopy)
5	Southerly tournament courts	Reconfiguration of existing courts	—
6	New administrative and retail building	Construction of new 80,000-gsf administrative and retail building, including four tennis courts on its roof, on former site of relocated Grandstand Stadium	40'
7	New Parking Garage A	Construction of new 423-space, 2-level garage, including a 6,500-sf transportation center.	30'
8	New Parking Garage B	Construction of new 270-space, 3-level garage	40'
<p><b>Notes:</b></p> <p><sup>1</sup> See Figure 1-5 for the location of these elements in the proposed site plan.</p> <p><sup>2</sup> Heights represent conservative “envelopes” for the final design rather than current anticipated design.</p> <p><sup>3</sup> 80' is the total height of the new stadium. 14' is the incremental height compared to the existing stadium.</p> <p><sup>4</sup> 160' is the total height with the roof canopy. 22' is the incremental height compared to the existing maximum roof height.</p> <p><b>Source:</b> USTA and Rossetti</p>			

**TIER 1 SCREENING ASSESSMENT**

For the Tier 1 assessment, the longest shadow that the proposed structures could cast is calculated, and using this length as the radius, a perimeter is drawn around each proposed structure. Anything outside this perimeter, which represents the longest possible shadow, could never be affected by project-generated shadow, while any sunlight-sensitive resources inside the perimeter need additional assessment.

As noted in Table 4-1, in order to ensure a conservative analysis, design envelopes up to 13' taller than the current anticipated designs were used throughout the shadow analysis.

According to the *CEQR Technical Manual*, the longest shadow that a structure can cast at the latitude of New York City occurs on December 21, the winter solstice, at the start of the analysis day at 8:51 AM, and is equal to 4.3 times the height of the structure.

Therefore, at a maximum height of 60 feet, the proposed new Louis Armstrong Stadium (Stadium 2) could cast a shadow up to 344 feet in length (80 x 4.3). The relocated Grandstand Stadium (Stadium 3), at a height of 55 feet, could cast a shadow up to 236.5 feet. The two 40-foot proposed buildings in the northeast area of the site could each cast shadows of up to 172

feet. The 30-foot parking garage could cast a shadow of up to 129 feet and the 40-foot-high viewing platform canopy could cast a shadow of up to 172 feet in length. The addition on the north side of Arthur Ashe Stadium could cast a shadow up to 245 feet and the proposed canopy above the center court could cast a shadow reaching 688 feet away. Using these lengths, perimeters were drawn around the structures (see **Figure 4-1**).

#### *TIER 1 ASSESSMENT RESULTS*

As shown in Figure 4-1, the longest shadow study areas associated with the seven structures for analysis intersected with areas containing trees and grass beyond the adjacent Meridian Road to the west and north, and to the south beyond United Nations Avenue. In addition, a portion of the circular plaza northeast of the project site was located in the longest shadow study area. The analysis therefore proceeded to Tier 2.

#### **TIER 2 SCREENING ASSESSMENT**

Because of the path that the sun travels across the sky in the northern hemisphere, no shadow can be cast in a triangular area south of any given structure. In New York City, this area lies between -108 and +108 degrees from true north.

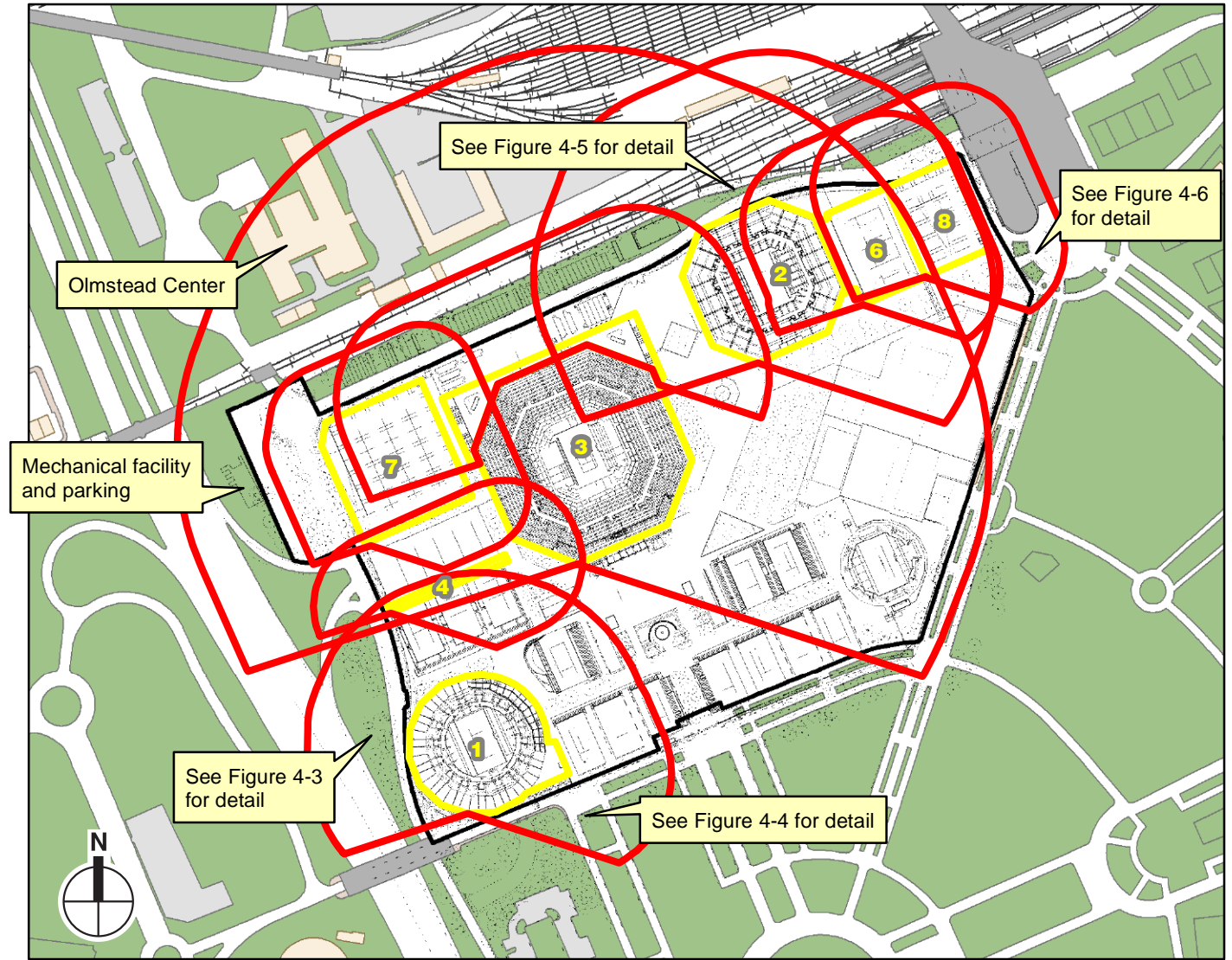
**Figure 4-2** illustrates the remaining longest shadow study area for each of the seven proposed structures being analyzed, with the triangular area south of each proposed structure removed from consideration. The remaining longest shadow study area to the north, east and west represents the area that could potentially experience new project-generated shadow.





#### *TIER 2 ASSESSMENT RESULTS*

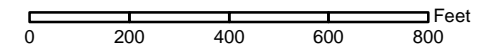
The longest shadow study area associated with the proposed relocated Grandstand Stadium (Stadium 3), in the southwest area of the site, includes small portions of adjacent park land area. To the west of the proposed Grandstand Stadium (Stadium 3), there is a landscaped area between Meridian Road and Grand Central Parkway containing grass and mature trees (see **Figures 4-2** and **4-3**) that could receive project-generated shadow. This shadow would occur in the morning, because this area is to the west of the proposed structure. At other times of day, this area would receive direct sun because there are no other structures to the south or west. This area contains no seating or other park user amenities.

To the southeast of the proposed relocated Grandstand Stadium (Stadium 3), there is an area containing a mix of paved road and walkways, grass and mature trees south of United Nations Avenue North (see **Figures 4-2** and **4-4**), a small portion of which could be reached by project-generated shadow. This area does not contain any seating or other park user amenities. Project-generated shadow could potentially reach this area in the late afternoon of the late spring and summer analysis days only, since it is to the southeast. The potentially affected area would likely receive direct sunlight throughout the mornings and much of the afternoons due to the lack of other structures to the south and east. It should also be noted that the proposed Grandstand Stadium (Stadium 3) was conservatively analyzed as a design envelope of 55 feet, but in its current anticipated design it would be 43 feet high on the west side, and would slope down to a shorter height on the east side.

West of the proposed Parking Garage A and the northwesterly tournament courts, there is a large landscaped area between Meridian Road and Grand Central Parkway; this area of grass and mature trees contains no amenities for park users but does contain mechanical equipment and a



-  Project site boundary
-  Proposed new structures for analysis (see Table 4-1 for number key)
-  Tier 2: Remaining longest shadow study area
-  Publicly-Accessible open space (outside project site boundary)









parking area. It is therefore only minimally sensitive to any new shadows it might receive from the proposed parking garage, the viewing platform and canopy, or the Arthur Ashe roof canopy.

North of the project site, there is a strip containing some grass and trees between Meridian Road and the rail yards (see **Figures 4-2 and 4-5**) that is located within the longest shadow study area for the proposed parking garage A, the Arthur Ashe stadium additions, the reconstructed Louis Armstrong Stadium (Stadium 2), and the two proposed buildings in the northeast area of the project site. This strip or median is difficult to access and does not have any park user amenities. Portions of it are sometimes used for trailers and for parking, including during the US Open. In the No-Action condition, a portion of the central portion of this strip will be occupied by a cooling tower and chiller plant, leaving grass and trees only on smaller portions in the west and east sections of the strip, by 2019.

Shadow from the Arthur Ashe Stadium (Stadium 1) additions could potentially reach farther north beyond the railroad tracks to the landscaped areas surrounding the Olmsted Center, a DPR administrative facility.

East of the project site, a portion of the circular plaza at the base of the Passerelle Building (the one-story buildings that also functions as a ramp and bridge to the adjacent Metropolitan Transportation Authority [MTA] and Long Island Rail Road [LIRR] stations) is located within the longest shadow study area of the proposed parking garage in the northeast corner of the project site. The potentially affected area of this plaza includes two fenced areas of trees and landscaping, and benches (see **Figures 4-2 and 4-6**). This area could potentially receive project-generated shadow in the late afternoons of late spring and summer days, since it is southeast of the proposed garage. No structures are located south or east of this area, so it likely would receive direct sunlight during mornings and much of the afternoons of these days.

Since the Tier 2 Assessment could not eliminate the possibility of new shadows on the sunlight-sensitive areas described above, the next tier of analysis was conducted.

### **TIER 3 SCREENING ASSESSMENT**

The direction and length of shadows vary throughout the course of the day and also differ depending on the season. In order to determine whether project-generated shadow could fall on a sunlight-sensitive resource, three-dimensional (3D) computer mapping software<sup>1</sup> is used in the Tier 3 assessment to calculate and display the proposed project's shadows on individual representative days of the year. A computer model was developed containing three-dimensional representations of the elements in the base map used in the preceding assessments, the topographic information of the study area, and a reasonable worst-case three-dimensional representation of the proposed project.

#### *REPRESENTATIVE DAYS FOR ANALYSIS*

Following the guidance of the *CEQR Technical Manual*, shadows on the summer solstice (June 21), winter solstice (December 21) and spring and fall equinoxes (March 21 and September 21, which are approximately the same in terms of shadow patterns) are modeled, to represent the range of shadows over the course of the year. An additional representative day during the

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<sup>1</sup> MicroStation V8i (SELECTSeries 3)





growing season is also modeled, generally the day halfway between the summer solstice and the equinoxes (i.e., May 6 or August 6), which have approximately the same shadow patterns.

#### *TIMEFRAME WINDOW OF ANALYSIS*

The shadow assessment considers shadows occurring between one and a half hours after sunrise and one and a half hours before sunset. At times earlier or later than this timeframe window of analysis, the sun is down near the horizon and the sun's rays reach the Earth at very tangential angles, diminishing the amount of solar energy and producing shadows that are very long, move fast, and generally blend with shadows from existing structures until the sun reaches the horizon and sets. Consequently, shadows occurring outside the timeframe window of analysis are not considered significant under *CEQR*, and their assessment is not required.

#### *TIER 3 SCREENING ASSESSMENT RESULTS*

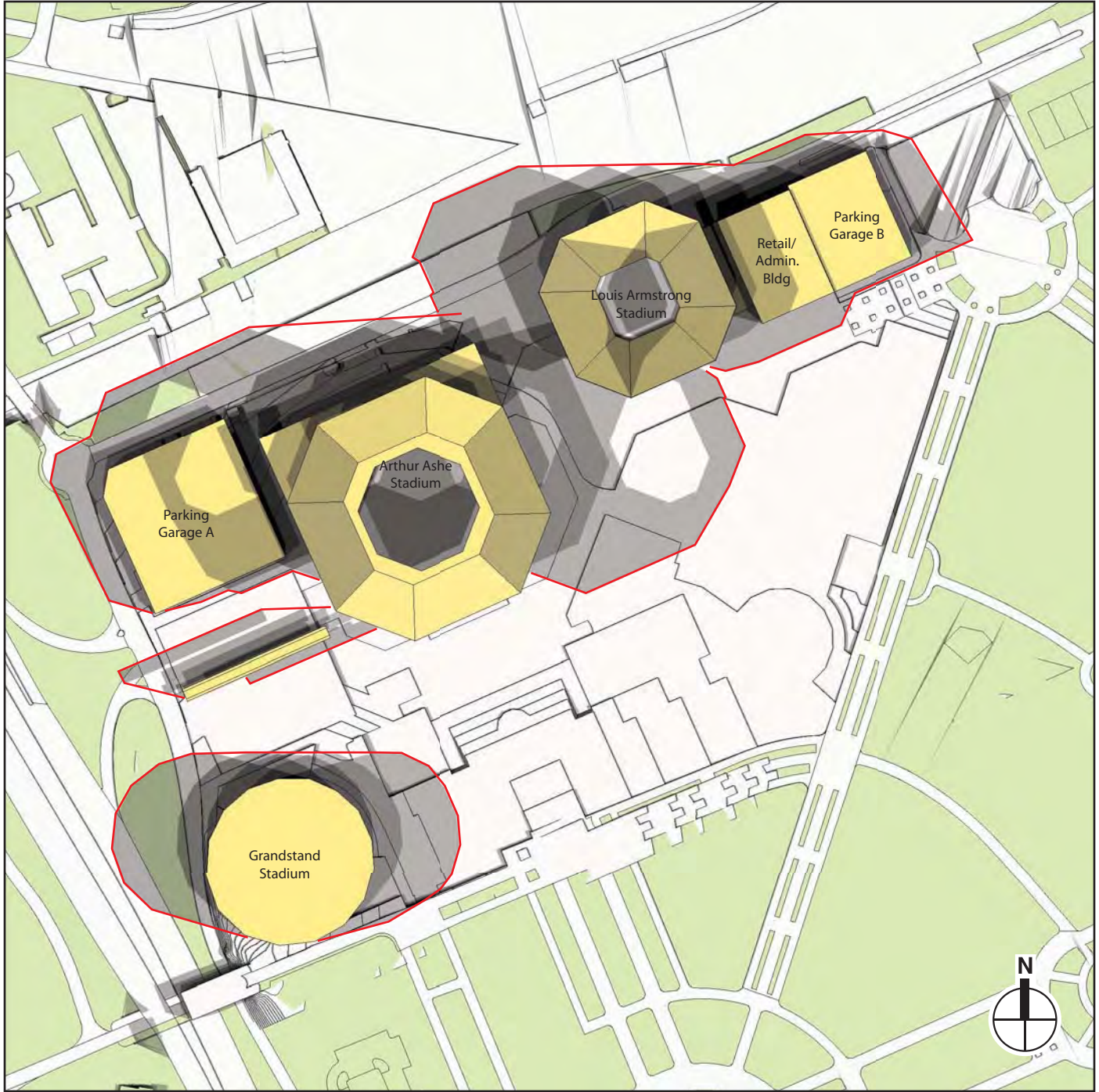
**Figures 4-7 through 4-10** show the range of shadows from the proposed structures for analysis over the course of the March 21/September 21, May 6/August 6, June 21 and December 21 analysis periods. Only the proposed structures or additions and the shadows they cast are included in the Tier 3 analysis. The existing buildings and portions of buildings, and the shadows they cast, are not included, in order to determine the potential reach of new shadows.

Shadow from the relocated Grandstand Stadium (Stadium 3) could reach portions of the landscaped area between Meridian Road and Grand Central Parkway containing grass and mature trees on all four analysis days. Shadow from the relocated Grandstand Stadium (Stadium 3) would reach a small area containing grass and trees to its southeast beyond United Nations Avenue in the afternoons of the May 6/August 6 and June 21 analysis days, but would only reach a portion of the sidewalk on the March 21/September 21 analysis day. In the northwesterly tournament courts area, shadow from the proposed viewing platform's canopy would reach very small portions of the landscaped area to its west in the spring, summer and fall seasons. Shadow from proposed Parking Garage A would similarly reach small areas of the landscaped area to its west in the spring, summer and fall, and the strip to its north in the fall, winter and spring. Shadow from the proposed roof canopy would reach portions of the strip to its north in the fall, winter and spring, areas with grass and trees in the Olmsted Center and its parking lot further north in the winter, and, early in the June 21 morning, the landscaped area west of Parking Garage A. Shadow from the rebuilt Louis Armstrong Stadium (Stadium 2) would reach portions of the strip to the north containing grass and trees between Meridian Road and the rail yards on all four analysis days, although on June 21 the shadow would be minimal. Shadow from the proposed administrative and retail building and Parking Garage B would reach a portion of this strip on the March 21/September 21 and December 21 analysis day only. Shadow from Parking Garage B could reach a portion of the circular plaza at the base of the Passerelle Building, east of the site, on the spring, summer, and fall analysis days but not the December 21 analysis day.

In order to determine the extent and duration of project-generated incremental shadow, further analysis was conducted.

#### **D. DETAILED SHADOW ANALYSIS**

The purpose of the detailed analysis is to determine the extent and duration of incremental shadows on sunlight-sensitive resources and to assess their effects. A 3D computer model of the baseline condition was developed, containing the relevant existing buildings. The future



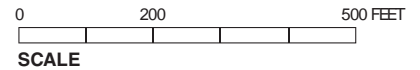
- Proposed Structures for Analysis*
- Publicly-Accessible Open Space*
- Total Potentially Affected Area on March 21/September 21*



Shadows were rendered at five individual times (7:36 AM, 9:30 AM, 12:00 PM, 2:30 PM, and 4:29 PM) and superimposed. Daylight Savings Time was not used, per CEQR Technical Manual guidelines.



- Proposed Structures for Analysis*
- Publicly-Accessible Open Space*
- Total Potentially Affected Area on May 6/August 6*



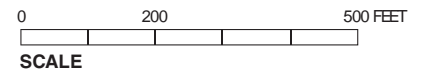
Shadows were rendered at five individual times (6:27 AM, 9:00 AM, 12:00 PM, 3:00 PM, and 5:18 PM) and superimposed. Daylight Savings Time was not used, per CEQR Technical Manual guidelines.



Proposed Structures for Analysis

Publicly-Accessible Open Space

Total Potentially Affected Area on June 21



Shadows were rendered at five individual times (5:57 AM, 9:00 AM, 12:00 PM, 3:00 PM, and 6:01 PM) and superimposed. Daylight Savings Time was not used, per CEQR Technical Manual guidelines.





- Proposed Structures for Analysis*
- Publicly-Accessible Open Space*
- Total Potentially Affected Area on December 21*



Shadows were rendered at five individual times (8:51 AM, 10:30 AM, 12:00 PM, 1:30 PM, and 2:53 PM) and superimposed.

condition with the proposed buildings and its shadows was compared to the baseline shadows to determine the incremental shadows that would result with the proposed project. **Figure 4-11** shows views of the future With Action and the future No-Action computer models. **Table 4-2** shows the duration of incremental shadow on each resource of concern. **Figures 4-12 through 4-17** show relevant instants in time on the analysis days when incremental shadow would occur, with the incremental shadow highlighted in red.

**Table 4-2  
Incremental Shadow Durations**

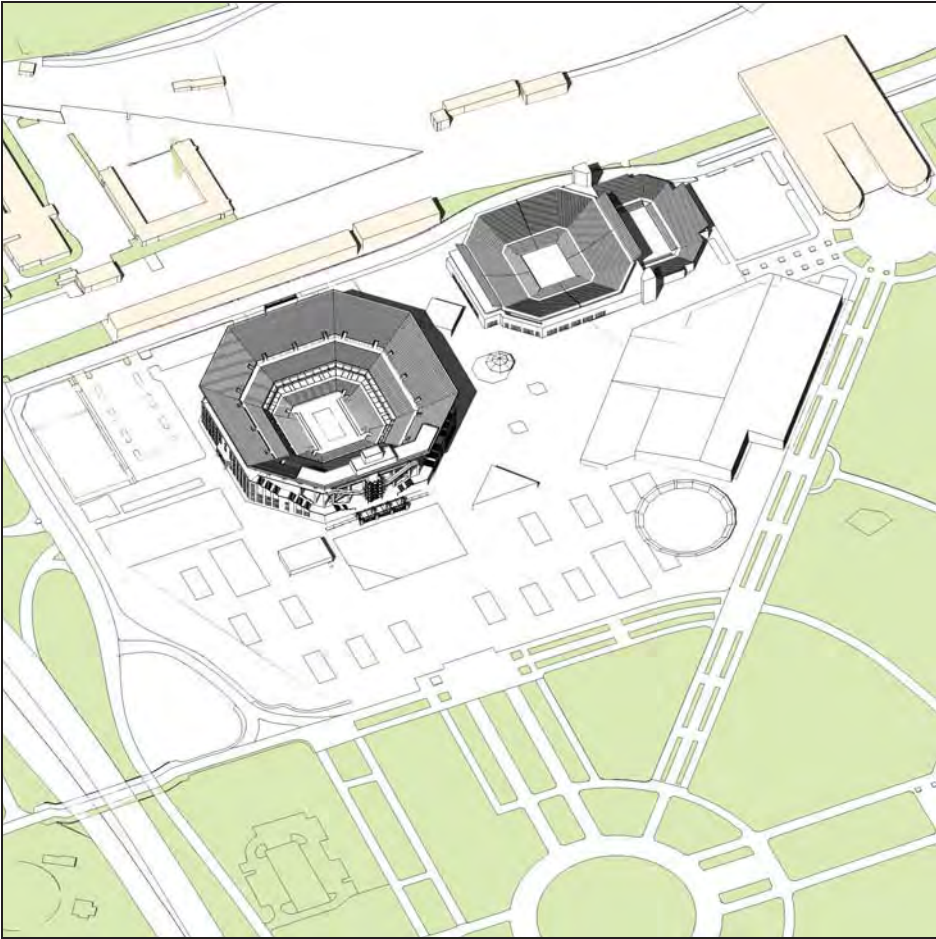
Analysis day and timeframe window	March 21 / Sept. 21 7:36 AM-4:29 PM	May 6 / August 6 6:27 AM-5:18 PM	June 21 5:57 AM-6:01 PM	December 21 8:51 AM-2:53 PM
<b>OPEN SPACES</b>				
Area west of relocated Stadium 3	7:36 AM–9:45AM Total: 2 hr 9 min	6:27 AM–9:15 AM Total: 2 hr 48 min	5:57 AM–9:15 AM Total: 3 hr 18 min	8:51 AM–10:15 AM Total: 1 hr 24 min
Area west of Parking Garage A	7:36 AM–7:45 AM Total: 9 min	6:27 AM–7:00 AM Total: 33 min	5:57 AM–6:45 AM Total: 48 min	—
Area north of Parking Garage A	7:36 AM–8:15 AM Total: 39 min	—	—	8:51 AM–11:00 AM Total: 2 hr 9 min
Olmsted Center	—	—	—	8:51 AM–10:00 AM Total: 1 hr 9 min
Area north of Stadium 2 and Parking Garage B	7:36 AM–3:15 PM Total: 7 hr 39 min	6:27 AM–11:30 AM Total: 5 hr 3 min	6:15 AM–10:45 AM Total: 4 hr 30 min	8:51 AM–2:53 PM Total: 6 hr 2 min
Landscaping and benches in circular plaza east of project site	4:25 PM–4:29 PM Total: 4 min	3:55 PM–5:18 PM Total: 1 hr 23 min	4:10 PM–6:01 PM Total: 1 hr 51 min	—
Grass/trees southeast of relocated Stadium 3	—	4:45 PM–5:18 PM Total: 33 min	4:45 PM–6:01 PM Total: 1 hr 16 min	—
<b>Notes:</b> Table indicates entry and exit times and total duration of incremental shadow for each sunlight-sensitive resource. Daylight saving time is not used.				

Shadow analyses were performed for each of the representative days and analysis periods indicated in the Tier 3 assessment.

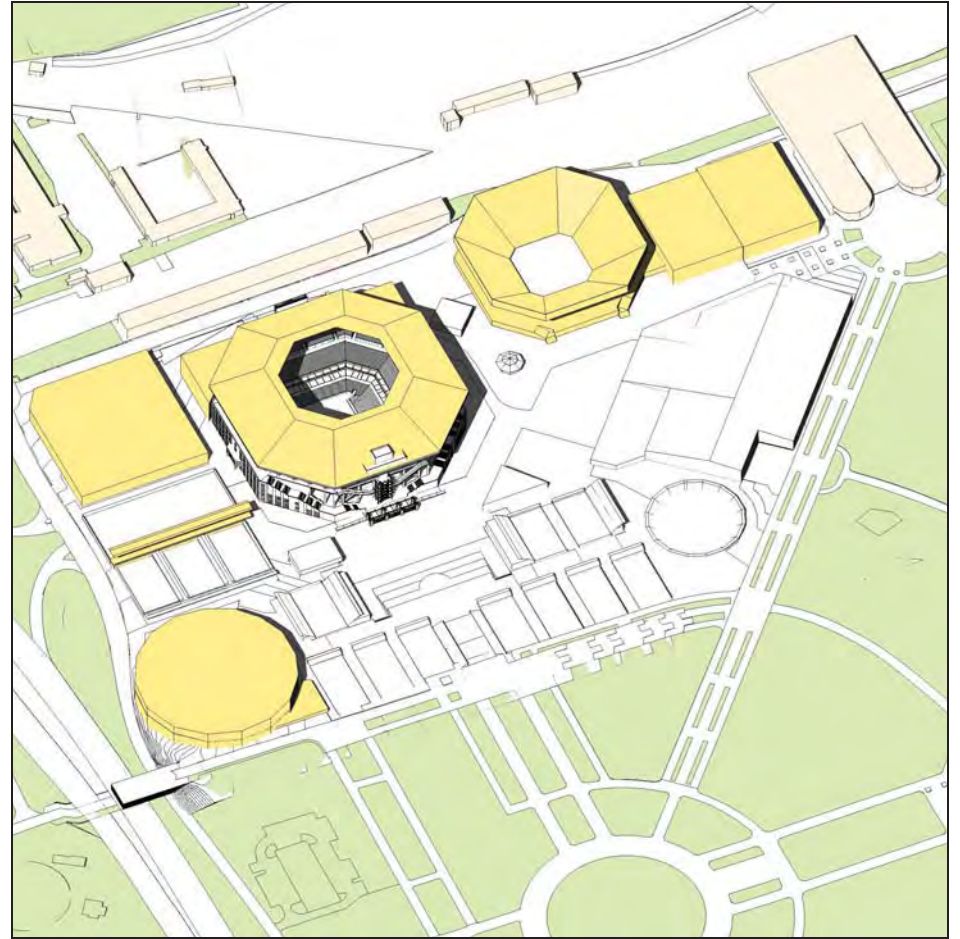
## E. CONCLUSIONS

The analysis showed that incremental shadows would fall on a portion of the landscaped area west of the relocated Stadium 3 early in the mornings, ranging in duration from about an hour and a half in winter to three and a quarter hours on the summer solstice.



Incremental shadow would also fall on the landscaped area west of the proposed Parking Garage A, which contains mechanical equipment and a parking lot, in the spring, summer and fall, only lasting between about 10 minutes to 48 minutes depending on the season.



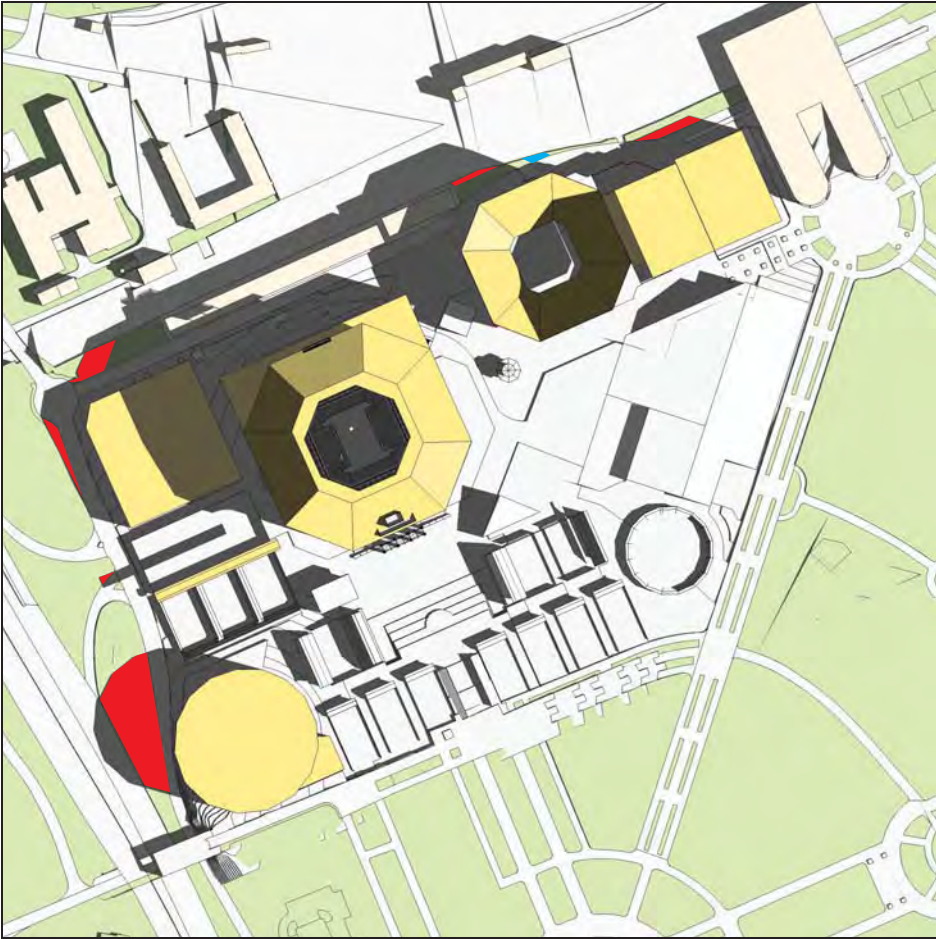
No Action



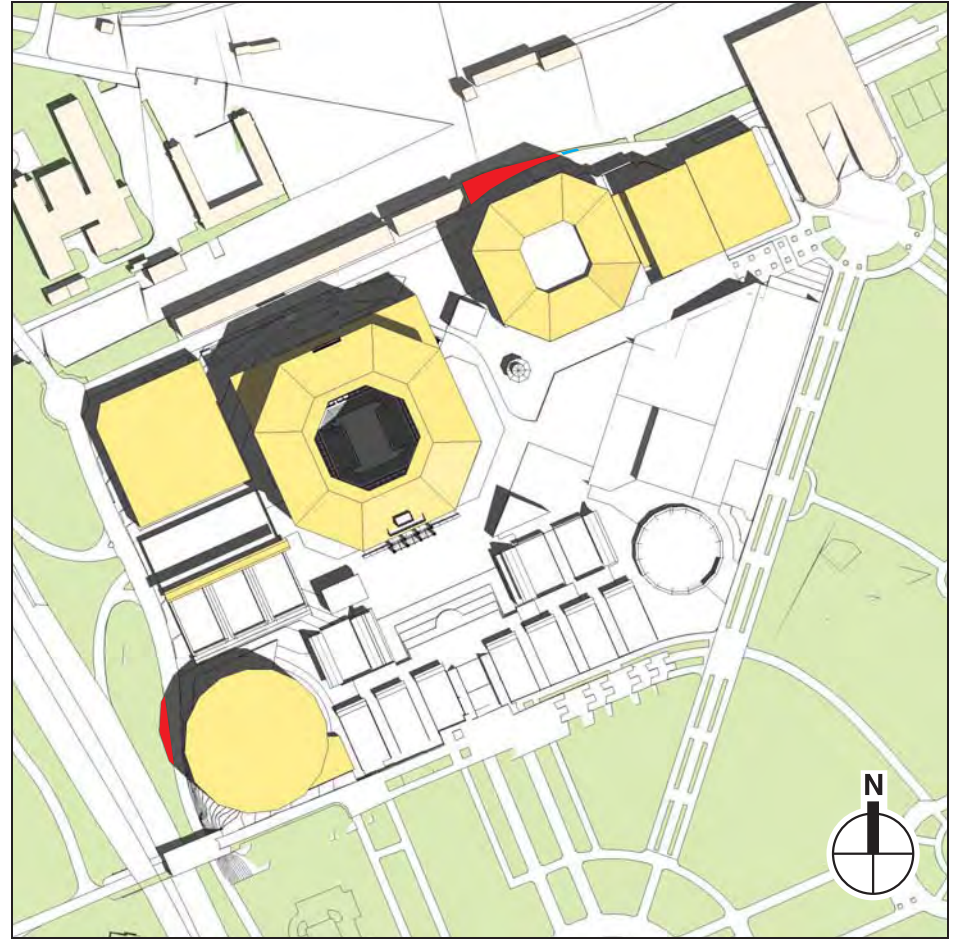
With Action

-  *Proposed Structures for Analysis*
-  *Publicly-Accessible Open Space*

Three-Dimensional Computer Models for Detailed Analysis - View North  
**Figure 4-11**



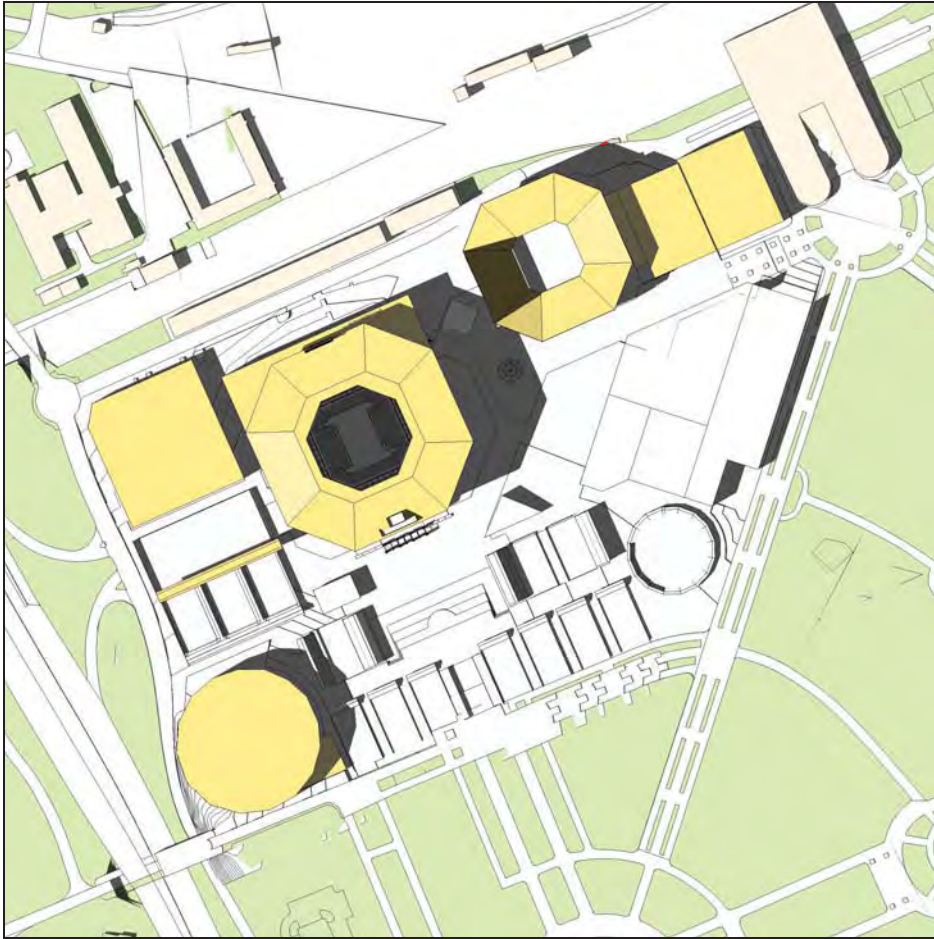
7:36 AM



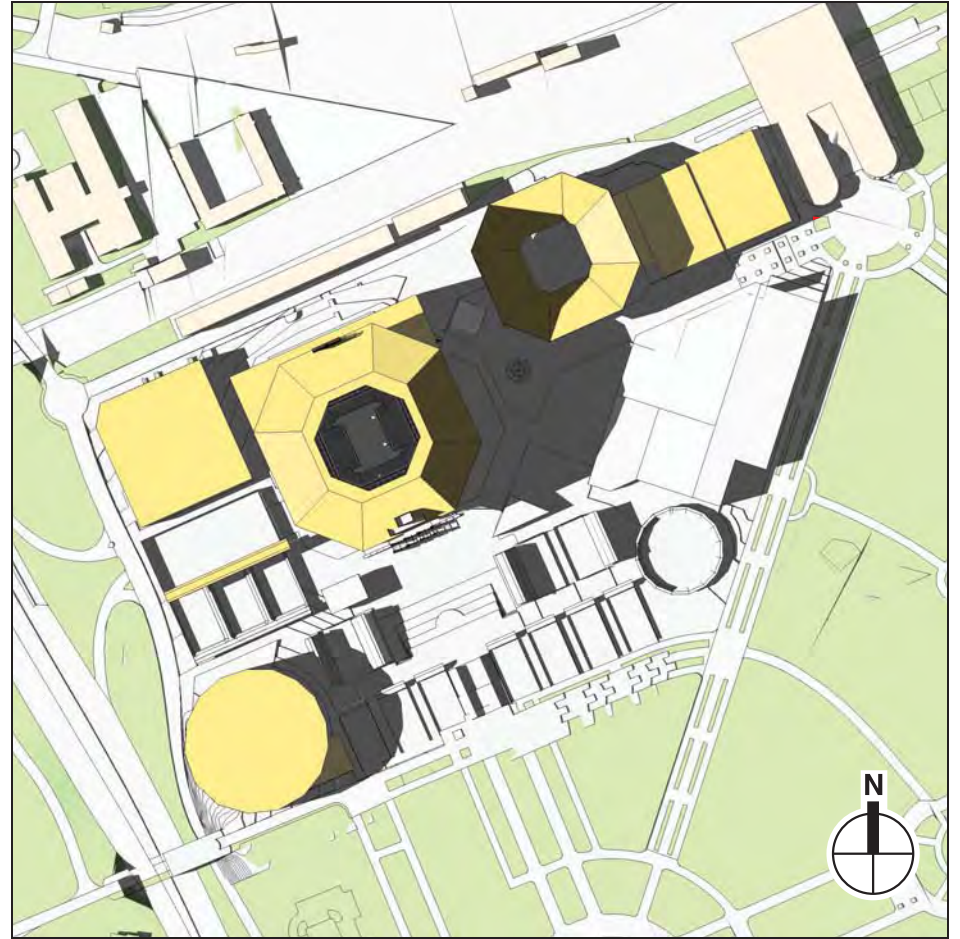
9:30 AM

- Proposed Structures for Analysis*
- Publicly-Accessible Open Space*
- Incremental Shadow on Sunlight-Sensitive Resource*
- Reduced Shadow on Sunlight-Sensitive Resource*

Daylight Savings Time was not used, per CEQR Technical Manual guidelines.



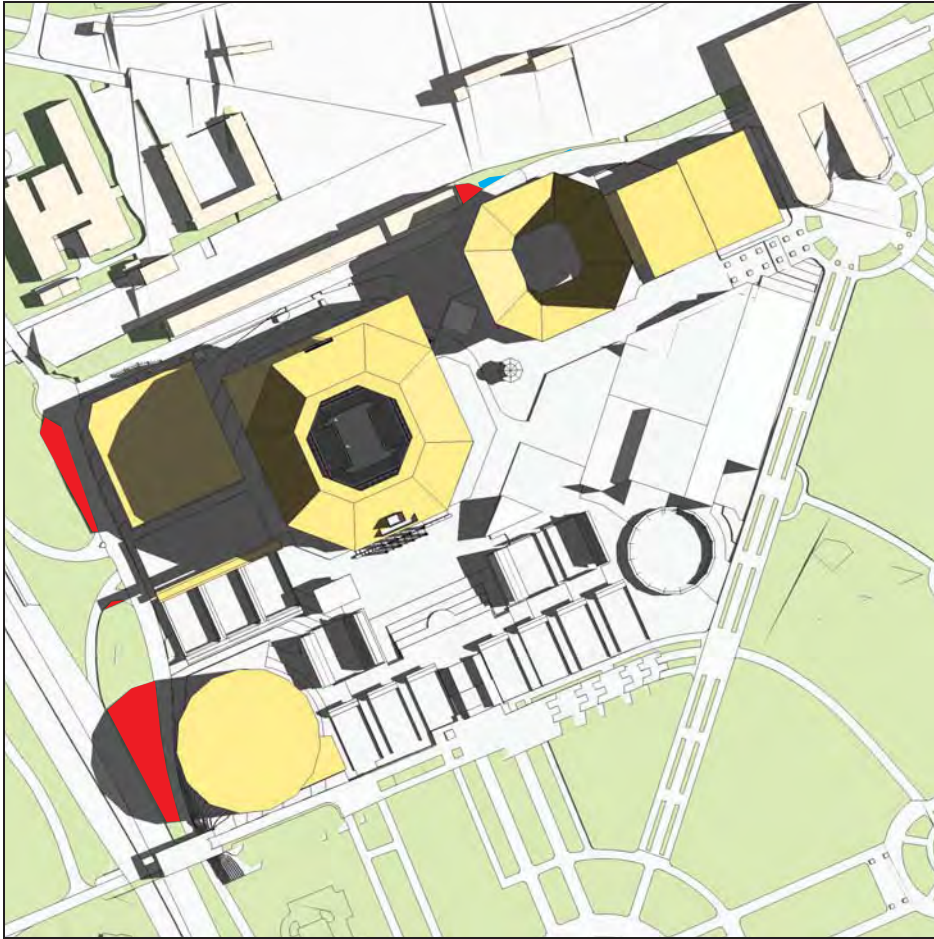
3:15 PM



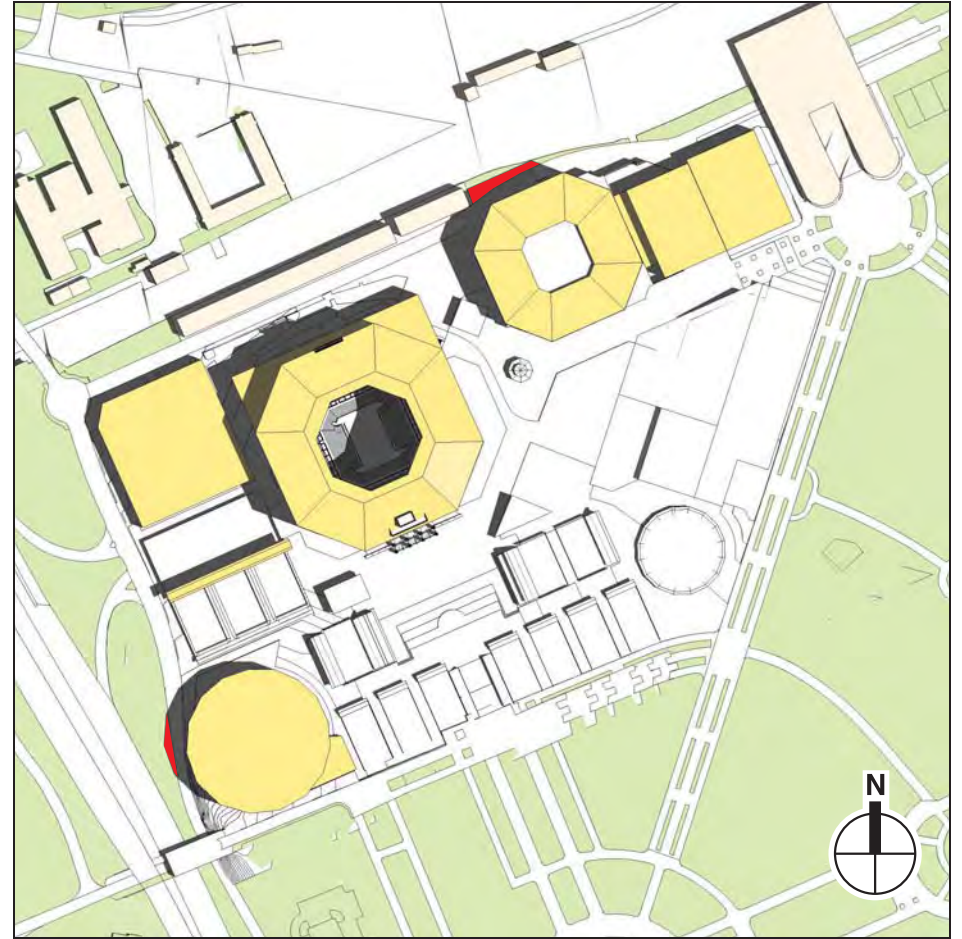
4:29 PM

- Proposed Structures for Analysis*
- Publicly-Accessible Open Space*
- Incremental Shadow on Sunlight-Sensitive Resource*

Daylight Savings Time was not used, per CEQR Technical Manual guidelines.



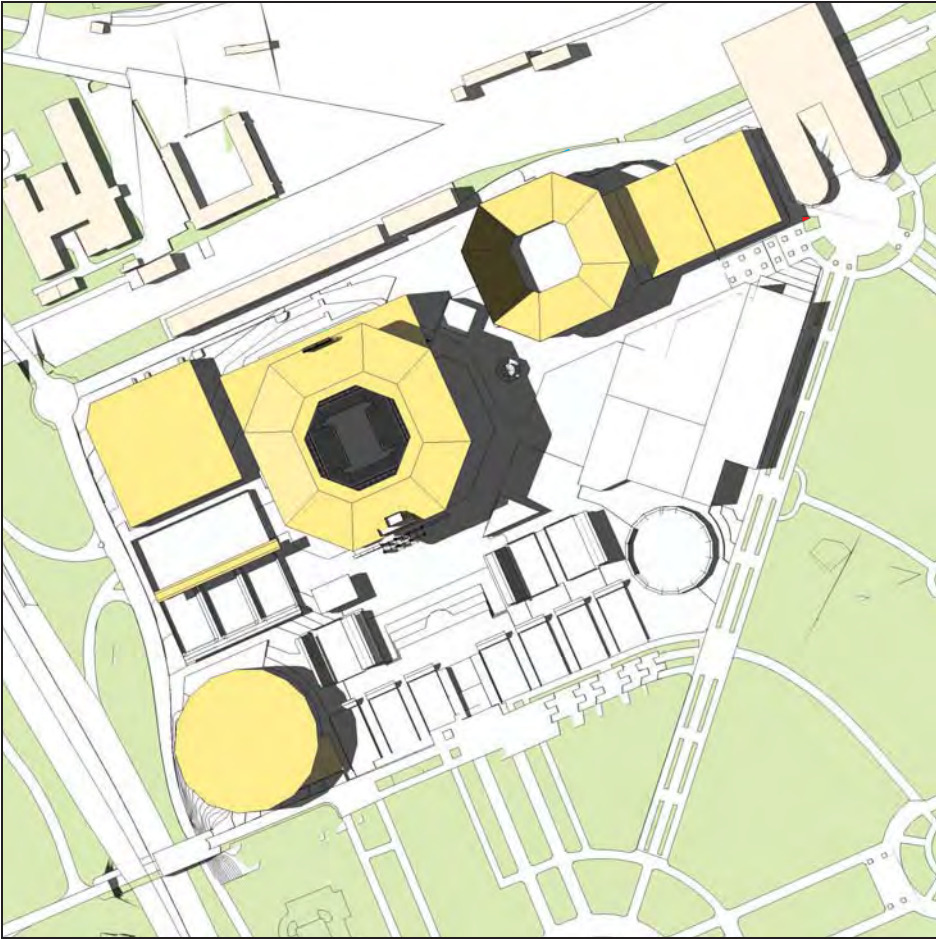
6:27 AM



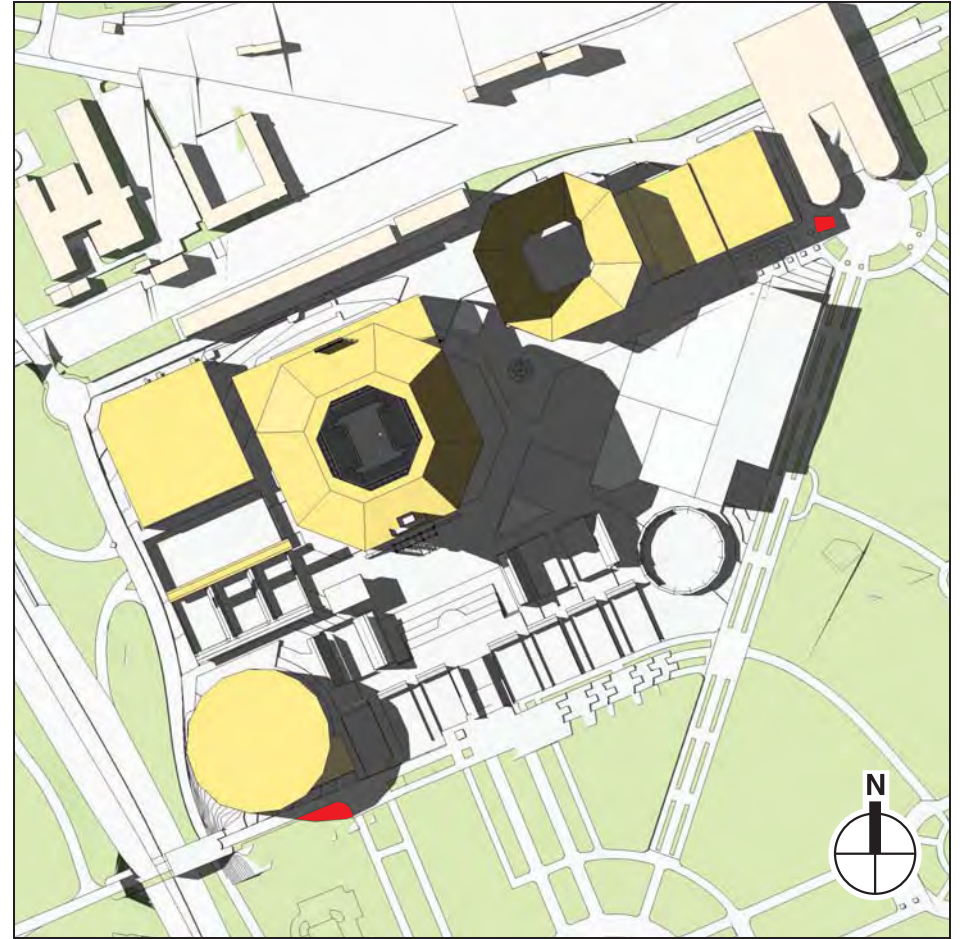
9:00 AM

- Proposed Structures for Analysis*
- Publicly-Accessible Open Space*
- Incremental Shadow on Sunlight-Sensitive Resource*
- Reduced Shadow on Sunlight-Sensitive Resource*




Daylight Savings Time was not used, per CEQR Technical Manual guidelines.



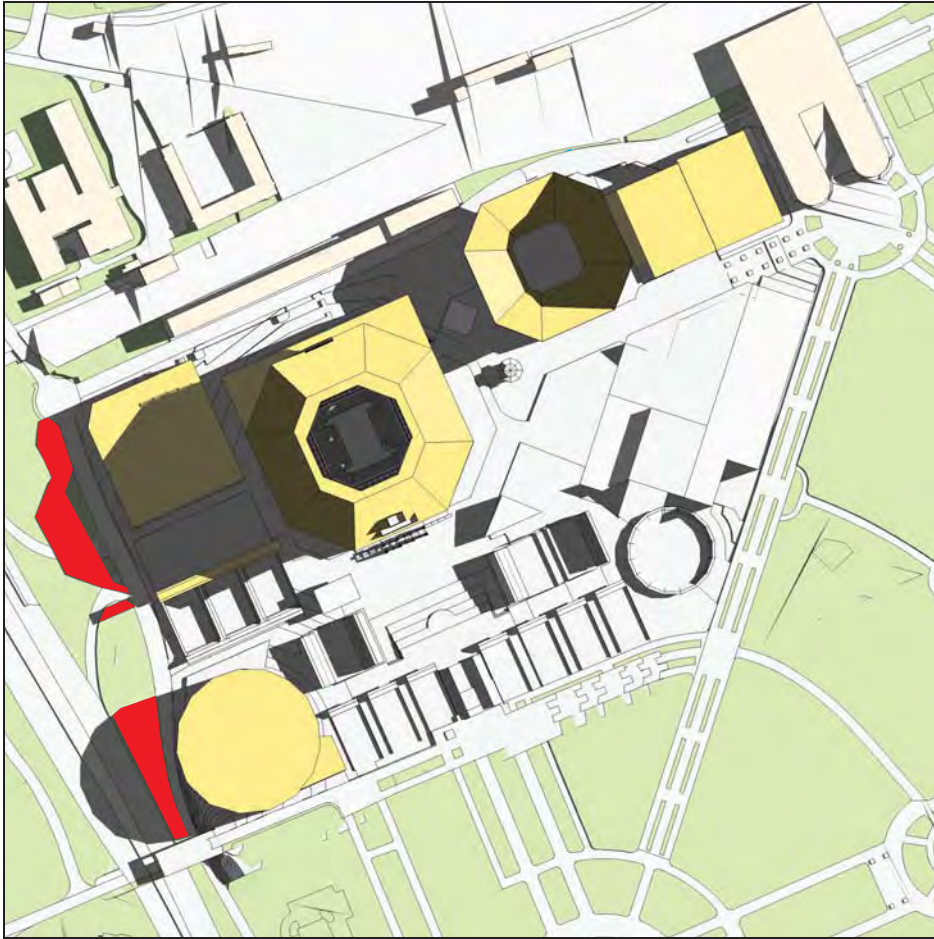
4:00 PM



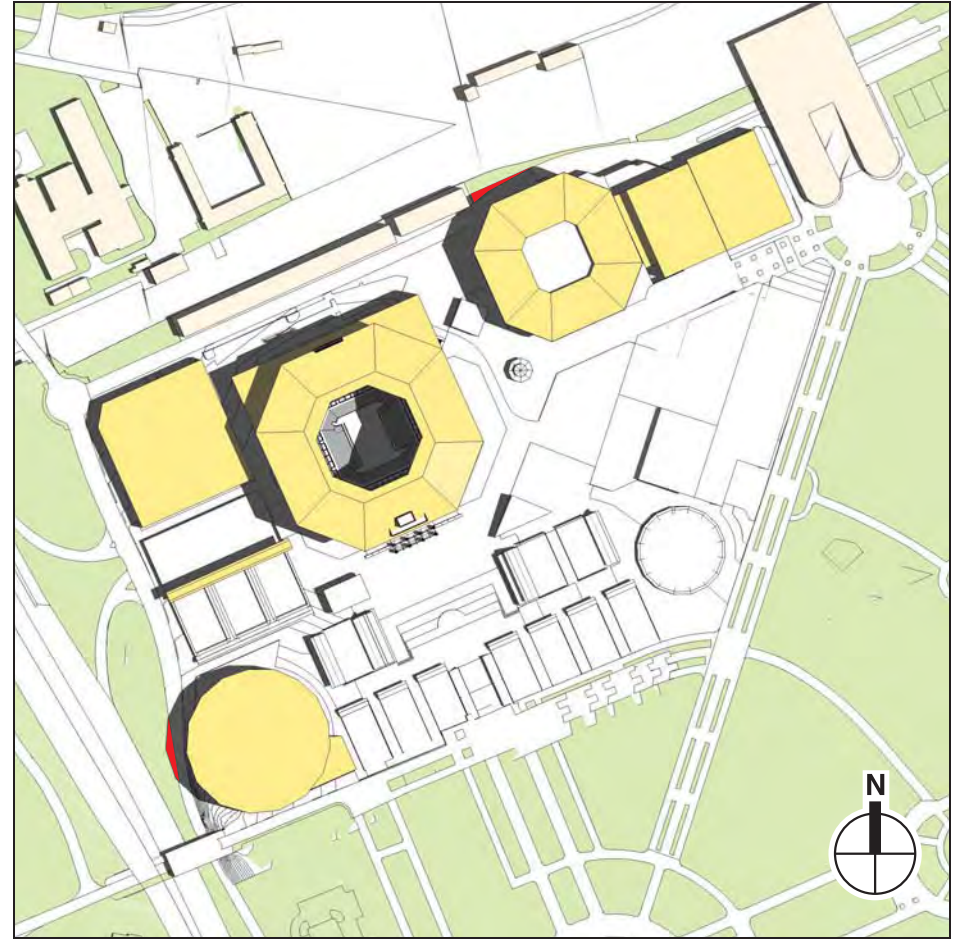
5:18 PM

-  *Proposed Structures for Analysis*
-  *Publicly-Accessible Open Space*
-  *Incremental Shadow on Sunlight-Sensitive Resource*




Daylight Savings Time was not used, per CEQR Technical Manual guidelines.



5:57 AM

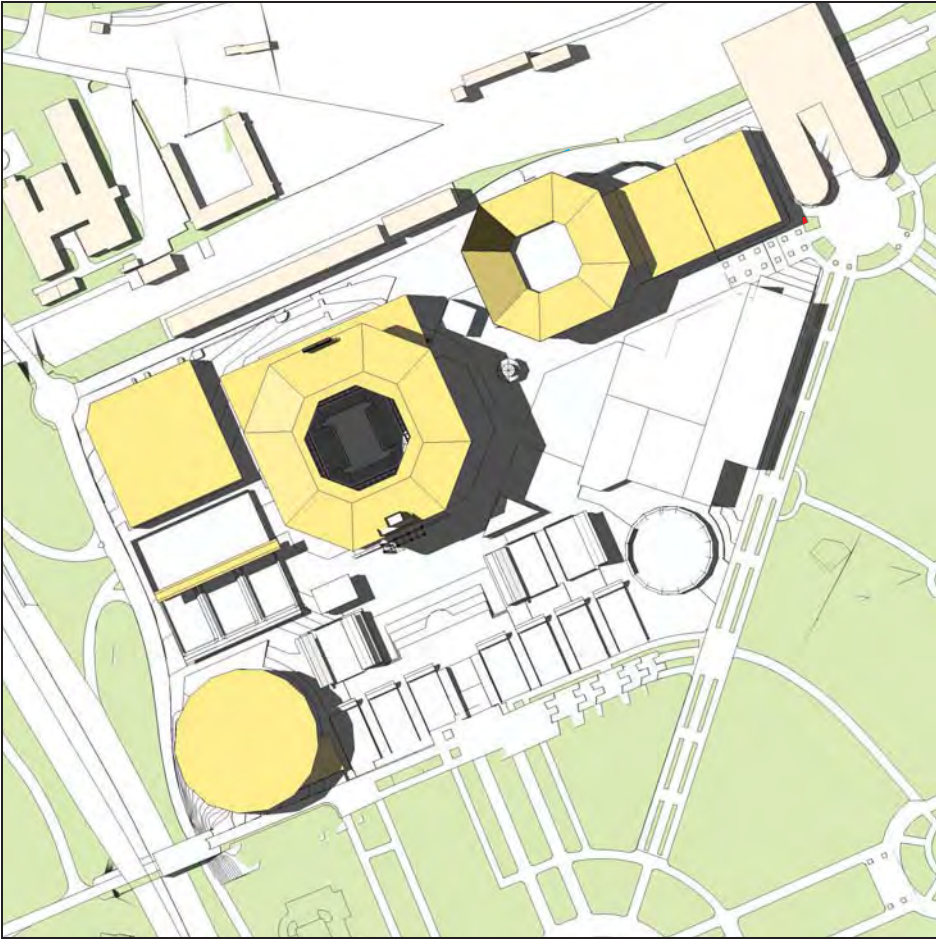


9:00 AM

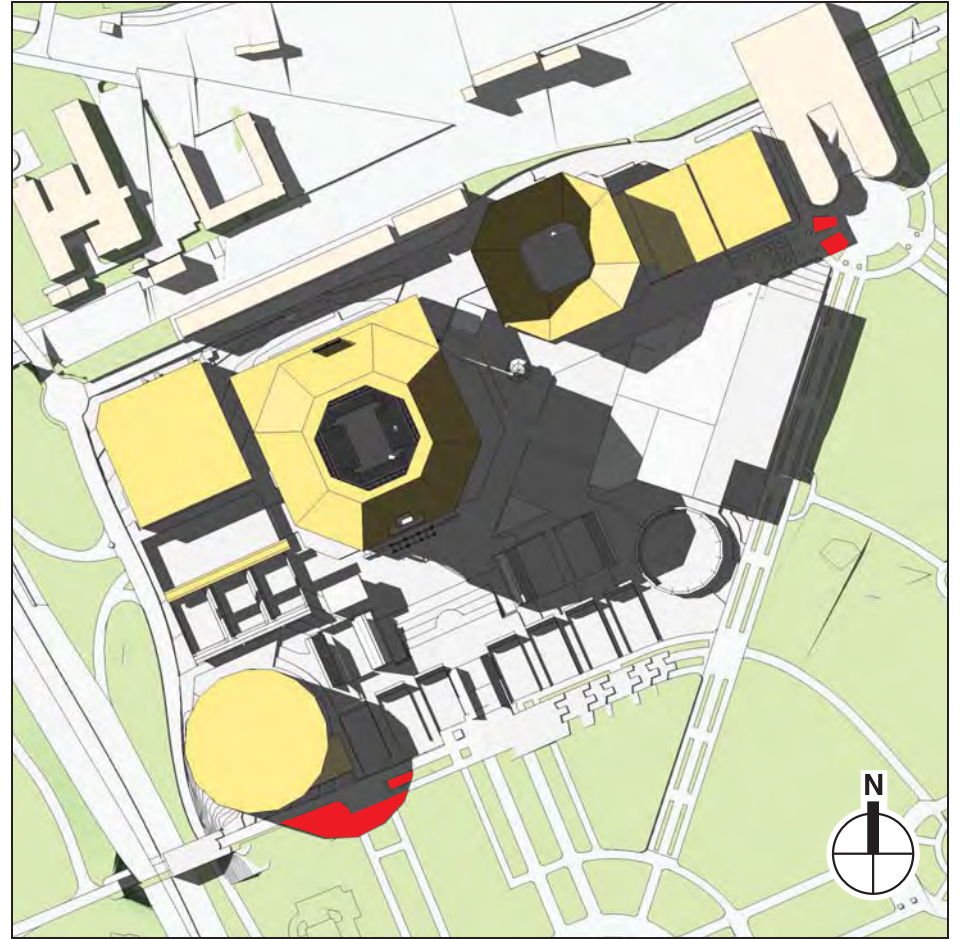
-  *Proposed Structures for Analysis*
-  *Publicly-Accessible Open Space*
-  *Incremental Shadow on Sunlight-Sensitive Resource*

Daylight Savings Time was not used, per CEQR Technical Manual guidelines.





4:15 PM



6:01 PM

- Proposed Structures for Analysis*
- Publicly-Accessible Open Space*
- Incremental Shadow on Sunlight-Sensitive Resource*

Daylight Savings Time was not used, per CEQR Technical Manual guidelines.

Incremental shadow would also fall on small portions of the strip north of the project site for up to two hours and nine minutes north of Parking Garage A, and between four and a half to seven and three quarters hours north of Stadium 2 and Parking Garage B.

The relocated Stadium 3 would also cast a new shadow to its southeast onto a small area of grass and trees in the late afternoons of the late spring and summer, ranging from a half-hour on May 6/August 6 to an hour and a quarter on the summer solstice.

These areas contain a mix of paved road or walkways, grass and mature trees, but no other user amenities, and, as noted in Chapter 3, “Open Space and Recreational Resources,” are lightly used, primarily for walking, running, and bicycling on the perimeter paths. The assessment concluded that these areas are therefore only minimally sensitive to effects of incremental shadows. Further, the areas west of the project site would continue to receive direct sun for more than six hours throughout the spring, summer and fall, since there are virtually no structures to the south or west.

The other area that could be affected by project-generated shadow, the portion of the circular plaza to the east of the project site, would receive between a few minutes and an hour and 50 minutes of incremental shadow in the spring, summer, and fall. Only a very small portion of this plaza would be affected by the new shadow, and even this small area would receive direct sun for most of the remaining day in those seasons due to the lack of structures to the south and east.

The analysis concluded that the proposed project could result in new shadows on several small areas containing sunlight-sensitive features adjacent to the project site within Flushing Meadows Corona Park. However, all but one of the areas are lightly used, primarily for activity on the perimeter paths. The assessment concluded that the new shadows would not significantly impact the park or its users. \*