

2.5 SHADOWS

2.5.1 INTRODUCTION

The *CEQR Technical Manual* defines a shadow 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. An incremental shadow is the additional or new shadow that a building or other built structure resulting from a proposed project would cast on a sunlight-sensitive resource during the year. The sunlight-sensitive resources of concern are those resources that depend on sunlight, or for which direct sunlight is necessary to maintain the resource's usability or architectural integrity, including public open space, architectural resources and natural resources. Shadows can have impacts on publicly accessible open spaces or natural features by adversely affecting their use and important landscaping and vegetation. In general, increases in shadow coverage make parks feel darker and colder, affecting the experience of park patrons. Shadows can also have impacts on historic resources whose features are sunlight-sensitive, such as stained-glass windows, by obscuring the features or details which make the resources significant.

As stated in the *CEQR Technical Manual*, structures within urban environments constantly cast shadows in their immediate vicinity. As the city develops and redevelops, the extent and duration of the shadows cast are altered. Sunlight and shadows affect people and their use of open space, although the effects vary by time of day and season. Sunlight can entice outdoor activities, support vegetation, and enhance architectural features, such as stained glass windows and carved detail on historic structures. Conversely, shadows can affect the growth cycle and sustainability of natural features and the architectural significance of built features.

Shadows also vary according to time of day and season. Shadows cast during the morning and evening, when the sun is low in the sky, are longer, while midday shadows are shorter in length. Shadows in winter, when the sun arcs low across the southern sky, are also longer throughout the day than at corresponding times in spring and fall seasons. In summer, the high arc of the sun casts shorter shadows than at any other time of year, and early and late shadows during the summer are cast more towards the south than shadows cast in other times of the year.

2.5.2 METHODOLOGY

The purpose of a shadow analysis per CEQR 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. If warranted, potential mitigation strategies and alternatives should be examined if and when significant adverse shadow impacts are identified. The majority of projects subject to CEQR, as noted in the *CEQR Technical Manual*, generally do not require a detailed shadow analysis.

The *CEQR Technical Manual* states that a shadow assessment considers projects that result in new shadows long enough to reach a sunlight-sensitive resource. Therefore, a shadow assessment is required only if the project would either result in new structures or additions to existing structures, including the addition of rooftop mechanical equipment, that (a) would be 50 feet or more in height; or, (b) located adjacent to, or across the street from, a sunlight-sensitive resource. However, a project located adjacent to or across the street from a sunlight-sensitive open space resource (which is not a designated New York City Landmark or listed on the State/National Registers of Historic Places, or eligible for these programs) may not require a detailed shadow assessment if the project's height or height increase is ten feet or less.

The sunlight-sensitive resources of concern are those resources that depend on sunlight or for which direct sunlight is necessary to maintain the resource's usability or architectural integrity, including public

open space, architectural resources and natural resources. In general, shadows on city streets and sidewalks or on other buildings are not considered significant. Some open spaces also contain facilities that are not sensitive to sunlight. These are usually those that are paved, such as handball or basketball courts, contain no seating, vegetation or unusual or historic plantings, or contain only unusual or historic plantings that are shade tolerant. These types of facilities do not need to be analyzed for shadow impacts. Additionally, it is generally not necessary to assess resources located to the south of projected development sites, as shadows cast by the action-generated development would not be cast in the direction of these resources. Furthermore, shadows occurring within one and one-half hours of sunrise or sunset generally are not considered significant in accordance with the *CEQR Technical Manual*.

Projected building heights within the Development Area are not expected to exceed the height limits of the proposed C4-1 and R3-2 zoning districts. However, in the future, when a specific developer is identified, it may be necessary to obtain a height variance to allow construction of the multi-unit senior housing,

The maximum building height permitted in the proposed C4-1 zoning district is governed by the sky exposure plane (after a 30-foot maximum base height), while R3-2 zoning districts allow a maximum building height of 35 feet. It is expected that the proposed retail buildings in the C4-1 zone would adhere to the sky exposure plane. While the proposed detached senior housing and school buildings would adhere to the R3-2 zoning district regulations and would rise to a maximum height of 35 feet tall, it is assumed for purposes of this analysis that the multi-unit senior housing would rise to 40 feet. R3-2 zoning district regulations allow a maximum residential floor area ratio ("FAR") of 0.6 and a maximum community facility FAR of 1.0. For the proposed senior housing, the 394,819 square foot site would contain up to an expected 236,890 square feet of floor area, at the allowed 0.6 FAR. For the proposed school, the 256,194 square foot site would contain an approximately 100,000 square foot facility building, with an FAR of approximately 0.4. C4-1 zoning district regulations allow a maximum community facility FAR of 2.0. The proposed approximately 15,000 square foot library would be situated on an approximately 18,650 square foot site within Retail Site "A", under the maximum allowed 2.0 FAR.

However, existing open space resources are located in the immediate area. North of the Development Area, across Englewood Avenue, is Clay Pit Ponds State Park Preserve ("CPPSPP"). East of the Development Area is the approximately 20-acre Conservation Area, which is proposed to be mapped as parkland and remain in its natural state under the Proposed Project. Therefore, the Proposed Project could result in an increase in shadows falling on nearby sun-sensitive resources, and further shadow screening assessments were performed.

2.5.3 PRELIMINARY SHADOW SCREENING ASSESSMENT

The shadow assessment begins with a preliminary screening assessment to ascertain whether a project's shadow may reach any sunlight-sensitive resources at any time of the year. If the screening assessment does not eliminate this possibility, a detailed shadow analysis is generally required to determine the extent and duration of the incremental shadow resulting from the project. If required, the detailed shadow analysis provides the necessary information for the assessment of shadow impacts, which describes the effect of shadows and their degree of significance on the sunlight-sensitive resources.

The effects of shadows on a sunlight-sensitive resource are site-specific; therefore, as noted in the *CEQR Technical Manual*, the screening assessment and subsequent shadow assessment (when required) are performed for each of the sites where a new structure could be built as a result of a project (e.g. for projected and potential development sites). The Preliminary Screening Assessment is divided into Tier 1, 2 and 3 Screening Assessments.

2.5.3.1 Tier 1 Screening Assessment

The first step in the preliminary shadow screening assessment is a Tier 1 Screening Assessment. A base map is developed that illustrates the proposed site location in relationship to the sunlight-sensitive resources. The base map includes the location of the proposed project, the street layout, and the locations of the sunlight-sensitive resources. After the base map is developed, the longest shadow study area is determined. The longest shadow study area encompasses the site of the proposed project(s) and a perimeter around the site's boundary with a radius equal to the longest shadow that could be cast by the proposed structure, which is 4.3 times the height of the structure that occurs on December 21st, the winter solstice. To find the longest shadow length, the maximum height of the structure (including any rooftop mechanical equipment) resulting from the proposed project building(s) is multiplied by the factor of 4.3.

Year 2015

A shadow radius of 4.3 times the maximum expected heights of buildings over the Development Area under the Proposed Project was performed, for both the 2015 and 2020 analyses years. **Figure 2.5-1** shows a Tier 1 Screening Assessment for the 2015 year analysis, in which buildings within Retail Site "A" and Fairview Park would be constructed.

As shown in **Figure 2.5-1**, the results of the Tier 1 Screening Assessment show that there are no sunlight-sensitive open space resources or sunlight-sensitive cultural or historic resources located within a potential shadow radius of 4.3 times the expected maximum heights of buildings, and thus further study under the next screening level is not warranted. Under this analysis, the longest shadows cast from the expected retail, library, and park buildings in the Development Area would not reach either the adjacent Conservation Area or CPPSPP situated north of the Englewood Avenue corridor. Furthermore, the shadows would also not reach the nearest designated historic resource, the Kreischer House.

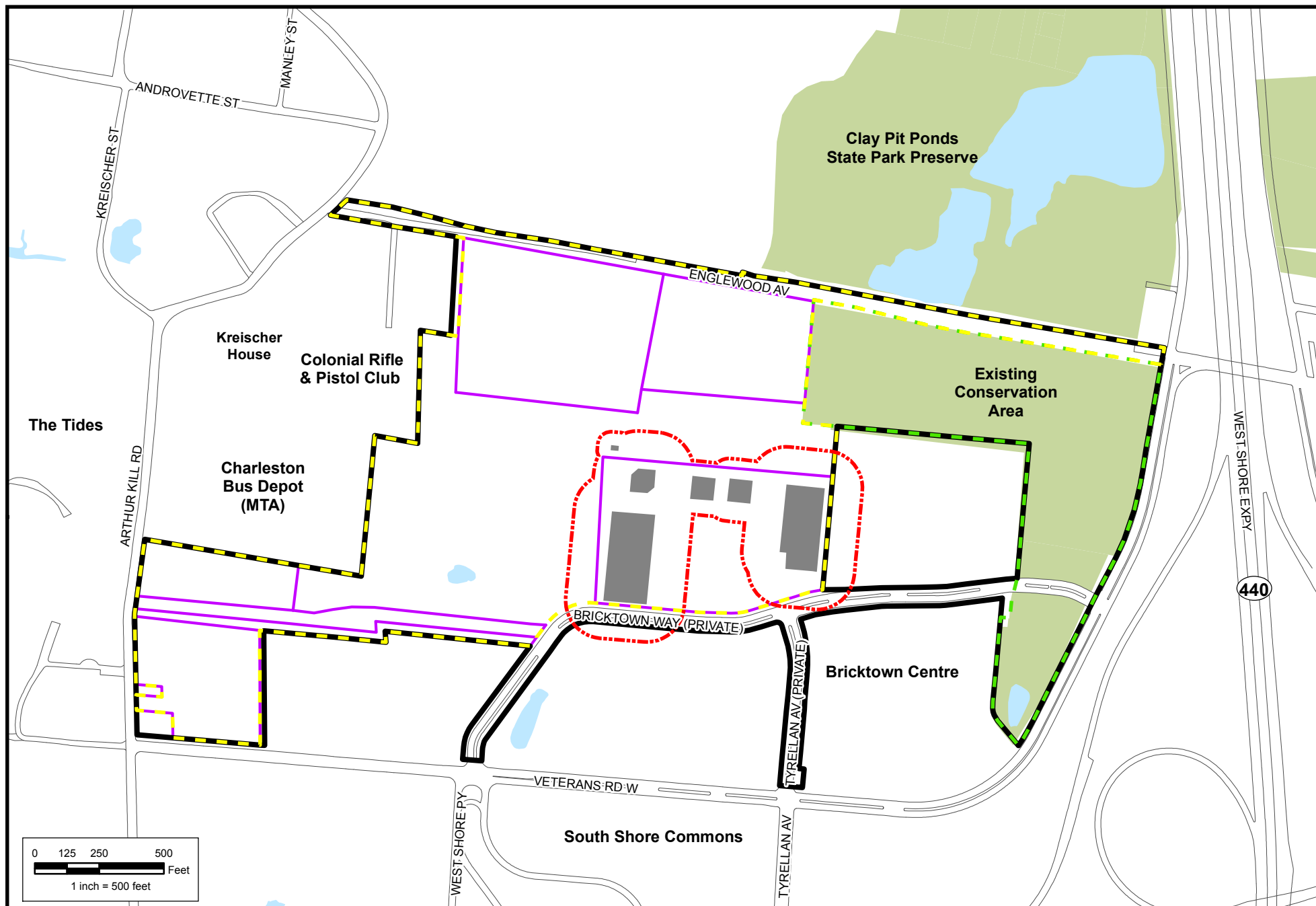
As such, further shadow analyses screening under Tiers 2 and 3, and detailed shadow assessments, are not warranted, as these building components of the Proposed Project would not cast any new shadows that would reach the nearest sunlight-sensitive resources. Therefore, the Proposed Project would not result in any significant adverse shadow impacts under the 2015 year analysis.

Year 2020

Figure 2.5-2 shows a Tier 1 Screening Assessment for the 2020 year analysis, in which buildings within Retail Site "B", the senior housing and the public school would be constructed.

As shown in **Figure 2.5-2**, the results of the Tier 1 Screening Assessment show that there are no sunlight-sensitive open space resources or sunlight-sensitive cultural or historic resources located within a potential shadow radius of 4.3 times the expected maximum heights of buildings, and thus further study under the next screening level is not warranted. Under both analyses for the 2015 year and the 2020 year, the longest shadows cast from the expected retail, library, school, housing and park buildings in the Development Area would not reach either the adjacent Conservation Area or CPPSPP situated north of the Englewood Avenue corridor. Furthermore, the shadows would also not reach the nearest designated historic resource, the Kreischer House.

As such, further shadow analyses screening under Tiers 2 and 3, and detailed shadow assessments, are not warranted, as all of the building components of the Proposed Project would not cast any new shadows that would reach the nearest sunlight-sensitive resources. Therefore, the Proposed Project would not result in any significant adverse shadow impacts under the 2020 year analysis.



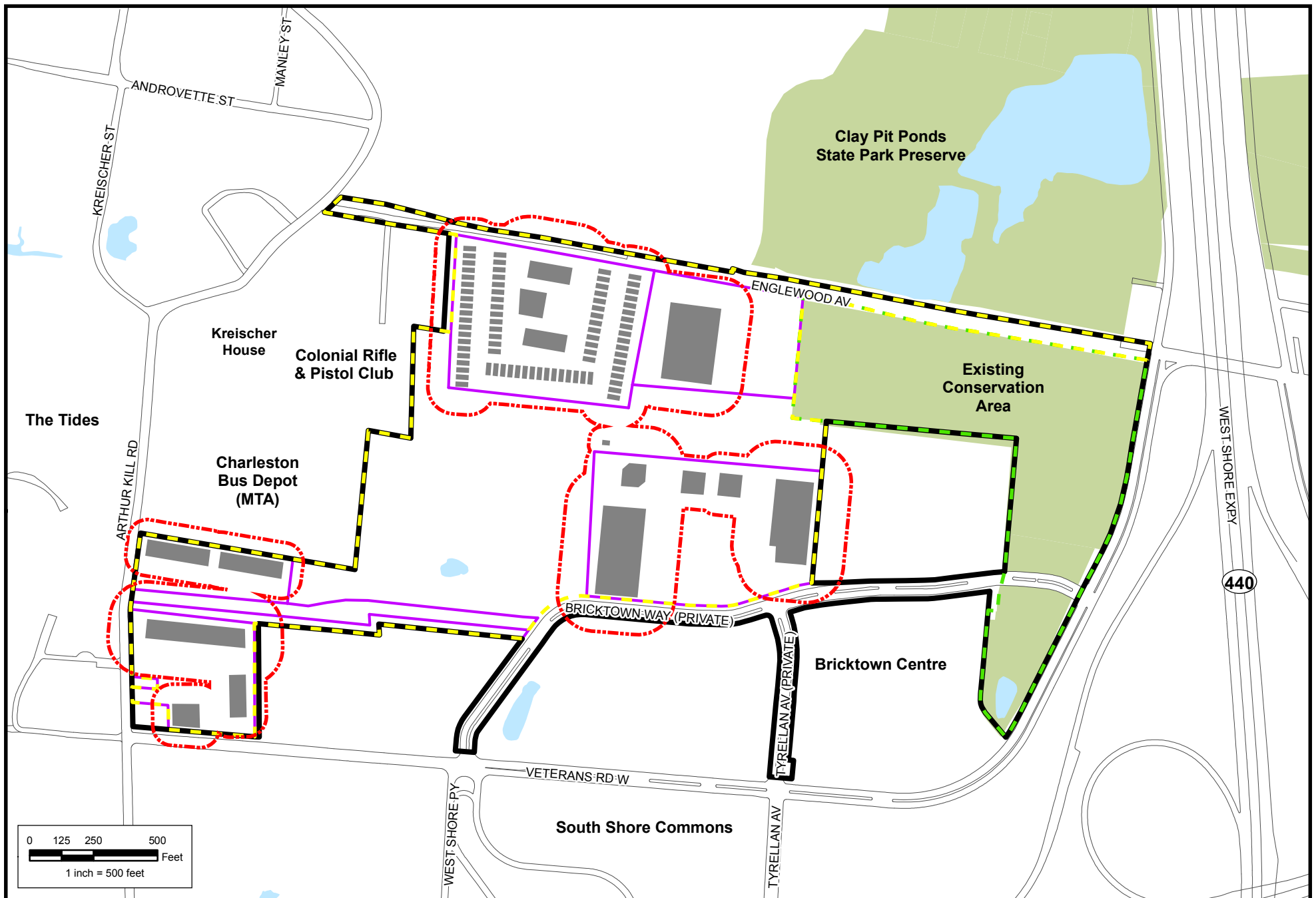
AECOM

Legend

- Project Area
- Development Area
- Conservation Area
- Proposed Building
- Longest Shadow Study Area Boundary
- Open Space & Recreation
- Site Boundary

Charleston Mixed-Use
Development

Figure 2.5-1
Tier 1
Shadow Screening
Analysis (2015)



AECOM

- Legend**
- Project Area
 - Development Area
 - Conservation Area
 - Proposed Building
 - Longest Shadow Study Area Boundary
 - Open Space & Recreation
 - Site Boundary



Charleston Mixed-Use
Development

Figure 2.5-2
Tier 1
Shadow Screening
Analysis (2020)

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