SHADE/SHADOW ANALYSIS

for

Artesia Overlay District Project

Artesia, California

Consultant:

urbansims

15 Whispering Willow Ct

Azusa, California 91702

Contact: Larry Onaga, Owner

June 8, 2020

Shade and Shadow Analysis

Introduction

A shade and shadow analysis was conducted for the proposed Overlay Zone Project. The issue of shade and shadow pertains to the obstruction of direct sunlight by proposed buildings, which affect adjacent properties. Shade/shadow impacts is an important environmental issue because the users or occupants of certain land uses, such as residential, recreational, outdoor restaurants, and pedestrian areas have expectations for direct sunlight and warmth from the sun. These land uses are termed "shadow-sensitive," because sunlight is important to function, physical comfort, and commerce.

Factors that influence the extent of range of shading include: season; time of day; weather (i.e., sunny vs. cloudy day); building height, bulk, and scale; spacing between buildings; and tree cover. The longest shadows are cast during the winter months, when the sun is lowest on the horizon, and the shortest shadows are cast during the summer months. Shadows are longer in the early morning and late afternoon.

Methodology

The shade and shadow analysis is based on the proposed project design using geo-located (i.e. parcel specific) SketchUp modeling of sunlight conditions. Shade and shadow effects are dependent upon several factors, including the local topography, the season, the height and mass of adjacent structures, the shade-sensitivity of adjacent land uses, and duration of shadow projection.

Shade and shadows cast by the proposed project onto adjacent shadow-sensitive land uses were analyzed during the summer solstice (June 20) for each hour from 9:00 a.m. to 5:00 p.m., during winter solstice (December 21) for each hour from 9:00 a.m. to 3:00 p.m., during spring equinox (March 20) for each hour from 9:00 a.m. to 3:00 p.m., and during fall equinox (September 22) for each hour from 9:00 a.m. to 5:00 p.m.

Summer and Winter Solstices

"Solstice" is defined as either of the two points on the sun's elliptic that lie midway between the equinoxes (separated from them by an angular distance of 90°). At the solstices, the sun's apparent position on the celestial sphere reaches its greatest distance above or below the celestial equator, about 23 1/2° of the arc. At the time of summer solstice, around June 20, the sun is directly overhead at noon at the Tropic of Cancer. In the Northern Hemisphere, the longest day and shortest night of the year occur on this date, marking the beginning of summer. At winter solstice, around December 21, the sun is overhead at noon at the Tropic of Capricorn; this marks the beginning of winter in the Northern Hemisphere. Measuring shadow lengths for the winter and summer solstices represents the extreme shadow patterns that occur throughout the year. Shadows cast on the summer solstice are the shortest shadows during the year, becoming progressively

longer until winter solstice when the shadows are the longest they are all year. Shadows are shown for summer solstice, cast from 9:00 a.m. to 5:00 p.m., and for winter solstice, cast from 9:00 a.m. to 3:00 p.m.

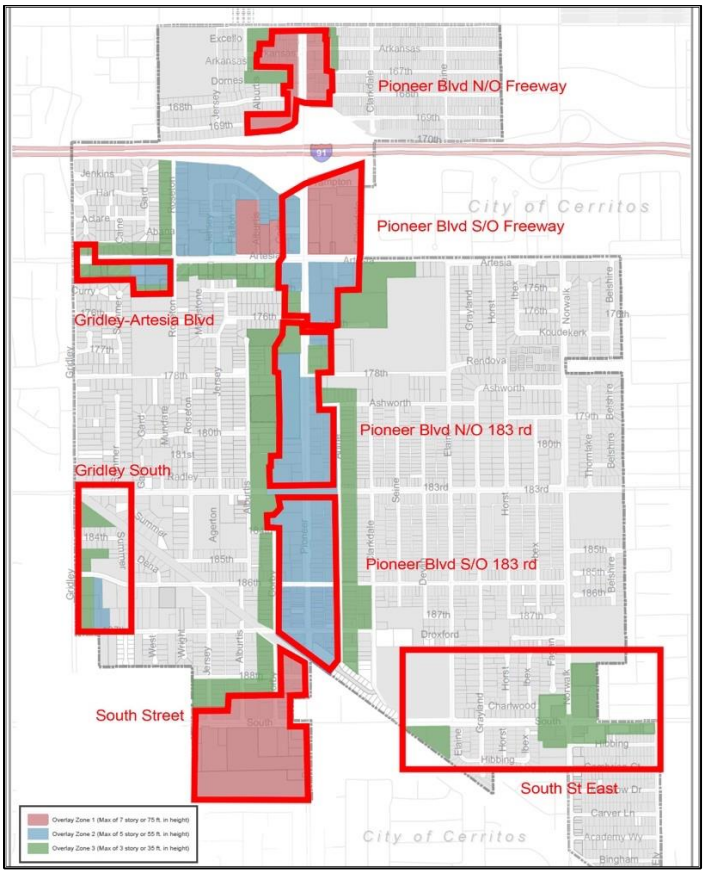
Spring and Fall Equinoxes

"Equinox" is defined as either of two points of intersection of the sun's apparent annual path and the plane of the earth's equator, that is, a point of intersection of the elliptic and the celestial equator. At the equinoxes (March 20 for spring, and September 22 for fall), day and night are the same duration as the sun's transit falls on the equator. Shadows cast on the equinoxes are intermediary between the solstices. Shadows are shown for spring equinox, cast from 9:00 a.m. to 3:00 p.m., and for fall equinox, cast from 9:00 a.m. to 5:00 p.m.

Impacts Analysis

In order for the Project to generate a significant shadow impact, it must increase shadows cast upon shadow-sensitive uses. Shadow impacts can be considered significant if shadow-sensitive uses would be shaded by Project related structures for more than three hours between 9:00 a.m. and 3:00 p.m. between late October and early April (including winter solstice, and spring equinox), or for more than four hours between early April and late October (including summer solstice, and fall equinox).

Shadow modeling has been performed for select areas of the overall project area based on City staff identification of the areas most likely to impacted by the proposed changes. Because of the size of the overall area, the shade/shadow diagrams have been divided into eight subareas shown on the subareas key map below.



Subareas Key Map

Pioneer Blvd North of the 91 Freeway

Shadow-sensitive uses located within the path of the shadows cast by the proposed project include the Cerritos Mobile Lodge on 166th Street in the City of Norwalk, the yards of a number of residential properties along 166th Street, Arkansas St, 167th Street, 168th Street, and Alburtis Ave. These are the only shadow-sensitive uses in the direct vicinity of this particular subarea and are, therefore, of particular interest in the shadows analysis.

The estimated winter solstice (December 21) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 1. During the winter solstice, shadows would be cast up to 209 feet to the northwest in the morning, 118 feet to the north at midday, and 243 feet to the northeast in the afternoon. Between the hours of 9:00 a.m. and 12:00 p.m., the Project would cast shadows upon a small portion (south-east corner) of the Cerritos Mobile Lodge on 166th Street for more than 3 hours. Likewise, single-family homes between 11224 -11660 166th Street would experience shadows for more than 3 hours in the morning. In the afternoon, shadows are cast over a residentially zoned property at 11224 166th Street for more than 3 hours (between 12pm and 3pm).

These shadow impacts are lessened or eliminated under the Reduced Height Project

alternative and the No Project alternative. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

Figure 1 Winter Solstice Shadows

The estimated summer solstice (June 20) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 2. During the summer solstice, shadows would be cast up to 61 feet to the west in the morning, 24 feet to the north at midday, and 172 feet to the east in the afternoon. A narrow portion of the side yards of existing residentially zoned properties immediately east at 11839 168th St and 11836 167th St might be shaded for a period of greater than four hours between the hours of 1:00 p.m. and 5:00 p.m.

These shadow impacts are lessened or eliminated under the Reduced Height Project alternative and the No Project alternative or increased side setbacks under the Project proposal. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

Figure 2 Summer Solstice Shadows

The estimated spring equinox (March 20) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 3. During the spring equinox, shadows would be cast up to 103 feet to the north-west in the morning, 50 feet to the north at midday, and 103 feet to the north-east in the afternoon. No shadow sensitive uses are shaded for more than three hours between 9 a.m. and 3 p.m. Because shadows would not be cast onto shade sensitive areas for a period greater than three hours between the hours of 9:00 a.m. and 3:00 p.m., impacts would be less than significant.

Figure 3 Spring Equinox Shadows

The estimated fall equinox (September 22) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 4. During the fall equinox, shadows would be cast up to 94 feet to the north-west in the morning, 60 feet to the north at midday, and about 465 feet to the east in the afternoon. Portions of the side yards of existing residentially zoned properties immediately east of the subarea at 11839 168th St

and 11836 167th St would be shaded for a period of greater than four hours between the hours of 1:00 p.m. and 5:00 p.m.

These shadow impacts are lessened or eliminated under the Reduced Height Project alternative and the No Project alternative. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

Figure 4 Fall Equinox Shadows

Pioneer Blvd South of the 91 Freeway

The subarea south of the 91 freeway consists of the 4 quadrants at the intersection of Artesia Blvd and Pioneer Blvd. The north-east quadrant if proposed to be designated as Overlay Zone 1 (7 stories/75 feet). The other 3 quadrants are designated Overlay Zone 2 (5 stories/55 feet) with a small area designated Overlay Zone 3 (3 stories/35 feet) on the west side of Pioneer Blvd south of Artesia Blvd. Shadow-sensitive uses located within the path of the shadows cast by the proposed project include the playground at Juarez Elementary School, the yards of a number of residential properties along Aclare St and Shasta Cr, the Windsor Palm Care Center on Artesia Blvd, the Los Arboles Apartments on 176th St, and single-family homes along 175th and 176th Streets west of Pioneer Blvd. These are the only shadow-sensitive uses in the direct vicinity of this particular subarea and are, therefore, of particular interest in the shadows analysis.

The estimated winter solstice (December 21) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 5. During the winter solstice, the longest shadows (Overlay 1) would be cast up to 209 feet to the northwest in the morning, 118 feet to the north at midday, and 243 feet to the northeast in the afternoon. Between the hours of 9:00 a.m. and 12:00 p.m., the Project would cast shadows upon a small portion of a residential property on 175th St but for less than one hour. During the afternoon hours, the project would cast shadows on a residential property on Aclare St but for less than 3 hours. Shadows would also be cast on the Windsor Palm Care Center

on Artesia Blvd for less than 3 hours and those shadows would fall mainly on the building on the west side of the facility and not on the outdoor open space/leisure areas. A medical office building (Cerritos Medical Center) at the northeast corner of Artesia Blvd and Clarkdale Ave will be partially shaded for less than three hours, however, this building appears to have an array of rooftop solar panels that could be impacted.

Because shadows would not be cast onto shade sensitive areas for a period greater than three hours between the hours of 9:00 a.m. and 3:00 p.m., impacts would be less than significant.

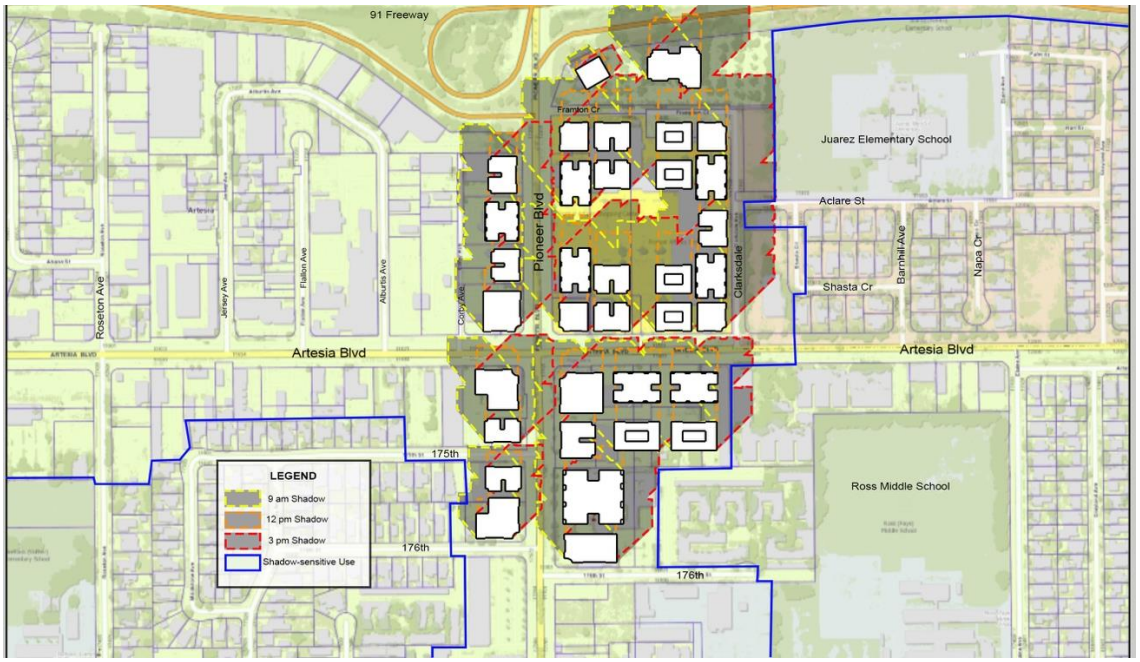


Figure 5 Winter Solstice Shadows

The estimated summer solstice (June 20) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 6. During the summer solstice, longest shadows (Overlay 1) would be cast up to 61 feet to the west in the morning, 24 feet to the north midday, and172 feet to the east in the afternoon. An existing residential property at the corner of Aclare and Shasta immediately east of the subarea would be shaded but for less than 3 hours. Also a portion of the Windsor Palm Care Center on Artesia Blvd would be shaded for less than 3 hours and those shadows would fall mainly on the building on the west side of the facility and not on the outdoor open space/leisure areas. A medical office building (Cerritos Medical Center) at the northeast corner of Artesia Blvd and Clarkdale Ave will be partially shaded for less than three hours, however, this building appears to have an array of rooftop solar panels that could be impacted.

Because summer shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 5:00 p.m., impacts would be less than significant.

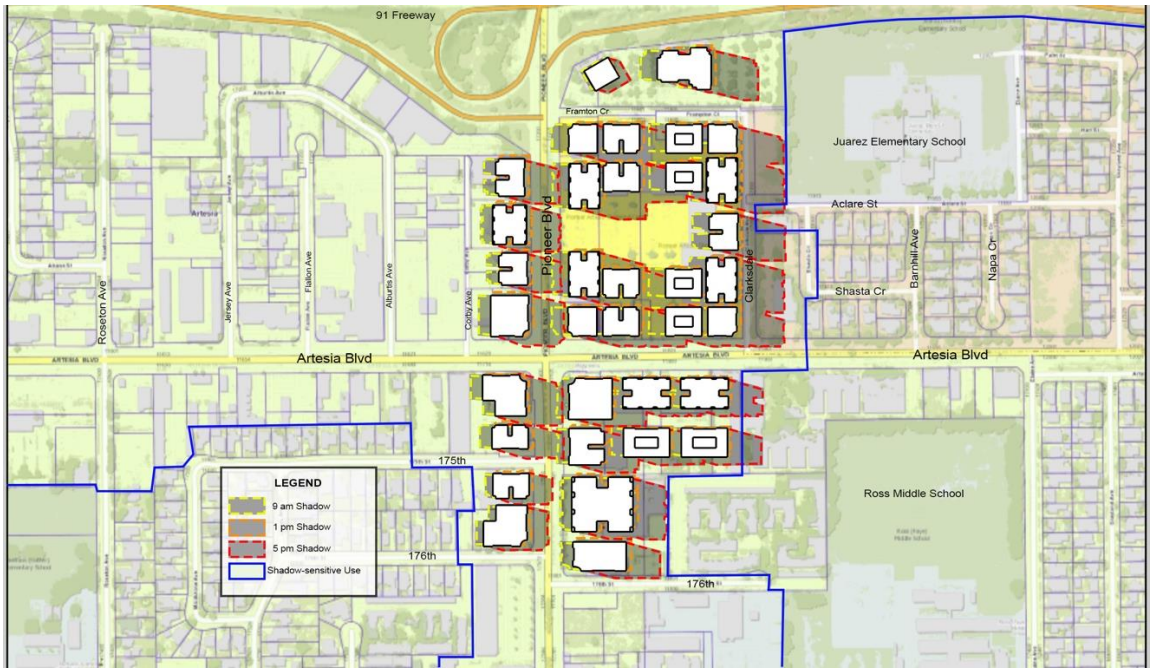


Figure 6 Summer Solstice Shadows

The estimated spring equinox (March 20) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 7. During the spring equinox, the longest shadows (Overlay 1) would be cast up to 103 feet to the north-west in the morning, 50 feet to the north at midday, and 103 feet to the north-east in the afternoon. A small portion of an existing residential property at the corner of Aclare and Shasta immediately east of the subarea would be shaded but for less than 3 hours. Also a portion of the Windsor Palm Care Center on Artesia Blvd would be shaded for less than 3 hours and those shadows would fall mainly on the building on the west side of the facility and not on the outdoor open space/leisure areas. Because shadows would not be cast onto shade sensitive areas for a period greater than three hours between the hours of 9:00 a.m. and 3:00 p.m., impacts would be less than significant.

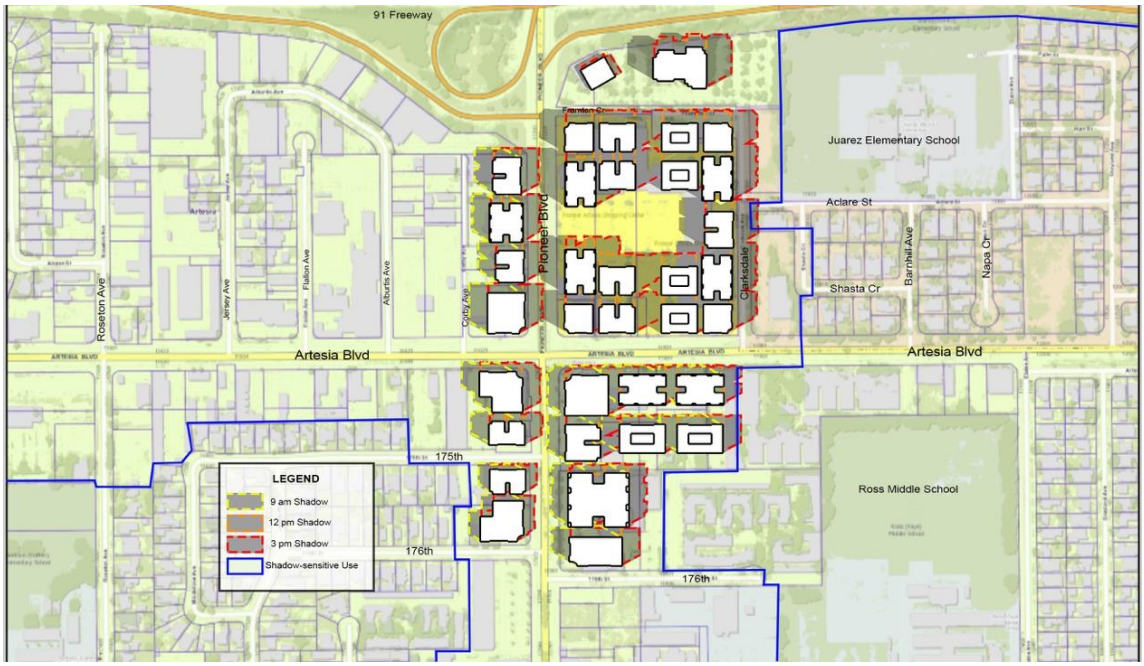


Figure 7 Spring Equinox Shadows

The estimated fall equinox (September 22) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 8. During the fall equinox, shadows would be cast up to 94 feet to the north-west in the morning, 60 feet to the north at midday, and about 465 feet to the east in the afternoon. Existing residential properties on Aclare St and Shasta Cr immediately east of the subarea would be shaded but for less than 4 hours. Also a portion of the Windsor Palm Care Center on Artesia Blvd and a portion of the Los Arboles Apartments on 176th St would be shaded for less than 4 hours.

A medical office building (Cerritos Medical Center) at the northeast corner of Artesia Blvd and Clarkdale Ave will be shaded for less than 4 hours (approximate 1.5 hours), however, this building appears to have an array of rooftop solar panels that could potentially be impacted. These shadow impacts are lessened or eliminated under the Reduced Height Project alternative and the No Project alternative or increased side setbacks under the Project proposal. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

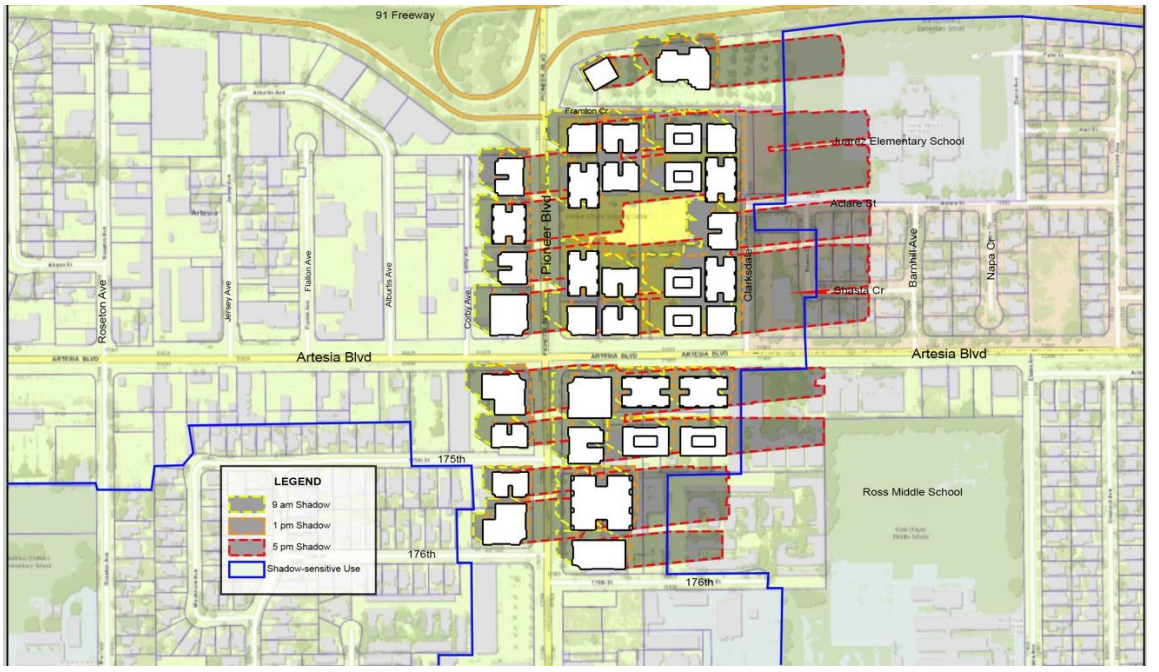


Figure 8 Fall Equinox Shadows

Pioneer Blvd North of 183rd Street

The subarea north of 183rd Street generally consists of the properties along Pioneer Blvd between 176th Street and 183rd Street. Most of this subarea is proposed to be designated as Overlay Zone 2 (5 stories/55 feet) with a smaller area designated Overlay Zone 3 (3 stories/35 feet) at the northern end of the subarea. Shadow-sensitive uses located within the path of the shadows cast by the proposed project include residential properties along 176th St, 178th St, Arline Ave, Ashworth St, and Alburtis Ave near Pioneer Blvd. These are the only shadow-sensitive uses in the direct vicinity of this particular subarea and are, therefore, of particular interest in the shadows analysis.

The estimated winter solstice (December 21) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 9. During the winter solstice, the longest shadows (Overlay 2) would be cast up to 153 feet to the northwest in the morning, 86 feet to the north at midday, and 178 feet to the northeast in the afternoon. Between the hours of 9:00 a.m. and 3:00 p.m., the Project would cast shadows upon portions of a residential property on Alburtis Ave, 178th St, Arlene Ave, and Ashworth St but, in most cases for less than 3 hours.

Two properties (18020 Alburtis and 11829 Ashworth St) would experience shadows for periods greater than 3 hours. These shadow impacts can be lessened or eliminated under the Reduced Height Project alternative and the No Project alternative. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

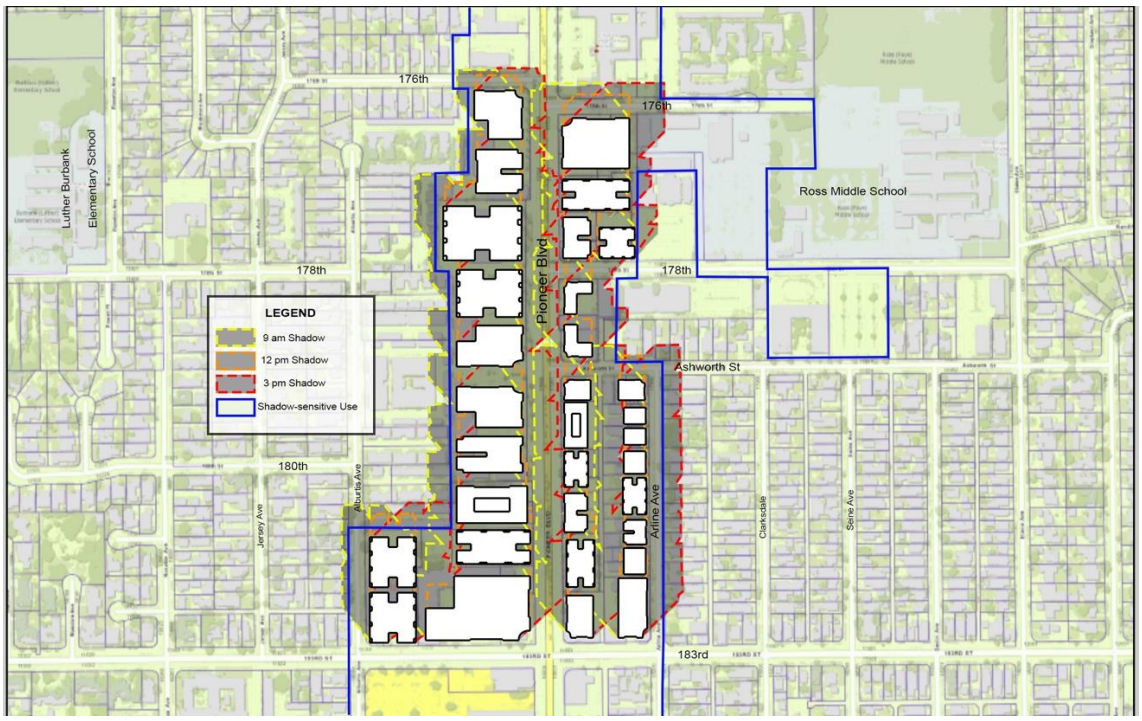


Figure 9 Winter Solstice Shadows

The estimated summer solstice (June 20) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 10. During the summer solstice, longest shadows (Overlay 1) would be cast up to 45 feet to the west in the morning, 18 feet to the north midday, and 126 feet to the east in the afternoon. Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on Alburtis Ave, 178th St, Arlene Ave, and Ashworth St but, in most cases for less than 4 hours.

Because summer shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 5:00 p.m., impacts would be less than significant.

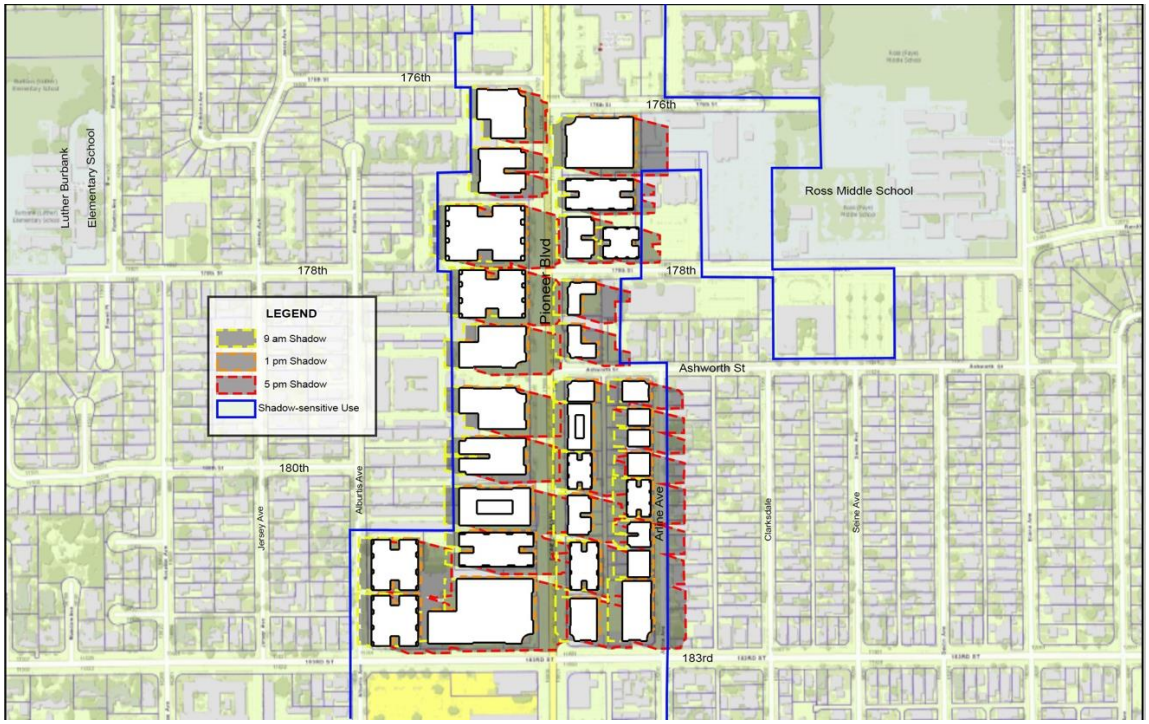


Figure 10 Summer Solstice Shadows

The estimated spring equinox (March 20) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 11. During the spring equinox, the longest shadows (Overlay 2) would be cast up to 75 feet to the north-west in the morning, 37 feet to the north at midday, and 75 feet to the north-east in the afternoon. Between the hours of 9:00 a.m. and 3:00 p.m., the Project would cast shadows upon portions of a residential property on Alburtis Ave, and 178th St but for less than 3 hours.

Because shadows would not be cast onto shade sensitive areas for a period greater than three hours between the hours of 9:00 a.m. and 3:00 p.m., impacts would be less than significant.

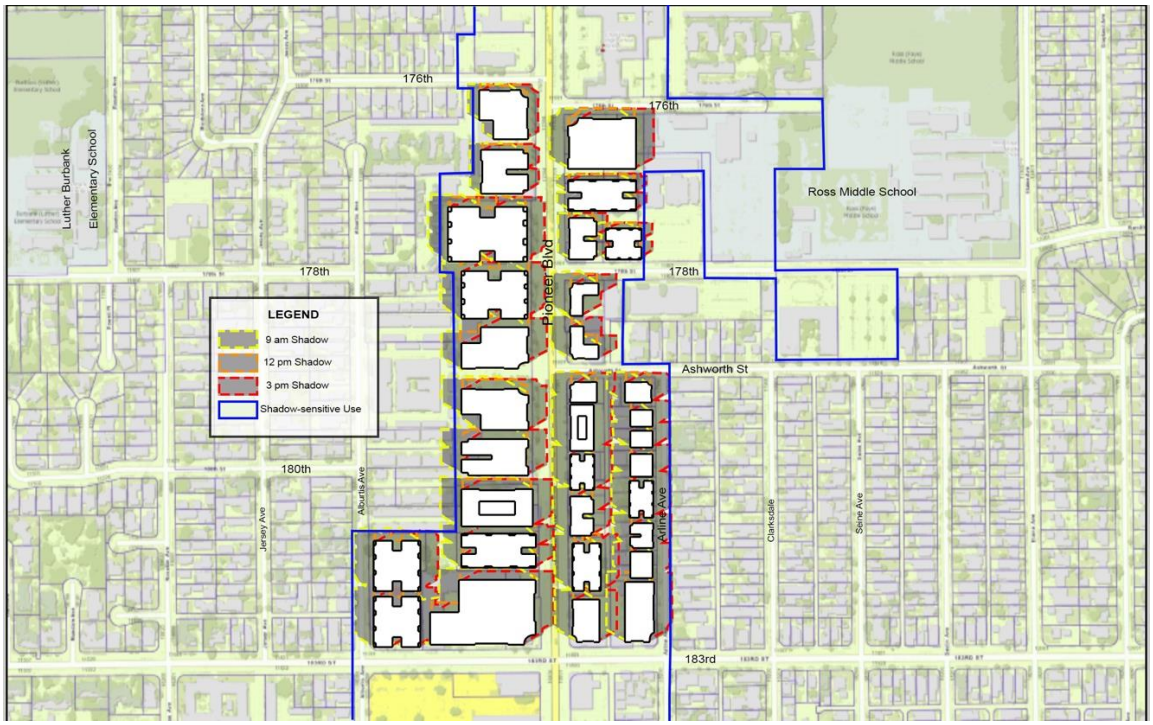


Figure 11 Spring Equinox Shadows

The estimated fall equinox (September 22) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 12. During the fall equinox, shadows would be cast up to 69 feet to the north-west in the morning, 43 feet to the north at midday, and about 341 feet to the east in the afternoon. Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on 178th St, Alburtis Ave, Arlene Ave, and Ashworth St but for less than 4 hours

Because shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 5:00 p.m., impacts would be less than significant.

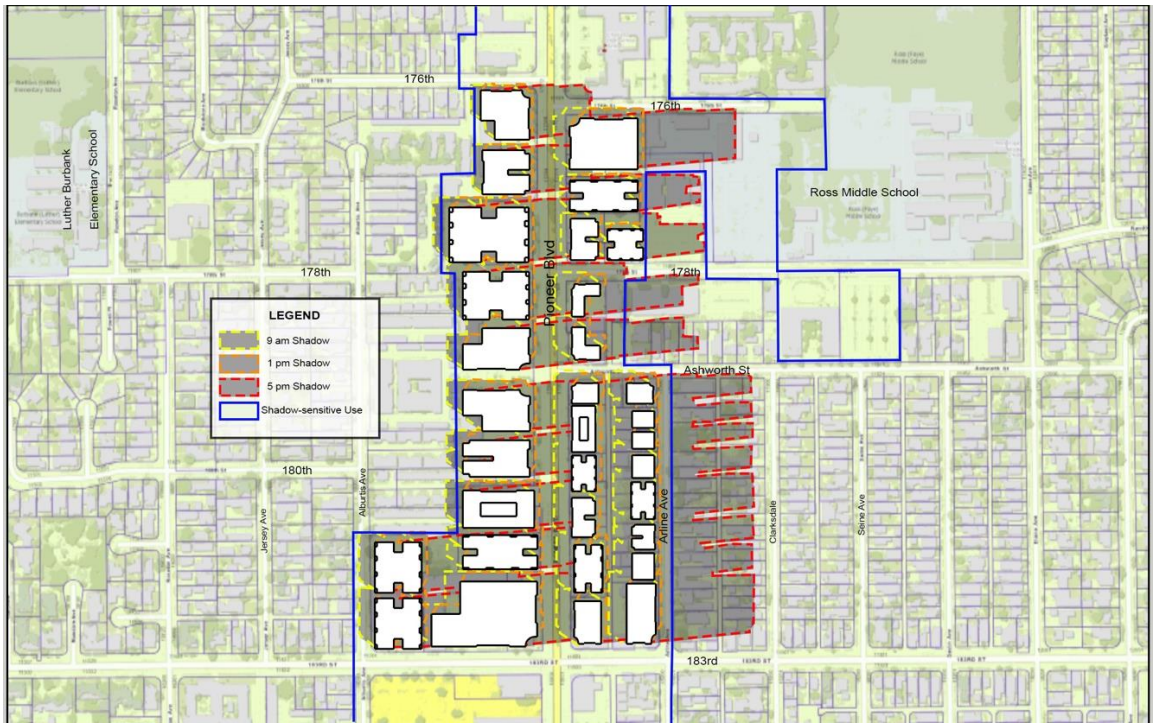


Figure 12 Fall Equinox Shadows

Pioneer Blvd South of 183rd Street

The subarea south of 183rd Street generally consists of the properties along Pioneer Blvd between 183rd Street and the MTA ROW. This subarea is proposed to be designated as Overlay Zone 2 (5 stories/55 feet). Shadow-sensitive uses located within the path of the shadows cast by the proposed project include residential properties along Corby Ave west of Pioneer Blvd, and Arlene Ave east of Pioneer Blvd. These are the only shadow-sensitive uses in the direct vicinity of this particular subarea and are, therefore, of particular interest in the shadows analysis.

The estimated winter solstice (December 21) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 13. During the winter solstice, the longest shadows (Overlay 2) would be cast up to 153 feet to the northwest in the morning, 86 feet to the north at midday, and 178 feet to the northeast in the afternoon. Between the hours of 9:00 a.m. and 3:00 p.m., the Project would cast shadows upon portions of a residential property on portions of Arlene Ave, and Corby Ave but for less than 3 hours.

The Pioneer Cash and Carry store at 11700 183rd Street is within the shadow path but for less than three hours. However, aerial photographs appear to show an array of rooftop solar panels on this building which could potentially be impacted. These shadow impacts can be lessened or eliminated under the Reduced Height Project alternative and the No Project alternative. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

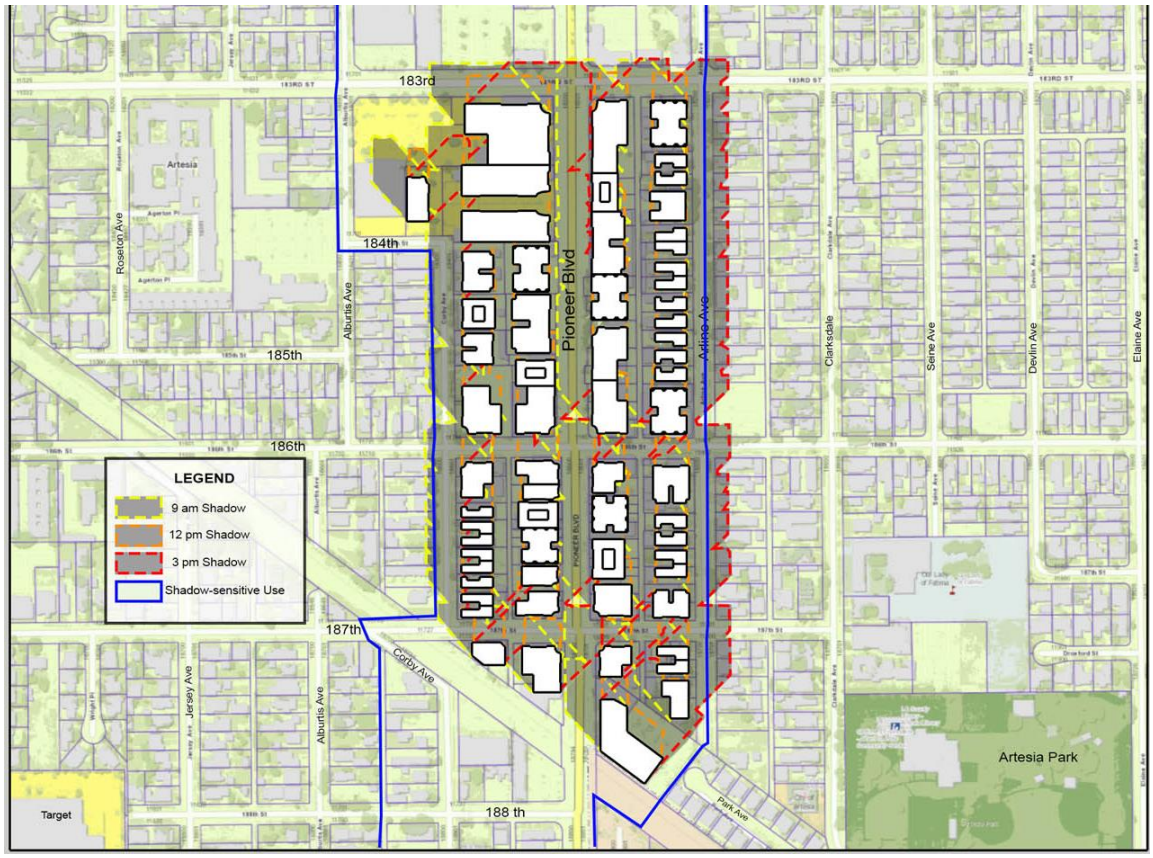


Figure 13 Winter Solstice Shadows

The estimated summer solstice (June 20) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 14. During the summer solstice, longest shadows (Overlay 1) would be cast up to 45 feet to the west in the morning, 18 feet to the north midday, and 126 feet to the east in the afternoon. Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on Alburtis Ave, 178th St, Arlene Ave, and Ashworth St but, in most cases for less than 4 hours.

Because summer shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 5:00 p.m., impacts would be less than significant.

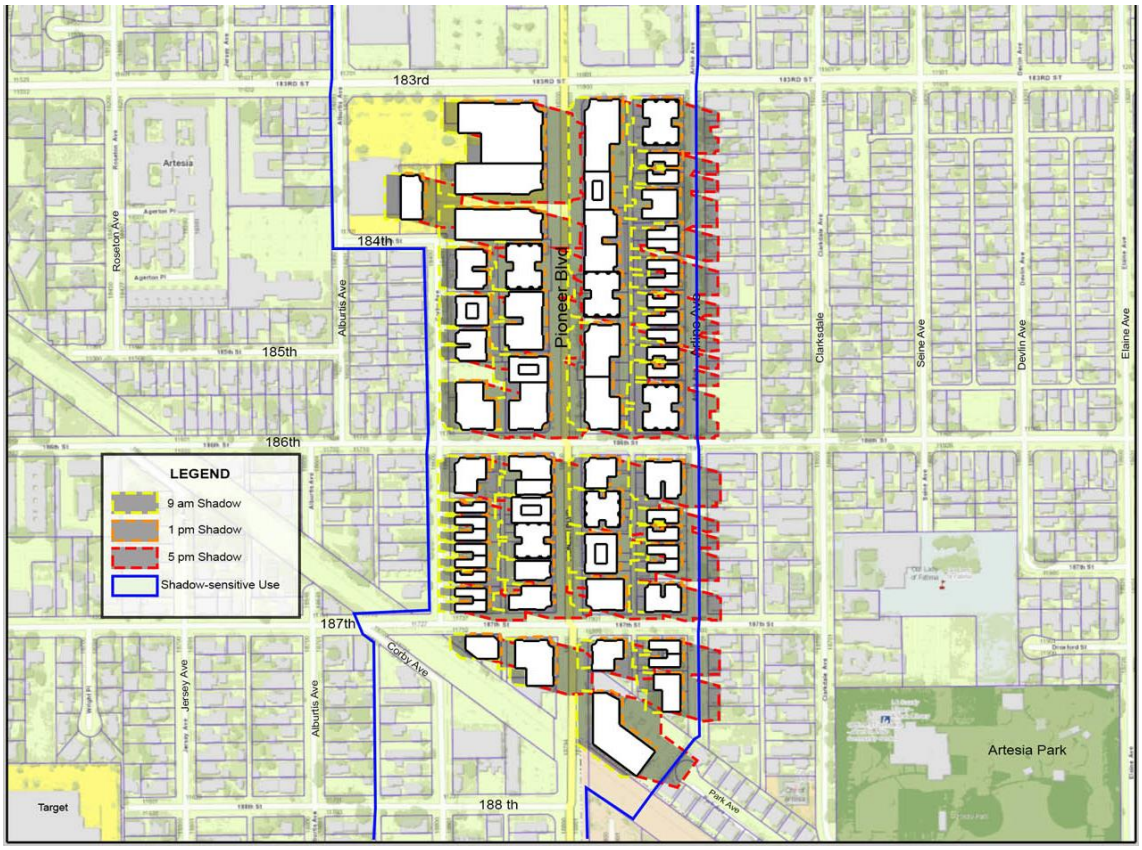


Figure 14 Summer Solstice Shadows

The estimated spring equinox (March 20) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 15. During the spring equinox, the longest shadows (Overlay 2) would be cast up to 75 feet to the north-west in the morning, 37 feet to the north at midday, and 75 feet to the north-east in the afternoon. Between the hours of 9:00 a.m. and 3:00 p.m., the Project would not cast shadows upon any shade sensitive land uses for more than 3 hours.

Because shadows would not be cast onto shade sensitive areas for a period greater than three hours between the hours of 9:00 a.m. and 3:00 p.m., impacts would be less than significant.

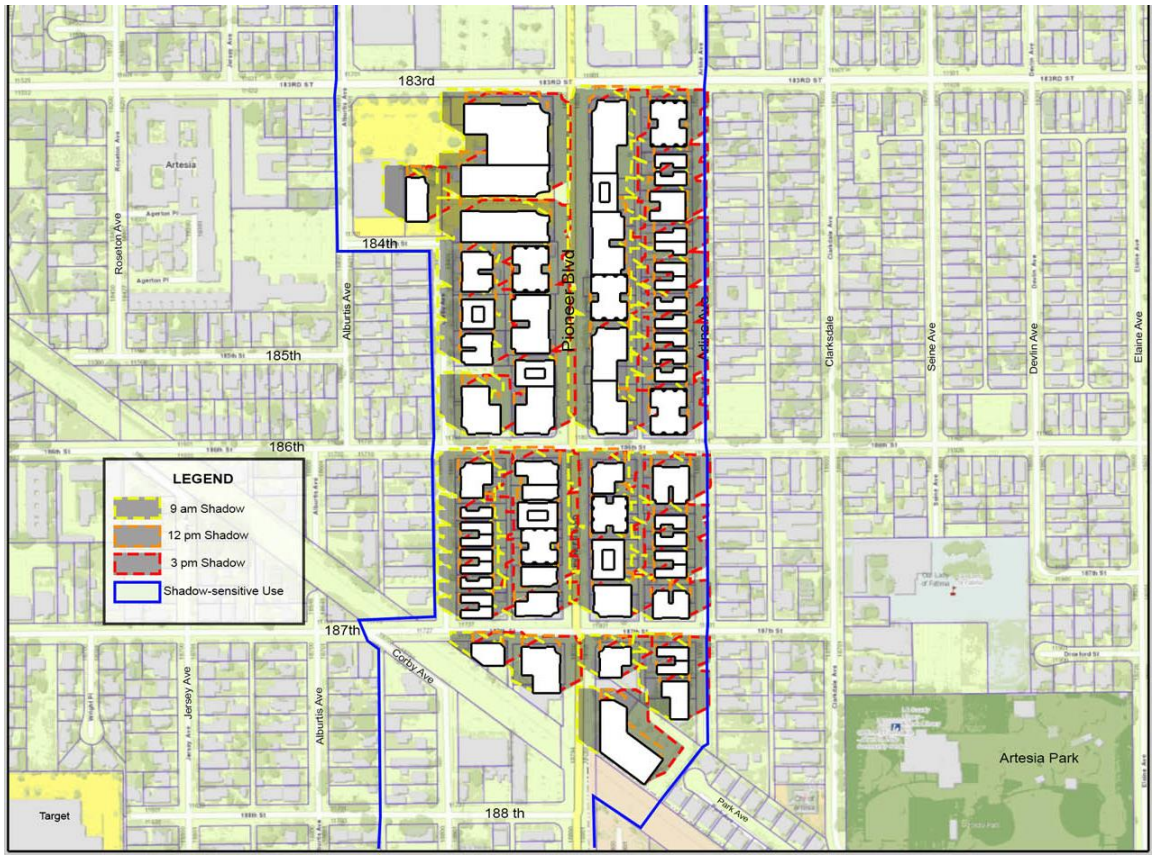


Figure 15 Spring Equinox Shadows

The estimated fall equinox (September 22) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 16. During the fall equinox, shadows would be cast up to 69 feet to the north-west in the morning, 43 feet to the north at midday, and about 341 feet to the east in the afternoon. Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on Arlene Ave, and Clarksdale Ave but for less than 4 hours

Because shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 5:00 p.m., impacts would be less than significant.

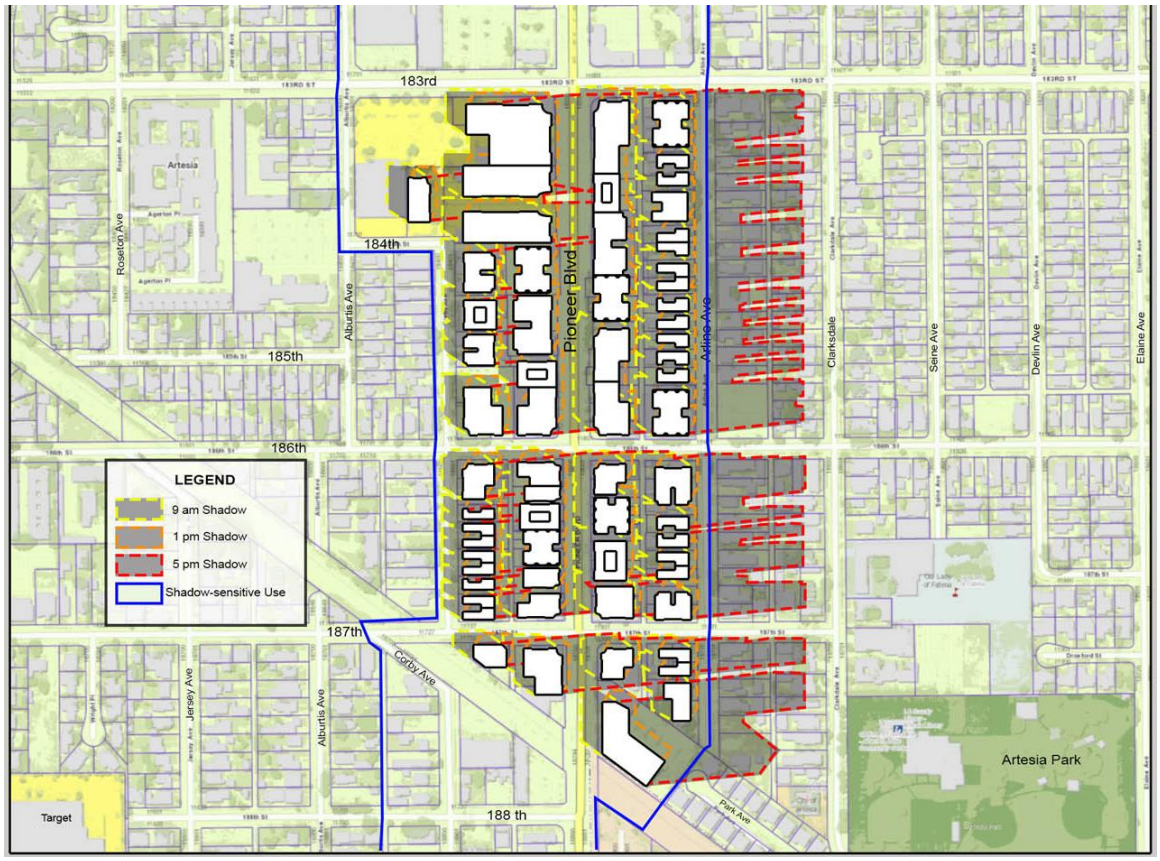


Figure 16 Fall Equinox Shadows

South Street

The subarea along South Street west of Pioneer Blvd. This subarea is proposed to be designated as Overlay Zone 1 (7 stories/75 feet) and Overlay Zone 2 (5 stories/55 feet). Shadow-sensitive uses located within the path of the shadows cast by the proposed project include residential neighborhoods Roseton Ave, Buford St, Chamblee Ave, Halmark Ln, Poseidon Ave, Wyeth Dr, Pioneer Blvd, Solano Pl, Prado Ct, Park Ave, Jersey Ave, Alburtis Ave, and Corby Ave. These are the only shadow-sensitive uses in the direct vicinity of this particular subarea and are, therefore, of particular interest in the shadows analysis.

The estimated winter solstice (December 21) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 17. During the winter solstice, the longest shadows (Overlay 1) would be cast up to 209 feet to the northwest in the morning, 117 feet to the north at midday, and 243 feet to the northeast in the afternoon. Between the hours of 9:00 a.m. and 3:00 p.m., the Project would cast shadows upon portions of a residential property on portions of Roseton Ave, Pioneer Blvd, Solano Pl, Prado Ct, Park Ave, Jersey Ave, Alburtis Ave, and Corby Ave. but mostly for less than 3 hours.

On certain properties along Jersey Ave (18818 – 18829), Alburtis (18802 – 18812),

Corby (18813-18819) shadows will impact portions of these properties for more than three hours. These shadow impacts can be lessened or eliminated under the Reduced Height Project alternative and the No Project alternative. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

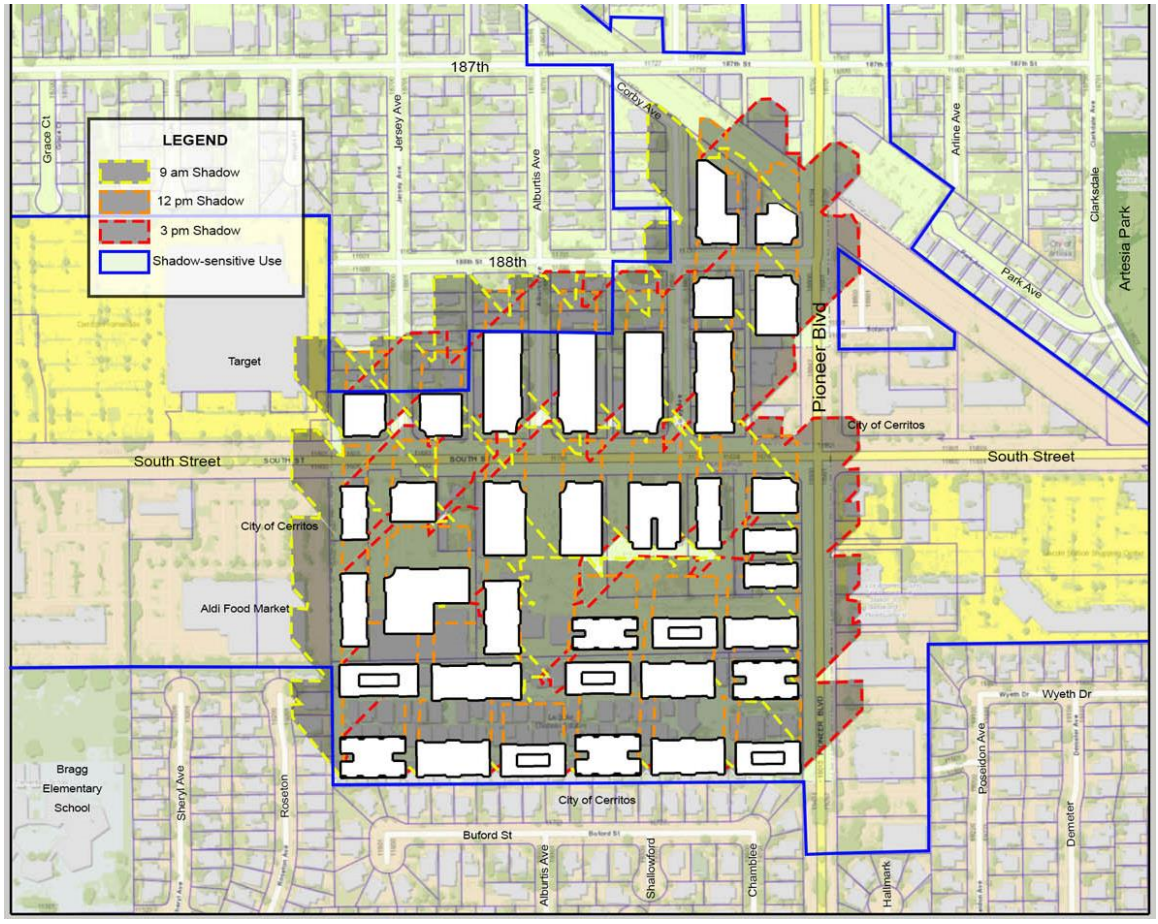


Figure 17 Winter Solstice Shadows

The estimated summer solstice (June 20) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 18. During the summer solstice, longest shadows (Overlay 1) would be cast up to 61 feet to the west in the morning, 24 feet to the north midday, and 172 feet to the east in the afternoon. Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on Roseton Ave, Buford St, Prado Ct and Solano Pl. but for less than 4 hours.

Because summer shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 5:00 p.m., impacts would be less than significant.

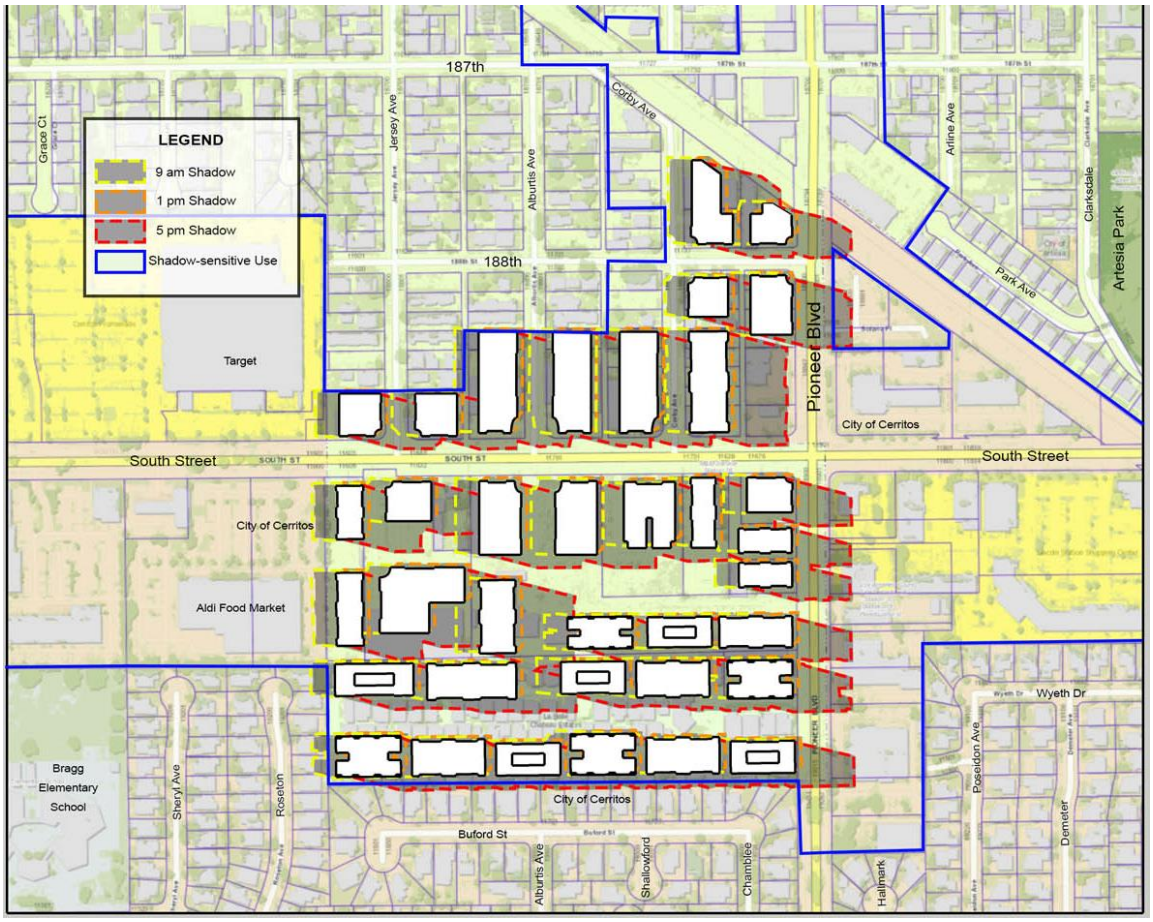


Figure 18 Summer Solstice Shadows

The estimated spring equinox (March 20) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 19. During the spring equinox, the longest shadows (Overlay 1) would be cast up to 103 feet to the north-west in the morning, 50 feet to the north at midday, and 103 feet to the north-east in the afternoon. Project would cast shadows upon portions of a residential property on Roseton Ave, Jersey Ave, Alburtis Ave, and Corby Ave but mostly for less than 3 hours.

Only two properties on Jersey Ave (18828-29) and two properties on Alburtis Ave (18811-12) will be shaded for more than three hours. These shadow impacts can be lessened or eliminated under the Reduced Height Project alternative and the No Project alternative. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

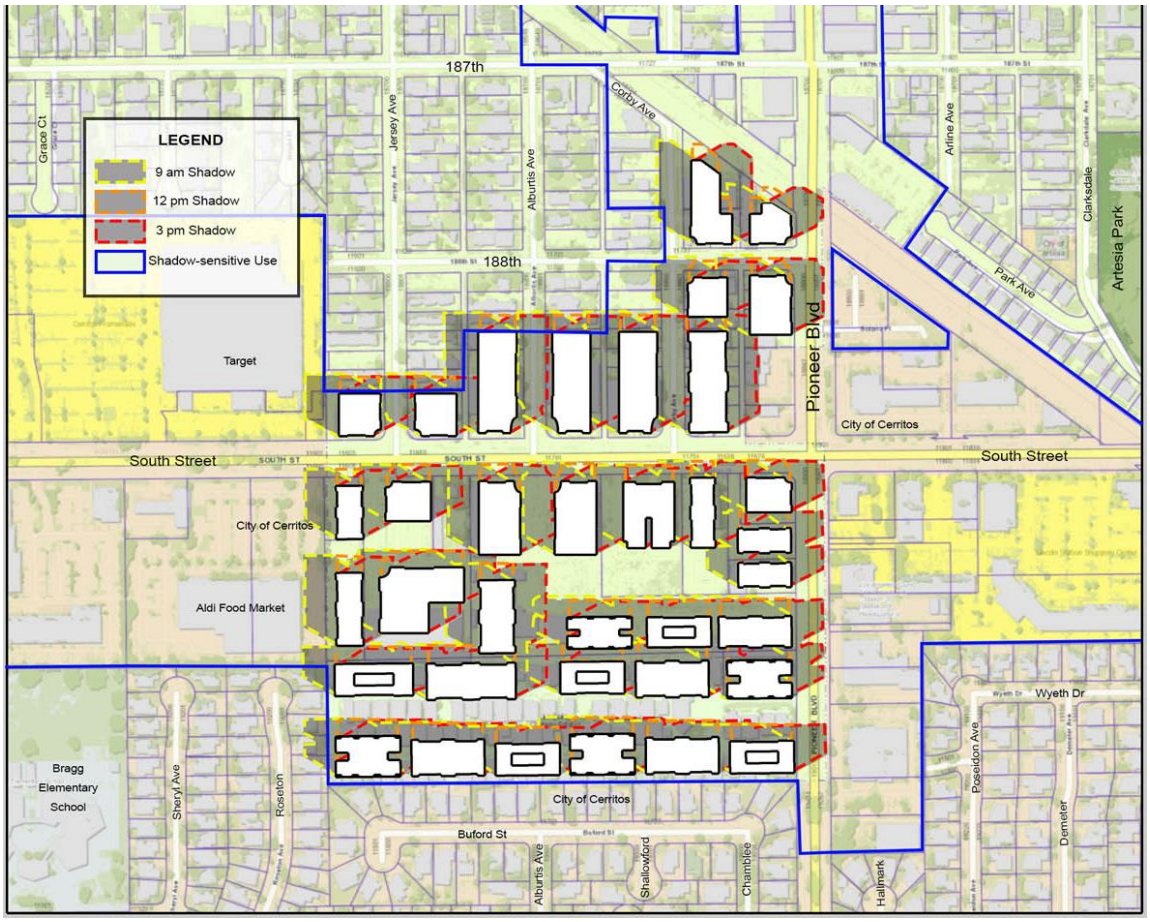


Figure 19 Spring Equinox Shadows

The estimated fall equinox (September 22) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 20. During the fall equinox, shadows would be cast up to 94 feet to the north-west in the morning, 59 feet to the north at midday, and about 465 feet to the east in the afternoon. Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on portions of Roseton Ave, Pioneer Blvd, Solano Pl, Prado Ct, Park Ave, Jersey Ave, Alburtis Ave, Poseidon Ave, Wyeth Dr, Park Ave, and Corby Ave. but mostly for less than 4 hours.

Only two properties on Jersey Ave (18828-29)and two properties on Alburtis Ave (18811-12) will be shaded for more than four hours. These shadow impacts can be lessened or eliminated under the Reduced Height Project alternative and the No Project alternative. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

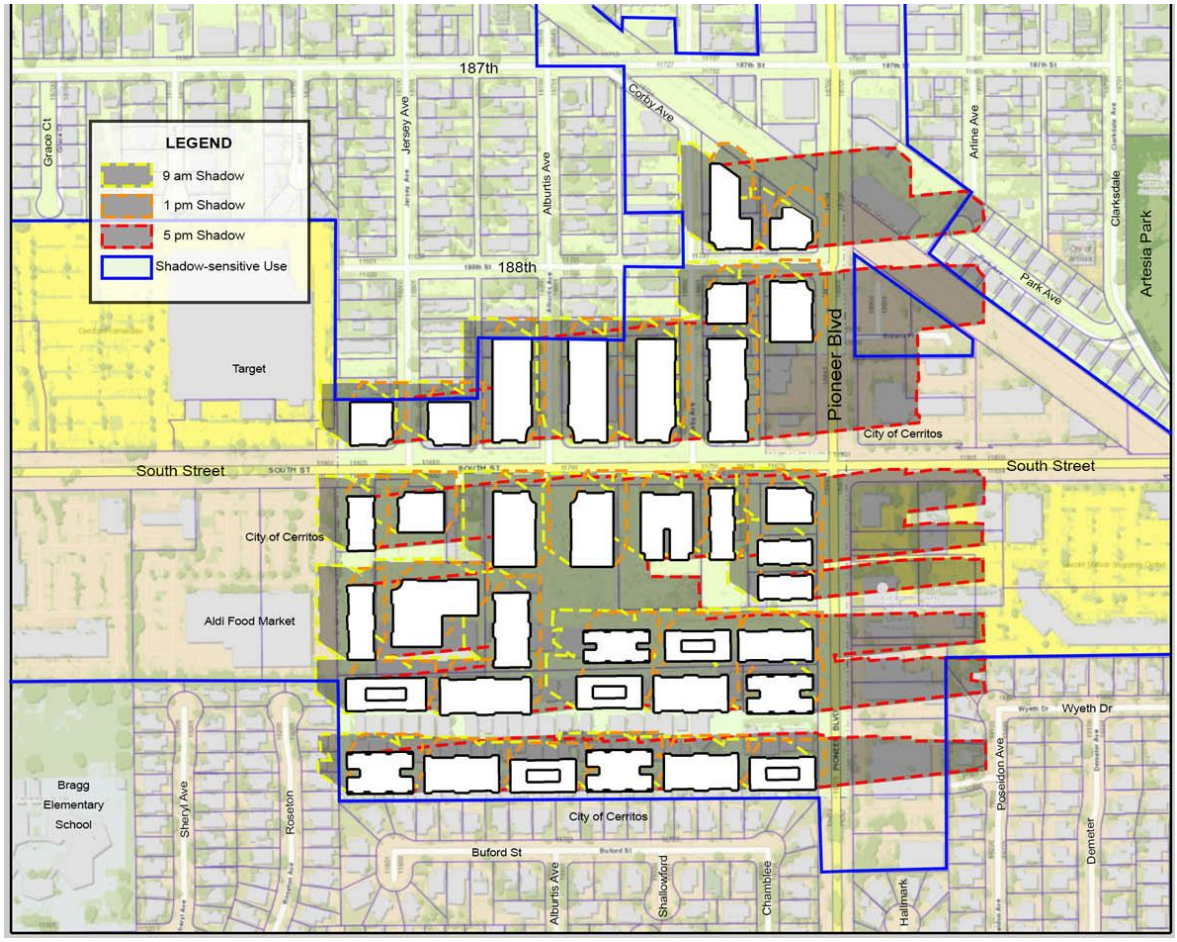


Figure 20 Fall Equinox Shadows

South Street East

This subarea is generally located along South Street east of Pioneer Blvd. to Norwalk Blvd. and includes the land at the intersection of South St and Norwalk Blvd, as well as a triangular area on South St adjacent to the MTA ROW. This subarea is proposed to be designated as Overlay Zone 3 (3 stories/35 feet). Shadow-sensitive uses located within the path of the shadows cast by the proposed project includes adjacent residential neighborhoods, the Cerritos Senior Center, Artesia Park, and the New Life Community Center. These are the only shadow-sensitive uses in the direct vicinity of this particular subarea and are, therefore, of particular interest in the shadows analysis.

The estimated winter solstice (December 21) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 21. During the winter solstice, shadow would be cast up to 97 feet to the northwest in the morning, 55 feet to the north at midday, and 113 feet to the northeast in the afternoon. Between the hours of 9:00 a.m. and 3:00 p.m., the Project would cast shadows upon portions of a residential property on portions of Ibex Ave. north and south of South St, Elaine Ave, Belshire Ave, and Fagan Ave north of South St. and the parking lot of the New Life Community Church. but mostly for less than 3 hours.

Only two homes at the end of the Fagan Ave cul-de-sac (18858 and 18861 Fagan Ave) and the southern-most strip of the New Life Community Church will be shaded for more than 3 hours. These shadow impacts can be lessened or eliminated under the No Project alternative. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

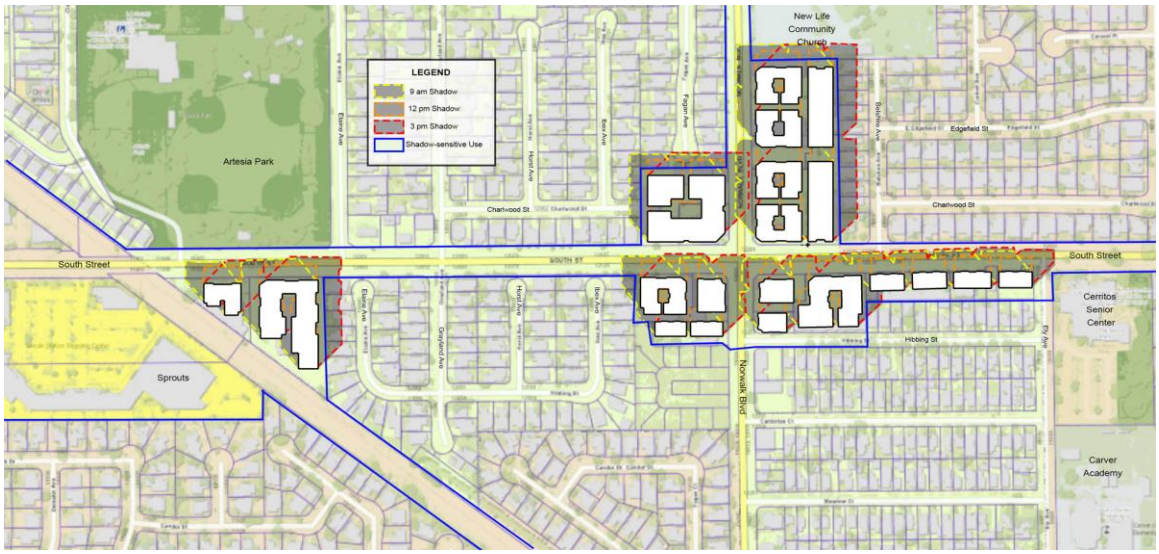


Figure 21 Winter Solstice Shadows

The estimated summer solstice (June 20) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 22. During the summer solstice, shadows would be cast up to 29 feet to the west in the morning, 11 feet to the north midday, and 80 feet to the east in the afternoon. Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on Belshire Ave, Hibbing Ave and Elaine Ave in the afternoon but for less than 4 hours.

Because summer shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 5:00 p.m., impacts would be less than significant.

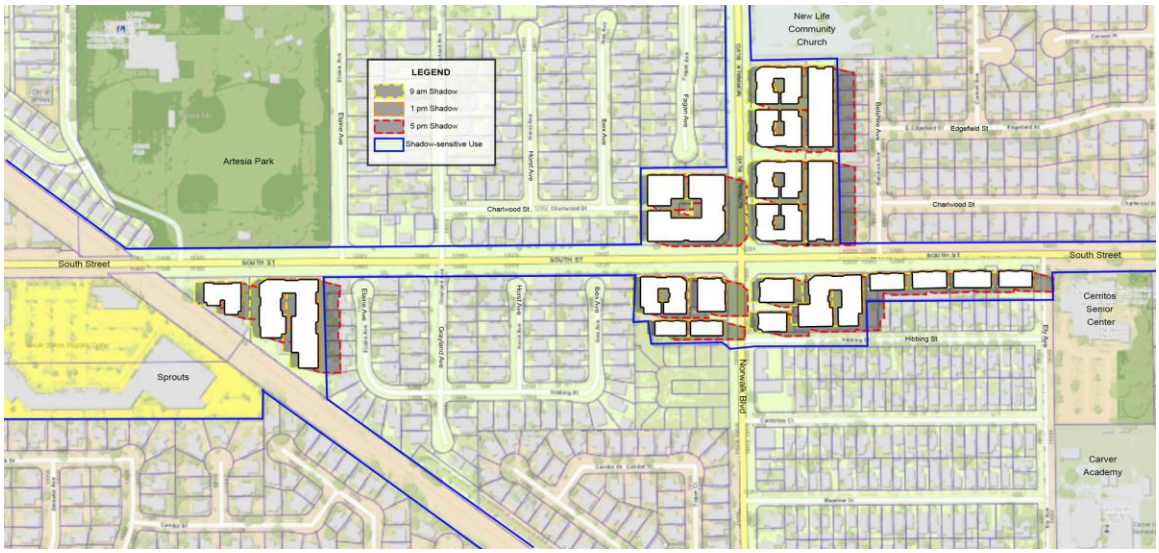


Figure 22 Summer Solstice Shadows

The estimated spring equinox (March 20) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 23. During the spring equinox, shadows would be cast up to 48 feet to the north-west in the morning, 23 feet to the north at midday, and 48 feet to the north-east in the afternoon. Project would cast shadows upon portions of a residential property on Belshire Ave, Hibbing, Charlwood St, Ibex Ave and Elaine Ave but for less than 3 hours.

Because spring shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 3:00 p.m., impacts would be less than significant.

Figure 23 Spring Equinox Shadows

The estimated fall equinox (September 22) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 24. During the fall equinox, shadows

would be cast up to 44 feet to the north-west in the morning, 28 feet to the north at midday, and about 217 feet to the east in the afternoon. Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on portions of Elaine Ave, Belshire Ave, Hibbing St, Charlwood St, Ibex Ave. and the Cerritos Senior Center but for less than 4 hours.

Aerial photographs appear to show the presence of residential rooftop solar panels on a home at 12302 Edgefield St that may be within the shadow path for less than 4 hours. While not within the threshold of significance, this home may potentially be impacted by the Project shadows. These shadow impacts can be lessened or eliminated under the Reduced Height or No Project alternatives. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

Figure 24 Fall Equinox Shadows

Gridley Rd South

This subarea is generally located along east side of Gridley Rd between 187th Street and the MTA ROW. The Los Cerritos Center is located west of the subarea (in the City of Cerritos) along Gridley Rd. This subarea is proposed to be designated as Overlay Zone 3 (3 stories/35 feet) with a smaller Overlay Zone 2 (5 stories/55 feet) consisting of 11423 187th St and extending north to 186th St. Shadow-sensitive uses located within the path of the shadows cast by the proposed project includes nearby residential neighborhoods to the east along 183rd St, 184th St, Summer Ave, 186th St, 187th St, Grace Ct, and West Pl. These are the only shadow-sensitive uses in the direct vicinity of this particular subarea and are, therefore, of particular interest in the shadows analysis.

The estimated winter solstice (December 21) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 25. During the winter solstice, shadow would be cast up to 97 feet to the northwest in the morning and 55 feet to the north at midday for Overlay Zone 3 buildings, and 86 feet to the north at midday and 178 feet to

the northeast in the afternoon for Overlay Zone 2 buildings. Between the hours of 9:00 a.m. and 3:00 p.m., the Project would cast shadows upon portions of a residential property on portions of 184th St, Summer Ln, 186th St, and 187th St. but mostly for less than 3 hours.

A few homes on the south side of 184th St (14440-14428) and the south-west corner of a condominium complex between 14422-14430 186th St will be shaded for more than 3 hours. These shadow impacts can be lessened or eliminated under the Reduced Height or No Project alternatives. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

Figure 25 Winter Solstice Shadows

The estimated summer solstice (June 20) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 26. During the summer solstice, shadows would be cast up to 29 feet to the west in the morning and 11 feet to the north midday (Overlay 3 buildings), and 18 feet to the north at midday and 126 feet to the east in the afternoon (Overlay 2 buildings). Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on Summer Dr, 184th St and 186th St in the afternoon but for less than 4 hours.

Because summer shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 5:00 p.m., impacts would be less than significant.

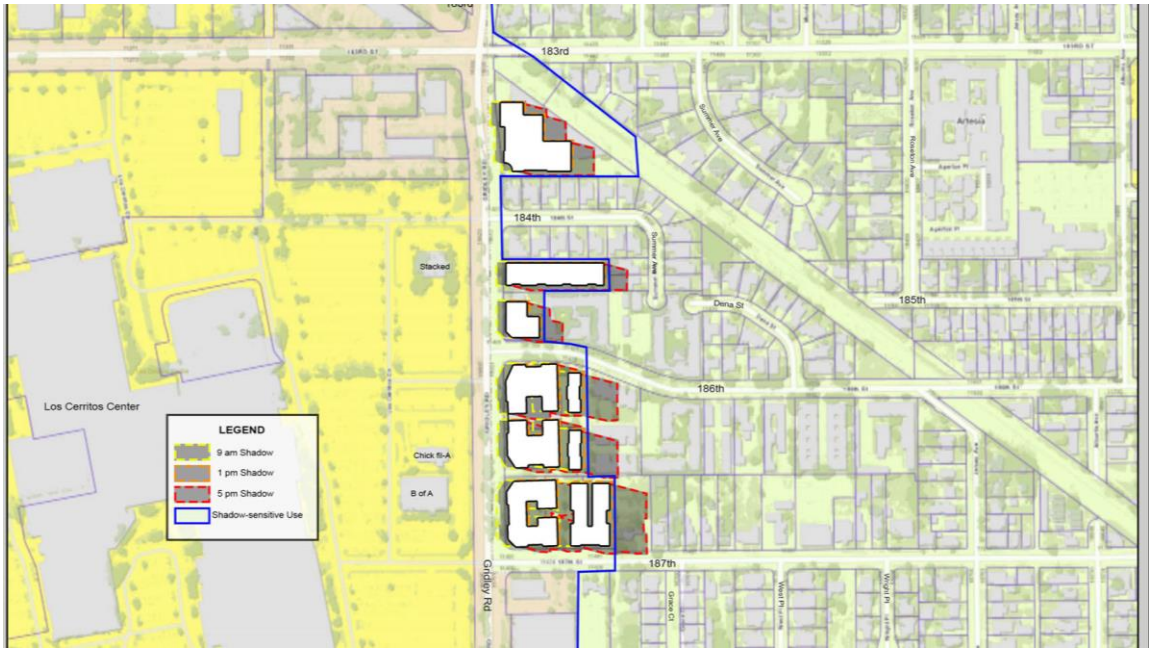


Figure 26 Summer Solstice Shadows

The estimated spring equinox (March 20) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 27. During the spring equinox, shadows would be cast up to 48 feet to the north-west in the morning and 23 feet to the north at midday (Overlay 3 buildings), and 37 feet to the north at midday and 75 feet to the north-east in the afternoon (Overlay 2 buildings). Project would cast shadows upon portions of a residential property on 184th St, Summer Ln, 186th St, and 187th St but for less than 3 hours.

Because spring shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 3:00 p.m., impacts would be less than significant.

Figure 27 Spring Equinox Shadows

The estimated fall equinox (September 22) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 28. During the fall equinox, shadows would be cast up to 44 feet to the north-west in the morning and 28 feet to the north at midday (Overlay 3 buildings), and 43 feet to the north at midday and 341 feet to the east in the afternoon (Overlay 2 buildings). Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on portions of 183rd St, Summer Ln, 186th St, and 187th St but mostly for less than 4 hours.

A narrow strip of the back yards of few homes on the south side of 184th St (14440-14428) might be shaded for more than 4 hours. These shadow impacts can be lessened or eliminated under the Reduced Height or No Project alternatives. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

Figure 28 Fall Equinox Shadows

Gridley Rd and Artesia Blvd

This subarea is generally located at the north-east and south-east corners of Gridley Rd and Artesia Blvd. and extending to Roseton Ave on the south side of Artesia Blvd. This subarea is proposed to be designated as Overlay Zone 3 (3 stories/35 feet) except for the south-west corner of Roseton Ave and Artesia Blvd, which will be designated Overlay Zone 2 (5 stories/55 feet). Shadow-sensitive uses located near the path of the shadows cast by the proposed project includes nearby residential neighborhoods Baber Ave, Caine Dr, Summer Ave, and Maidstone Ave. These are the only shadow-sensitive uses in the direct vicinity of this particular subarea and are, therefore, of particular interest in the shadows analysis.

The estimated winter solstice (December 21) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 29. During the winter solstice, shadow would be cast up to 97 feet to the northwest in the morning and 55 feet to the north at midday for Overlay Zone 3 buildings, and 86 feet to the north at midday and 178 feet to the northeast in the afternoon for Overlay Zone 2 buildings at Roseton Ave/Artesia Blvd. Between the hours of 9:00 a.m. and 3:00 p.m., the Project would cast shadows upon portions of a residential property on portions of Caine Dr and Baber Ave.

Three homes at the end of the Baber Ave cul-de-sac (17313, 17314, and 17319) and one home on Caine Dr (17355) will be shaded for more than 3 hours. These shadow impacts can be lessened or eliminated under the Reduced Height or No Project alternatives. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

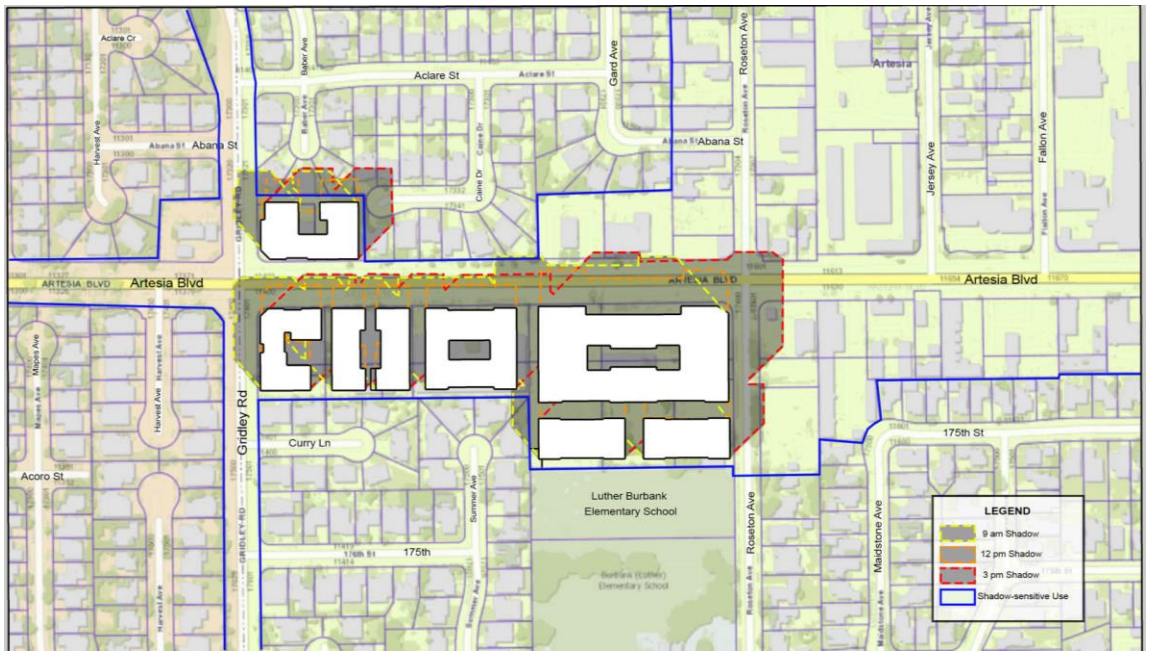


Figure 29 Winter Solstice Shadows

The estimated summer solstice (June 20) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 30. During the summer solstice, shadows would be cast up to 29 feet to the west in the morning and 11 feet to the north midday (Overlay 3 buildings), and 18 feet to the north at midday and 126 feet to the east in the afternoon (Overlay 2 buildings). Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon portions of a residential property on Summer Dr, 184th St and 186th St in the afternoon but for less than 4 hours.

Because summer shadows would not be cast onto shade sensitive areas for a period greater than four hours between the hours of 9:00 a.m. and 5:00 p.m., impacts would be less than significant.

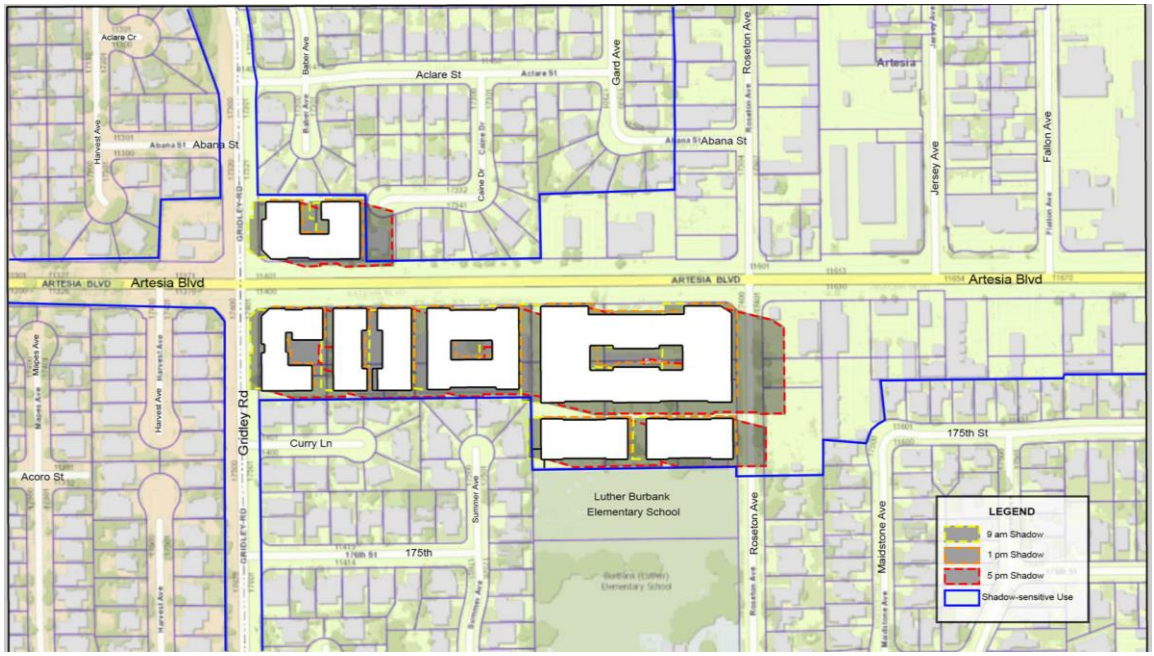


Figure 30 Summer Solstice Shadows

The estimated spring equinox (March 20) shadows generated by the proposed Project at 9 am, 12 pm, and 3 pm are illustrated on Figure 31. During the spring equinox, shadows would be cast up to 48 feet to the north-west in the morning and 23 feet to the north at midday (Overlay 3 buildings), and 37 feet to the north at midday and 75 feet to the north-east in the afternoon (Overlay 2 buildings). Project would cast shadows upon portions of a residential property on Caine Dr but for less than 3 hours.

A very narrow portion of the back yards of 3 homes at the end of the Baber Ave cul-de-sac (17313, 17314, and 17319) would be shaded for more than 3 hours. These shadow impacts can be lessened or eliminated under the Reduced Height or No Project alternatives. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development

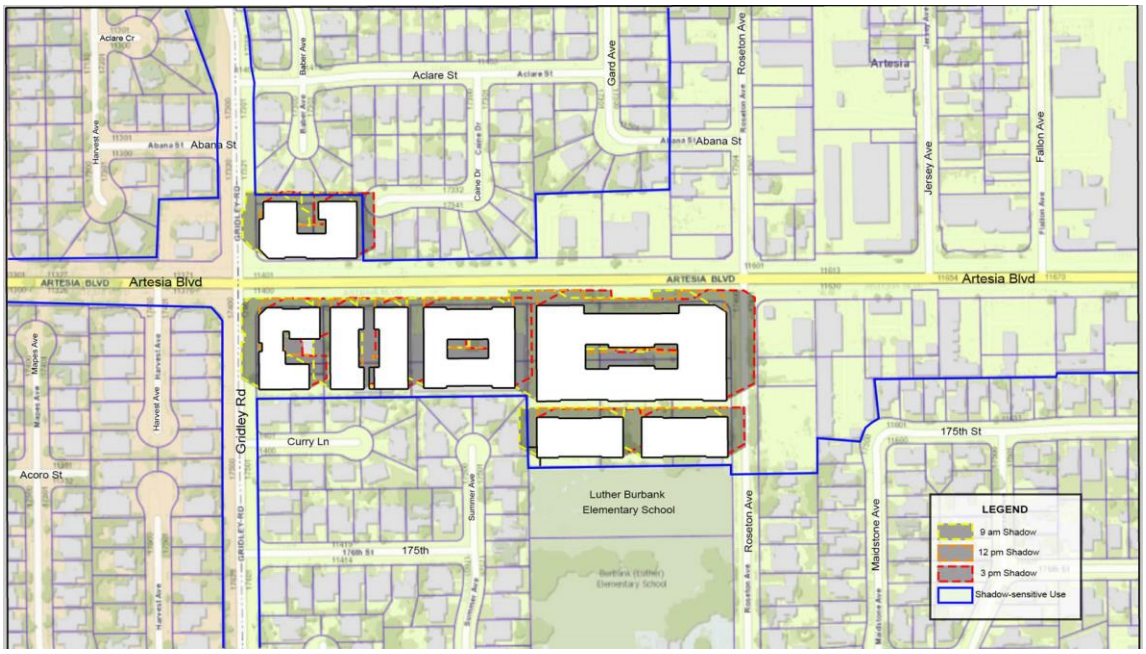


Figure 31 Spring Equinox Shadows

The estimated fall equinox (September 22) shadows generated by the proposed Project at 9 am, 1 pm, and 5 pm are illustrated on Figure 32. During the fall equinox, shadows would be cast up to 44 feet to the north-west in the morning and 28 feet to the north at midday (Overlay 3 buildings), and 43 feet to the north at midday and 341 feet to the east in the afternoon (Overlay 2 buildings). Between the hours of 9:00 a.m. and 5:00 p.m., the Project would cast shadows upon narrow portions of a residential property on portions of Maidstone Ave, Caine Dr. and Baber Ave but mostly for less than 4 hours.

A narrow strip of the back yards of few homes at the end of Baber Ave (14440-14428) might be shaded for more than 4 hours. These shadow impacts can be lessened or eliminated under the Reduced Height or No Project alternatives. Alternatively, shade/shadow impacts can be lessened to a level less than significant by increasing setbacks and/or stepping back upper levels through the development review/approval process.

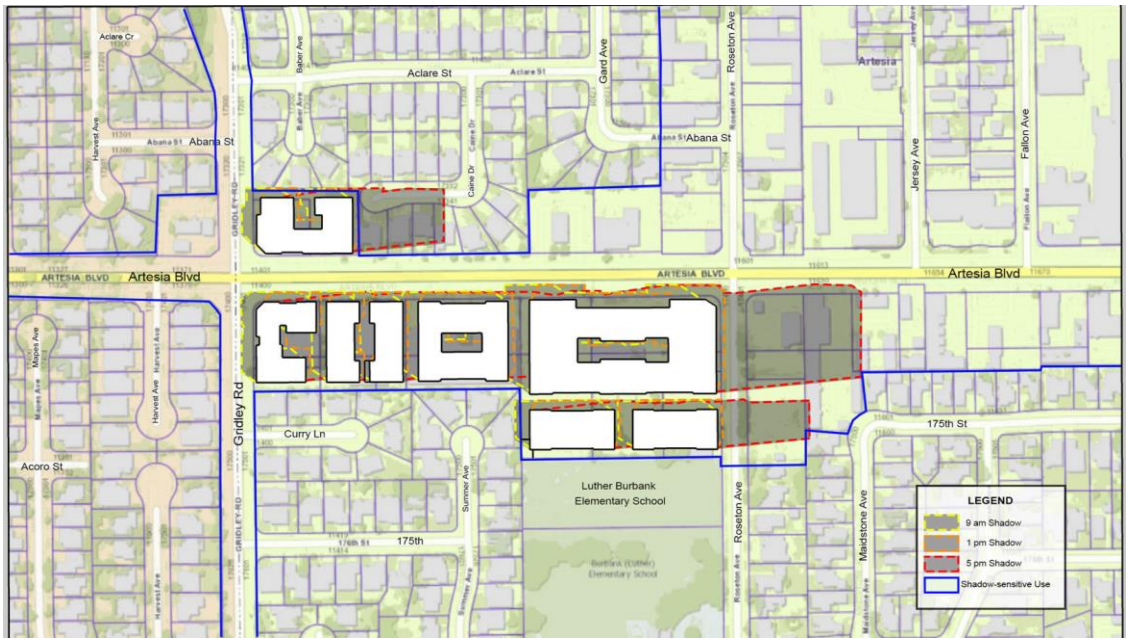


Figure 32 Fall Equinox Shadows

Significant Shade and Shadow Impacts

While potential construction of the proposed Project would result in new shadows being cast on shadow sensitive uses, the project is being constructed in an urban environment mainly along the City's major commercial corridors. As such, while new shading and shadow patterns would occur, impacts would generally be less than significant.

In a few instances, shading would occur on shadow sensitive uses for periods of time greater than three hours between 9am and 3pm during the Winter Solstice and Spring Equinox, and for periods greater than four hours between 9am and 5pm during the Summer Solstice and Fall Equinox. The occurrences of "significant impacts" are listed below:

Pioneer Blvd North of the 91 Freeway

Winter (Figure 1)
Between the hours of 9:00 a.m. and 12:00 p.m., the Project would cast shadows upon a small portion (south-east corner) of the Cerritos Mobile Lodge on 166th Street for more than 3 hours. Single-family homes at 11224 -11660 166th Street would experience shadows for more than 3 hours in the morning. In the afternoon, shadows are cast over the a residentially zoned property at 11224 166th Street for more than 3 hours (between 12pm and 3pm).

Summer (Figure 2)
A narrow portion of the side yards of existing residentially zoned properties immediately

east at 11839 168th St and 11836 167th St might be shaded for a period of greater than four hours between the hours of 1:00 p.m. and 5:00 p.m.

Fall (Figure 4)
Portions of the side yards of existing residentially zoned properties immediately east of the subarea at 11839 168th St and 11836 167th St would be shaded for a period of greater than four hours between the hours of 1:00 p.m. and 5:00 p.m.

Pioneer Blvd South of the 91 Freeway

Fall (Figure 8)
A medical office building (Cerritos Medical Center) at the northeast corner of Artesia Blvd and Clarkdale Ave will be shaded for less than 4 hours (approximate 1.5 hours). While less than the 4 hour threshold of significance, this building appears to have an array of rooftop solar panels that could potentially be impacted.

Pioneer Blvd North of 183rd Street

Winter (Figure 9)
Two properties (18020 Alburtis and 11829 Ashworth St) would experience shadows for periods greater than 3 hours.

Pioneer Blvd South of 183rd Street

Winter (Figure 13)
The Pioneer Cash and Carry store 11700 183rd Street is within the shadow path but for less than three hours. However, aerial photographs appear to show an array of rooftop solar panels on this building which could potentially be impacted.

South Street

Winter (Figure 17)
On certain properties along Jersey Ave (18818 – 18829), Alburtis (18802 – 18812), Corby (18813-18819) shadows will impact portions of these properties for more than three hours.

Spring (Figure 19)
Only two properties on Jersey Ave (18828-29) and two properties on Alburtis Ave (18811-12) will be shaded for more than three hours.

Fall (Figure 20)
Only two properties on Jersey Ave (18828-29) and two properties on Alburtis Ave (18811-12) will be shaded for more than four hours.

South Street East

Winter (Figure 21)
Only two homes at the end of the Fagan Ave cul-de-sac (18858 and 18861 Fagan Ave) and the southern-most strip of the New Life Community Church will be shaded for more than 3 hours.

Fall (Figure 24)
Aerial photographs appear to show the presence of residential rooftop solar panels on a home at 12302 Edgefield St that may be within the shadow path for less than 4 hours. While not within the 4 hour threshold of significance, this home may potentially be impacted by the Project shadows.

Gridley Rd South

Winter (Figure 25)
A few homes on the south side of 184th St (14440-14428) and the south-west corner of a condominium complex between 14422-14430 186th St will be shaded for more than 3 hours.

Fall (Figure 28)
A narrow strip of the back yards of few homes on the south side of 184th St (14440-14428) might be shaded for more than 4 hours.

Gridley Rd and Artesia Blvd

Winter (Figure 29)
Three homes at the end of the Baber Ave cul-de-sac (17313, 17314, and 17319) and one home on Caine Dr (17355) will be shaded for more than 3 hours.

Spring (Figure 31)
A very narrow portion of the back yards of 3 homes at the end of the Baber Ave cul-de-sac (17313, 17314, and 17319) would be shaded for more than 3 hours.

Fall (Figure 32)
A narrow strip of the back yards of few homes at the end of Baber Ave (14440-14428) might be shaded for more than 4 hours.

Mitigation of Significant Impacts

In the instances identified above, shadow impacts can be lessened or eliminated under the Reduced Height or No Project alternatives.

Alternatively, shade/shadow impacts can be lessened to a level of "less than significant" by increasing building setbacks and/or stepping back upper levels of the building. A process can be enacted through the City's development review/approval process, whereby a project proponent first submits a 3D "building envelope" massing model with

shadows of the site and adjacent properties. If shadows are cast on adjacent shade sensitive uses for more that three hours during the winter and spring, and/or four hours during the summer or fall, the project proponent will be given the opportunity to adjust the building envelope (i.e. setbacks and/or height). Once the shadows cast by the 3D massing model are deemed “less than significant” by the City, the project proponent will be allowed to proceed to the next step in the approval process so long as the actual building is contained within the approved building envelope.

Attachments:

- Exhibit A - Shade/Shadow diagrams for Project and Alternatives