Appendix A
Lighting Technical Report

ESA

Morningside Highschool Site Upgrade
Inglewood, CA

Lighting

Technical Report

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September 2022

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1. Introduction

This Lighting Technical Report (Report) evaluates the potential lighting impacts created by the Morningside Highschool Site Upgrade (Project) which involves the redevelopment of 19.1-acre (832,925 square foot) of Morningside Highschool (Property) and its existing athletic facilities, for use as an athletic and recreational fields/courts for the Morningside Highschool (School).

The Project would remove existing Morningside Highschool classrooms, buildings, and sports facilities to develop and/or replace one athletic field with bleacher seating, a nine-lane running track surrounding the aforementioned field, six tennis courts with seating, a baseball field with bleacher seating, and a softball field with bleacher seating. The Project would include ancillary field buildings, exterior light poles, fencing, and retention of the existing school buildings.

The Project is located between Yukon Avenue to the west, W 104th Street to the north, W 108th Steet to the south, Monroe Middle School and Crenshaw Boulevard to the east, and Los Angeles Fire Department (LAFD) Fire Station 170 to the southeast in Inglewood, California. This Report describes the existing environmental setting, identifies the applicable ordinances, regulations, and statutes, and evaluates potential lighting impacts on adjacent light sensitive receptors based on the applicable ordinances, regulations, and statutes. Light sensitive receptors include any space and/or use in which a user would be adversely affected by a significant increase in lighting levels. Such spaces include residential units or facilities where users may reside temporarily like hotels and nursing facilities.

2. Project Location

The Project Site is located at 10500 Yukon Avenue South, Inglewood, CA 90303 as a part of Los Angeles County (City). The Project Site is generally bounded by Yukon Avenue to the west, W 104th Street to the north, W 108th Street to the south, Crenshaw Boulevard to the east, and LAFD Fire Station 170 to the southeast.

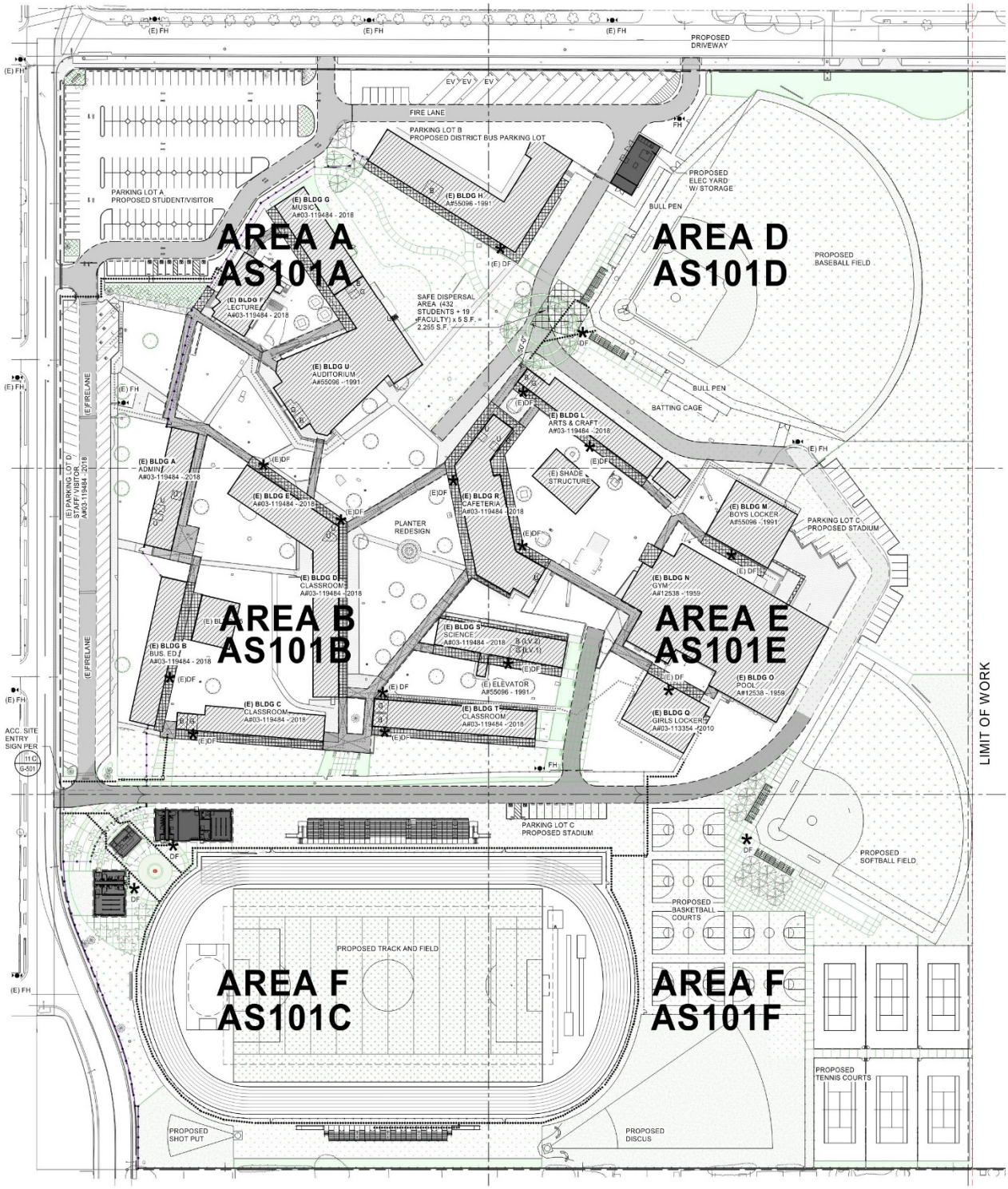


Figure 1- Project Development Area Map

3. Project Description

Morningside Highschool (School) is proposing to repurpose their existing site currently occupied by existing classrooms, ancillary buildings, and dated athletic and recreational facilities, for updated athletic and recreational facilities for its students and employees.

The Project would include:

- One athletic track & field with bleacher seating located in proximity to W 108th Street in the southwest sector of the Project Site along with field houses for maintenance and storage near the athletic track & field.

- One baseball field with bleacher seating and dug outs located in proximity to W 104th Street in the northeast sector of the Project Site with field houses for maintenance and storage near the baseball field.

- One softball field with bleacher seating located in between W 104th Street and W 108th Street in the east sector of the Project Site near the Limit of Work Line.

- Six tennis courts with seats located in proximity to W 108th Street in the southeast sector of the Project Site.

- Six basketball courts located to the west of the tennis courts.

Lighting and Signage

The Project would provide lighting and signage for outdoor athletic events and activities during the evening hours and pedestrian scale lighting along pathways 16-feet or less in height, in the surface parking area, and in entrance areas for security and wayfinding purposes. Locations of field lights for athletic activities are illustrated in **Figure** 2 – *Light Plan for the Project*, below. Field lights shown in Figure 2 would utilize Light Emitting Diode (LED) technology, timer controls, and shields directed only to the use intended to be illuminated to prevent spillover and glare and, as with all other exterior lighting, would be designed to comply with Los Angeles Municipal Code (LAMC). As required by LAMC Section 93.0117(b), exterior light sources and building materials would be designed such that they would not cause more than two footcandles of lighting intensity or generate direct glare onto nearby sensitive uses (i.e., residential uses).

As shown in Figure 2, the proposed Football, Track and Field will be illuminated with four 90-foot poles equally spaced near each corner of the facility. The proposed Baseball Field will utilize two 70-foot-tall field light poles along the northwest baseline, two 70-foot-tall field light poles along the southwest baseline, and two 70-foot-tall field light poles along the east outfield boundary. The proposed Softball Field will use two 70-foot poles along each baseline in the outfield and two 60-foot poles behind bleachers at the back of home plate. Finally, the proposed Tennis Courts will have three illuminated courts from four 50-foot poles at each corner of row of courts. All proposed scoreboards will be illuminated by LED light sources and numbering and should be capable of reducing output (dimming) with a daylight sensor for reduced nighttime output. The LED scoreboards would comply with LAMC Section 14.4.4 requirements which limit light intensity from signage to no more than three footcandles above ambient lighting at residential property boundaries.

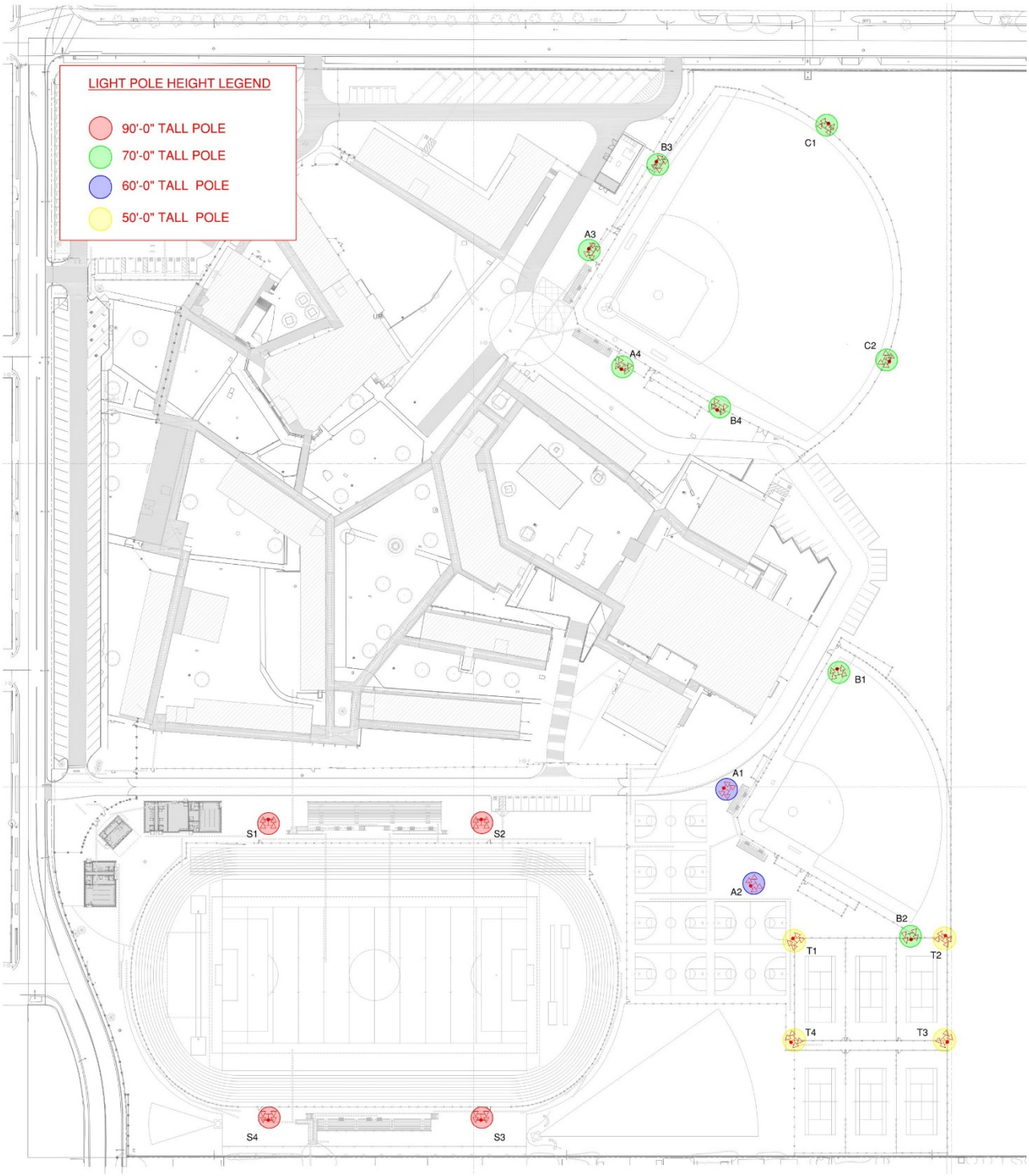


Figure 2 - Lighting Plan for the Project

4. Environmental Setting

Project Adjacent Existing Conditions

The Project Site is adjacent to residential neighborhoods to the south and west. These include limited multi-family neighborhoods in the R2 zone along the west side of Yukon Avenue directly West of the Project Site and along both the north and south sides of West 108th Street to the south of the Project Site. Commercial, manufacturing, and residential zones occupy the north side of West 104th Street which is north of the Project Site. Along the west side property line of the Project Site is Monroe middle school and additional R3 zone multi-family residential to the west of Two single-family homes in the R1 zone are located to the west of Monroe middle school. The surrounding residential neighborhoods are developed, with residential neighborhoods continuing north to the nearest commercial uses to the north along Yukon Avenue and Crenshaw Boulevard, approximately 0.25 miles north of the Project Site. Adjoining the southeast corner of the Project Site, LAFD Fire Station 170 is located at the west side of Crenshaw Boulevard, in between West 104th Street and West 108th Street.

The immediate area surrounding the Project Site is subject to the similarly high levels of nighttime illumination as found within busy commercial areas nearby. Street lighting and residential building lighting comprises most of the lighting sources on the immediate bounding streets. Vehicle headlights and illuminated signage also contribute to the nighttime lighting conditions and environment. Street lighting was found to be comprised of high-pressure sodium cobra-head style poles and updated LED fixtures of a similar style. The street lighting fixtures illuminated the streets but also provided enough lighting on the adjacent sidewalks to be adequately traveled.

Commercial properties to the south and north of West Century Boulevard is highly activated at night. The Boulevard is heavily trafficked with vehicles using the road to access the many commercial uses or to traverse across the area along the busy connector. West Century Boulevard is lined with retail stores, a wide variety of restaurants, as well as other commercial uses. These building uses high levels of illumination from signage, building lighting, internal and external functional and display lighting, and parking lot lighting. This all contributes to a high level of nighttime illumination along the corridor.

As most of the Project Site's neighboring properties to the south, east, and west are comprised of residential uses, they are considered sensitive receptors to glare and lighting trespass from new development, as outlined in the LAMC. For the purpose of this Report, eight locations have been evaluated for lighting and glare impacts relative to the existing and new conditions (Figure 3). These locations have been selected as their proximity and views makes them the likeliest to be affected by any increase in lighting levels from the Project Site.

Survey of Existing Conditions

On May 24, 2022, at 8:40 PM, a site visit was conducted at the Project Site to gather data on the relative brightness of the existing lighting fixtures on the Property as well as document the surrounding conditions, including the balance of the Project Site and adjacent neighborhoods. The weather was clear, and the sun set at 7:54 PM.

There are currently no existing sports-related lighting pole fixtures, however, luminance and illuminance readings were taken from the brightest sources of the Project Site's building mounted flood lights and parking lot poles along the south property edge as well as roadway poles along Yukon Avenue and West 104th Street. The existing building mounted lighting consists of retrofit LED flood lights that have been tilted up an estimated 30-degrees to illuminate the Project Site more evenly. This upward tilt, however, makes the light source more visible from surrounding viewpoints which creates measurable glare as documented below in the findings.

The existing parking lot is outfitted with LED cobra-head style light fixtures mounted in a two-head configuration along the east side of Yukon Avenue to illuminate Yukon Avenue as well as the Project Site existing parking lot. The LED fixtures have some optical control to provide illumination for the parking lot with minimal spill, and the fixtures are parallel to the ground, so off-site glare is limited.

The existing conditions were surveyed from many locations surrounding the Project Site to gather a Project baseline and document high luminance (i.e., glare) affected areas. As described earlier, eight different locations were documented from the surrounding areas to create a broad picture of the existing conditions on the Project Site. These locations include the seven sensitive receptors shown in Figure 3 as well as an additional location that had a good view of the Project Site. All survey locations have been documented in Figure 4, below, and the readings are shown in Table 1. All the measurements were taken after the sun had set in conformity with standard practice and regulations, and the twilight period following sunset had ended, eliminating the chance of additional sky glow affecting the readings. The measurements were taken using a Minolta luminance meter, which measures candelas/square meter (cd/m^2), and from the viewpoint of a pedestrian at ground level to the nearest light fixture on the Project Site.

Measured Existing Luminance				
Receptor (* = Sensitive)	**Location**	**Luminance (cd/m^2)**	**Light Source**	**Measurement Taken From**
1*	3601 W 105th St.	3500	Yukon Ave Streetlight	Pedestrian Sidewalk
		493	Parking Lot Light	Pedestrian Sidewalk
2*	10529 Yukon Ave S.	1283	Building Mounted Floodlight	Pedestrian Sidewalk
3*	10629 Yukon Ave S	500	Building Mounted Floodlight	Pedestrian Sidewalk
4*	10500 Yukon Ave S / South Property Edge	245	Building Mounted Floodlight	South Property Edge
5*	10500 Yukon Ave S / South Property Edge	250	Building Mounted Floodlight	South Property Edge
6	10500 Yukon Ave S / East Property Edge	281	Building Mounted Floodlight	East Property Edge
7*	3401-3405 W 104th St	29610	Parking Lot Light	Pedestrian Sidewalk
8*	3409 W 104th St	15580	Putting Green Floodlights	Side Pedestrian Entry

Table 1 - Measured Existing Luminance

The highest single value was recorded on West 104th Street, receptor 7. This location had the nearest proximity to nearby electrical post mounted parking lot light fixtures which were mounted at a lower elevation, providing a very direct view into the lighting fixtures. The distance and clear view returned the highest luminance values of any location surveyed.

Reference Approximate Luminance Values of common sources in cd/m^2:

Lightning flash	68,000,000,000	Cloud (sunny day)	35,000
Sun	1,600,000,000	Fluorescent lamp	12,000-14,000
Arc lamp	150,000,000	White illuminated cloud	10,000
Metal halide lamp	5,300,000	60 watt soft-white bulb	10,000
Clear incandescent lamp	2,000,000	Convenience store sign	150
Frosted incandescent lamp	50,000-400,000	Candle	7.5
Maximum visual tolerance	50,000	Moon	2.5

Figure 3 - Site Map and nearby sensitive receptors

Figure 4 - Existing Conditions Map and Light Measurement Locations

The existing lighting fixtures that were identified as viewable from the receptor locations were surveyed for quantity, approximate wattage, and fixture style to create a photometric calculation simulation of the existing conditions. Using the lighting fixture data collected from the facility, a calculation model was created to best approximate the conditions and allow for off-site lighting effects to be demonstrated graphically to support the on-site reading taken during the survey. Figure 5 below demonstrates the illuminance impacts that the existing Morningside Highschool lighting and surrounding roadway lighting creates on the surrounding areas. The school has many other lighting sources on the buildings around campus to support circulation, however these lights were well controlled and not impacting any of the receptor locations in a measurable way. As such, only the lighting that was considered impactful to surrounding areas is represented in the calculation. The blue isoline represents the extent of measurable lighting that is produced by lighting sources on the existing Project Site. As demonstrated, the existing roadway lighting extends well beyond the Project Site boundary into the neighboring sites. This simulation does not account for landscape, changes in elevation, intervening structures, or geography of the Project Site that might reduce lighting views to some areas. While conservative in nature, this methodology was selected since it matches the study methodology of the Project's proposed lighting, which will be discussed later in this Report.

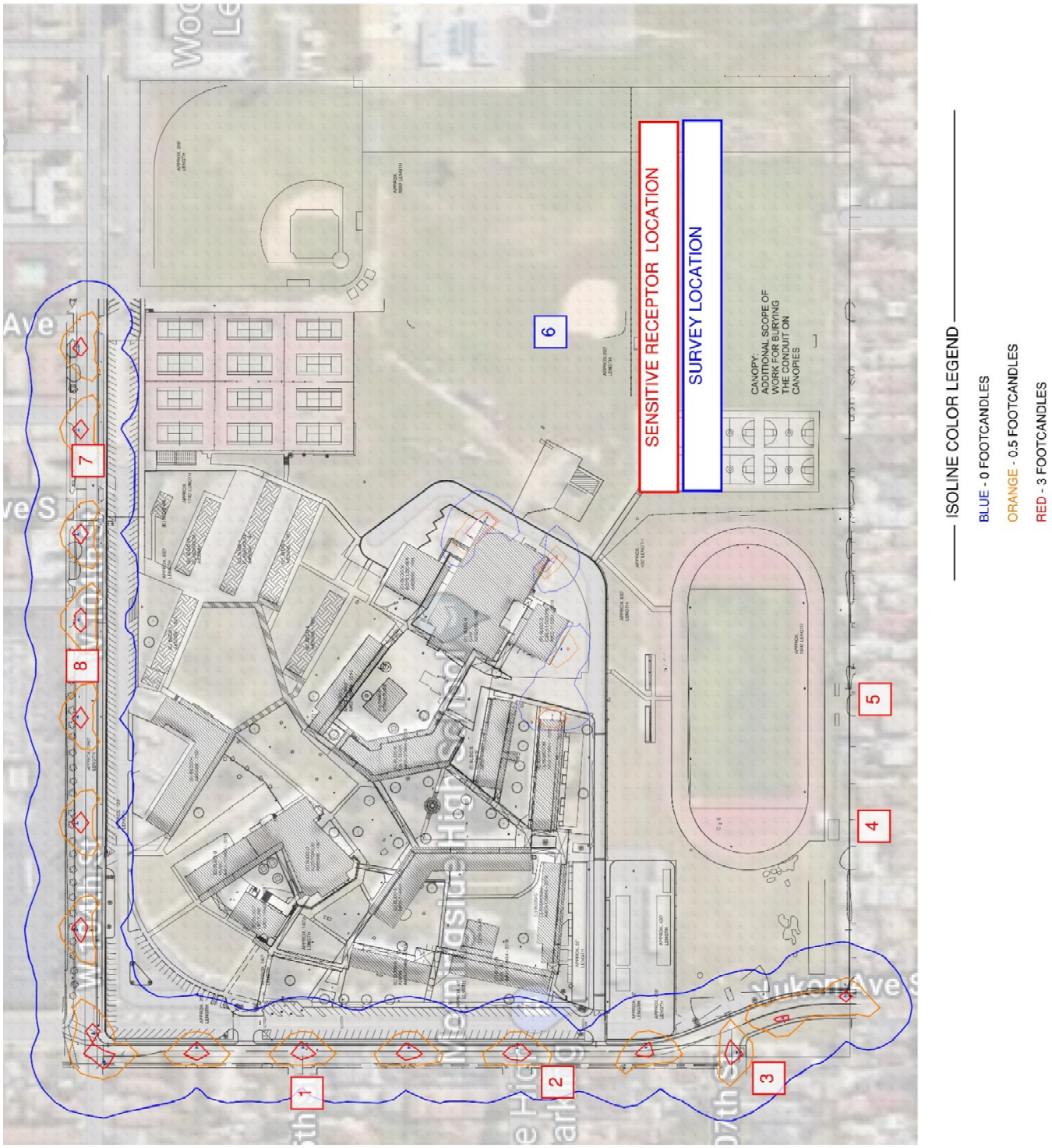


Figure 5 – Existing Off-Site Illuminance

5. Existing Regulatory Framework

Los Angeles Municipal Code

SECTION 93.0117

No exterior light source may cause more than two footcandles of lighting intensity or generate direct glare onto exterior glazed windows or glass doors; elevated habitable porch, deck, or balcony; or any ground surface intended for uses such as recreation, barbecue or lawn areas or any other property containing a residential unit or units.

6. Environmental Thresholds of Significance and Lighting Standards

Appendix G of the California Environmental Quality Act (CEQA) Guidelines includes a question to assist in determining whether increased illuminance or luminance due to the Project might constitute a significant impact. The City uses this question as its threshold of significance for evaluating impacts under CEQA. The threshold of significance indicates that a project would have a significant impact related to lighting if it would ***"Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area."*** As this threshold derived from Appendix G of the CEQA Guidelines does not provide a specific value or standard for determining significance, the following standards from the LAMC are used to inform the determination of impact significance:

- Per LAMC Section 93.0117, no exterior light source may cause more than two footcandles of lighting intensity or generate direct glare onto exterior glazed windows or glass doors; elevated habitable porch, desk, or balcony; or any ground surface intended for uses such as recreation, barbecue or lawn areas or any other property containing a residential unit or units. This shall apply to all lighting on the Project Site.

- Per LAMC Section 13.17.F.3, all site and building mounted lighting shall be designed such that it produces a maximum initial illuminance value no greater than 0.20 horizontal and vertical footcandles at the site boundary, and no greater than 0.01 horizontal footcandles 15 feet beyond the site. No more than 5.0 percent of the total initial designed lumens shall be emitted at an angle of 90 degrees or higher from nadir (straight down). All low-pressure sodium, high pressure sodium, metal halide, fluorescent, quartz, incandescent greater than 60 watts, mercury vapor, and halogen fixtures shall be fully shielded in such a manner as to not exceed the above limitation.

7. Methodology

The Project's lighting plan allows the use of the outdoor athletic facilities beyond sunset, extending the usable hours of the facility especially during the winter months. This provides greater opportunity for the school's athletic teams to host practices, matches and other evening events. This Report identifies the requirements governing the types, locations, maximum brightness, hours of operation, optical control, and visibility of the lighting designed as part of the Project. Please refer to Appendix 2 for additional information regarding the lighting designs including photometric calculation reports, plot maps, and cutsheets.

The analysis of light and glare describes the existing lighting environments in the Project area, identifies the light- and glare-sensitive land uses in the area, describes the light and glare sources under the Project, and

evaluates whether the Project would result in a substantial increase in nighttime lighting and daytime glare as seen from the area's sensitive uses. A quantitative analysis of luminance, or glare (expressed in cd/m^2), is also provided below. The analysis of lighting impacts focuses on whether the Project would cause or substantially increase adverse nighttime lighting effects on light sensitive uses.

The existing conditions were surveyed from several study locations surrounding the Project Site to gather a baseline and document any off-site areas currently affected by light or glare from the existing Project Site. The study locations include seven residential points along Yukon Avenue, West 104th Avenue, and the southern Project Site property edge. An additional study location was included on the east Project Site property edge. The location on the east property edge was selected because of its proximity to the existing middle school and associated lighting. All the measurements were taken after the sun had set in conformity with standard practice and regulations, and the twilight period had ended, eliminating the chance of additional sky glow which could affect the readings. All existing measurements were taken using a Minolta luminance meter, which measures candelas/square meter (cd/m^2), and from the viewpoint of a pedestrian at ground level to the nearest light fixture on the Project Site. The increases in illumination levels are not based on incremental changes to existing conditions, but on modeled calculations of illuminance levels from Project lighting (expressed in footcandles) at the sensitive receptor locations compared to regulatory standards. Lighting in both expressions, luminance, and illuminance, are additive quantities, meaning that any of the existing remaining lighting conditions that surround the Project Site will be in addition to the values documented in the calculations discussed later in this section. As such, and for the purpose of analyzing Project lighting in relation to applicable regulatory thresholds, this aspect of the Report does not evaluate the effects created by lighting not associated with the Project Site as it exists now or as it is being proposed. The lighting effects created in the areas surrounding the Project Site are assumed to be remaining, thus their values of contribution will not change and can be removed from the evaluation. Further, the thresholds outlined in the regulatory framework pertain to only the lighting effects created by the Project Site and do not account for changes unrelated to the reference Project. The values in this section of the Report demonstrate only the additional lighting contributions that are created by the Project. Please refer to section 10 of this Report for consideration of the cumulative impact of the Project and other projects located in the vicinity of the Project Site (Related Projects).

Using the photometry data for the proposed lighting solutions, a computer calculation model was created to evaluate each of the athletic facilities proposed for the Project Site. The model and calculations were created by Musco Lighting, the manufacturer and installer of the sports lighting systems proposed for the Project Site. Musco utilizes advanced photometric software to design the lighting system to meet the recommendations for athletic field/court illumination. The software uses a laboratory generated lighting fixture data file to simulate each fixture which are placed and aimed in the model as they would be installed on the Project Site. The software then calculates the illumination created by the array of lighting fixtures designed into the model.

Two analyses were prepared for the Project's lighting evaluation, which are based off the computer calculations that were generated by Musco Lighting of the proposed sports lighting fixtures. Musco Lighting uses a proprietary calculation engine that calculates luminance or illuminance at a specified task surface. The engine utilizes photometry files which define the amount of candela (light) emitted at any angle in a sphere around the fixture.

First, the proposed sports lighting fixtures were evaluated for off-site spill lighting illuminance at all surrounding properties to determine if the Project would produce two or more footcandles of light at any sensitive receptor, per LAMC Section 93.0117.

Second, the proposed sports lighting fixtures were evaluated for glare impacts from the nearest, most impactful light fixture at all surrounding sensitive receptors outside of the property line of the Project Site per the requirements set forth in LAMC Section 93.0117. The luminance readings of the proposed design were compared to the survey of existing conditions to evaluate the change in brightness at the receptor locations.

8. Impact Analysis

Evaluation of Fixture Glare Control

The Musco Lighting fixtures for the Project are specifically designed with precise optics and integral shields to aid in controlling the light and preventing unwanted spill light, uplight, or glare. This shield is demonstrated in the two views below as Figure 6. The Light Control Visor is specifically engineered such that the light from the fixture can reach the destination surface, in this case a sports field, pool, or tennis court, while the edges of the visor block any high angles which would impact neighboring sites. This level of control can be seen in Figures 5 and 8 by comparing the contour lines close to the athletic facilities and those points outside the facilities. The significant drop in footcandles and candela in Tables 2 and 3 is indicative of tight beam control and limited spill lighting. Additionally, the Musco lighting fixtures are designed to be tilted downward toward the target which further enhances effectiveness of the Control Visor.

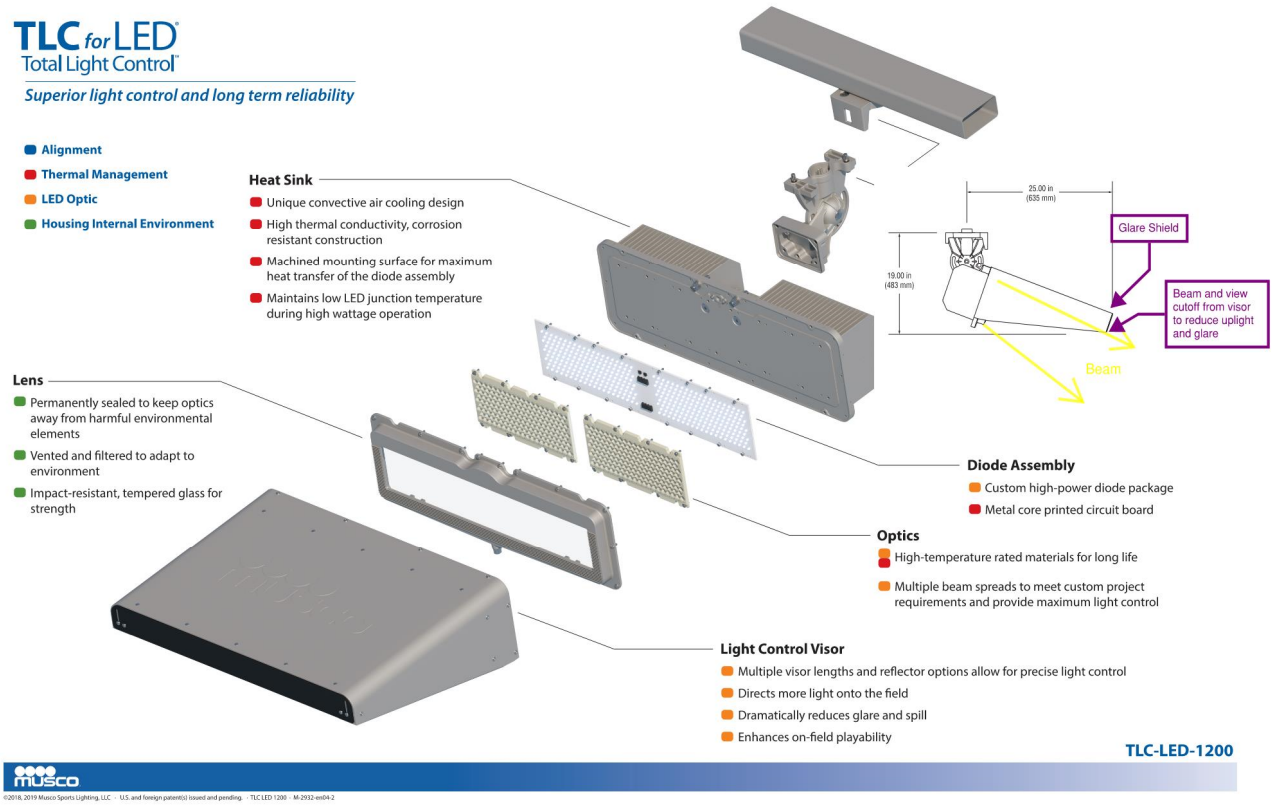


Figure 6 - Exploded Fixture View

By contrast, the existing building mounted fixtures on the Project Site have no integral shielding and a more generic optical pattern common to floodlighting. The existing fixtures use LED engine lamping with internal fixture optics around the lamp to control the beam pattern. Additionally, the lamp itself is directly visible with limited optical control which contributes to the perceived glare. Finally, these fixtures are tilted upward to cast the lighting across the intended area to maximize their effectiveness, but this further exposes the lights to the surrounding receptors and is the primary source of glare found during the survey. Figure 7 shows an example of existing floodlights currently on the Property.

Figure 7 - Existing Building Mounted Flood Lighting

Evaluation of Off-Site Illuminance

For this study, Musco Lighting provided the calculations for each of the light uses for athletic purposes on the Project Site. Musco Lighting also provided an expanded site map which shows the spill light from the sports lighting within the Project Site and beyond to all the neighboring properties. The light sensitive receptors near the Project Site, as shown previously in Figure 3, are all residential properties along Yukon Avenue, West 104th Street, and the south property edge bordering West 108th Street. Figure 8 below shows the footcandle intensity, delineated by contour lines, produced by the cumulative output of all the sports lighting on the Project Site and Figure 9 shows the specific footcandle values throughout the Project Site and adjacent neighborhood. The results of this calculation indicate that there would be little or no spill lighting leaving the Project Site, with the only noticeable spill found on the south property line edge bordering West 108th Street from proposed Track and Field lights, ranging from 0.1 to 1.3 footcandles along the southern property line. This spill light is limited to only the south property line edge and at the property line of all the residential properties surrounding the south side of the Project Site. There is next to no lighting being created from the sports lighting fixtures in other locations. With a maximum 1.4 footcandles being contributed at any property line, the Project lighting falls well under the LAMC maximum of 2.0 footcandles of additional light at any sensitive receptor.

Given that the Project Site is not equipped with sports lighting in its existing condition, the off-site illuminance comparison between Figure 8 (Project Off-Site Illuminance) and Figure 5 (Existing Off-Site Illuminance) shows an increase in the radius and intensity of illuminance. That said, the increase in illuminance is within the allowable LAMC maximum of 2.0 footcandles. Furthermore, the existing building mounted and parking lot light fixtures produce significant amounts of intrusive glare lighting. The proposed Project lighting utilizes light fixtures that allow for more control with only minimal spill beyond the Project Site boundary in a few areas assuring that measurable glare lighting, while will be increased from its current conditions, is being mitigated and addressed to minimize the increase in glare as much as possible. This comparison demonstrates the proposed lighting system will provide less intrusion into neighboring sites while still efficiently illuminating the sports fields. The illumination of the new sports fields would produce more footcandles on the athletic facilities than existing building mounted lighting which provides next to none. This would make the Project Site's surfaces more prominent at night than the previous facility, as the athletic fields will be brighter. However, the target plane for these areas is at ground level which is perpendicular to the views from the receptor locations, and the receptors are at or below the playing surfaces which makes their visibility low. With the extremely oblique viewing angle, the existing and proposed landscape on the Project Site, as well as the new architecture on the Project Site, the views of the illuminated surfaces would be limited.

Receptor (* = Sensitive)	Location	Project Illuminance (footcandles)		LAMC Compliant
		Horizontal	Vertical	
1*	3601 W 105th St.	0.00	0.00	YES
2*	10529 Yukon Ave S.	0.00	0.00	YES
3*	10629 Yukon Ave S.	0.00	0.10	YES
4*	10500 Yukon Ave S / South Property Edge	1.10	1.50	YES
5*	10500 Yukon Ave S / South Property Edge	0.20	0.30	YES
6	10500 Yukon Ave S / East Property Edge	0.00	0.00	YES
7*	3401-3405 W 104th St	0.20	0.50	YES
8*	3409 W 104th St	0.00	0.00	YES

Table 2 - Summary of Calculated Off-Site Illuminance

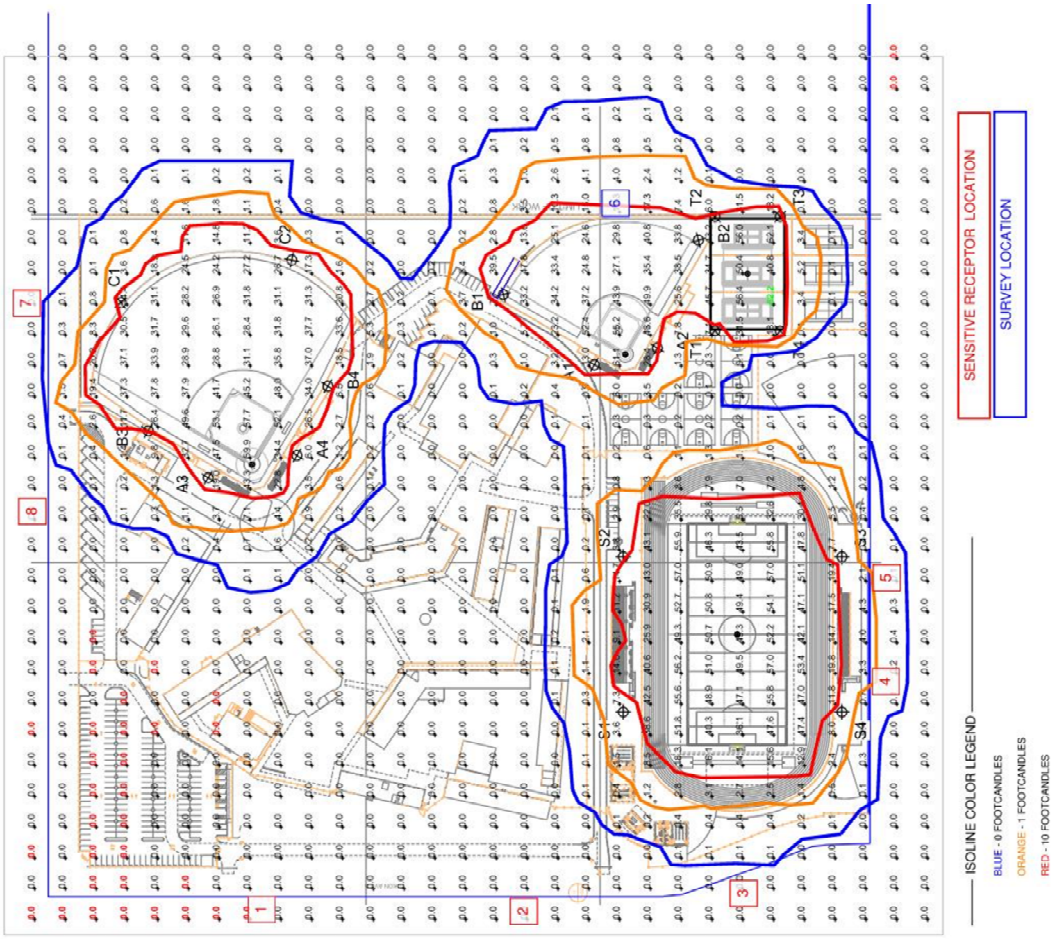


Figure 8 - Off Site Illuminance

Evaluation of Off-Site Luminance/Glare

Musco Lighting provided a second calculation set that evaluated the candela produced by fixtures in the direction of any given point on and off the Project Site, including at the sensitive receptors. Figure 9 below shows the values in candela across the Project Site and surrounding vicinity. Each point on this grid reflects the maximum candela value for the fixture with the highest potential for glare on any given pole on the Project Site. This represents the fixture intensity at the given angle that correlates directly to the view from the receptor and will determine what a user might perceive as the brightness, or point intensity, of a lighting fixture when directly viewed from the respective location. Consistent with the analysis of illuminance in the prior section, the calculation of off-site luminance does not take into consideration existing or proposed landscaping, changes in elevation, and the Project's architectural and hardscaping features. Thus, the calculation and comparisons are considered conservative.

The candela values provided by Musco are representative of the intensity at the fixture itself and need to be adjusted to account for distance and viewing angle to represent glare at the sensitive receptors and other survey locations. To relate the candela values at the fixture to the luminance (glare) received by each receptor location, the relationship between distance and solid angle was utilized to calculate the candelas per square meter (cd/m^2). This method is outlined by The Illuminating Engineering Society "The Lighting Handbook" 10^{th} Edition, section 9.11: Measuring Intensity. The equation relates illuminance, luminance, and solid angle as shown below, where solid angle is the spacial quantity representing a cone in which the fixture is viewed.

$E = L\ \Delta\omega \cos(\xi)$

L = object luminance
$\Delta\omega$ = solid angle subtended by the source to the illumination measurement point.
$\cos(\xi)$ = cosine of the angle between the solid angle and perpendicular of the illuminance plane.
E = illuminance produced by object.

Since the candela value provided is directed at the receiving points, the measurement is perpendicular to the source which simplifies the equation to:

$$L = \frac{E}{\Delta\omega}$$

The final equation substitution in the formula is to replace illuminance for the light intensity divided by the square of the distance between the source and the receptor. By following this equation, the luminance at each point is calculated using the candela intensity (I), distance (d), and solid angle ($\Delta\omega$) of the view of the light source. This method is the consistent with the mathematics used by the luminance meter in the initial survey.

$$L = \frac{I/d^2}{\Delta\omega}$$

Table 3, below, shows the values that were recorded during the survey as well as the calculated Project values of the designed system by Musco. As shown in in the table, the Project's new lighting would result in less glare at all but one of the sensitive receptor sites while the receptor #6 would be exposed to increase glare at property line to the adjacent school. Most of the glare is less than $100cd/m^2$ which is less than that of a standard convenience store sign brightness (see reference luminance values in Section 4 – Existing Conditions). These

values are considered less than substantial as their intensity is not impactful to the receptors however a new light source will be visible to them within operating hours. The highest value is found at receptor 6 along the east property edge at the adjacent school facility receives the more glare from the softball field light sources that are closely located to this point. With a maximum calculated luminance of 2502 cd/m2, the intensity is still less than a standard residential incandescent bulb. Values so low can be attributed to the placement of the lighting standards, the aiming of the fixtures on the tall poles, and the precise optics used to illuminate the sporting fields without excess spill on surrounding uses.

Summary of Calculated Off-Site Lighting			
Receptor (* = Sensitive)	**Location**	**Glare Intensity (cd/m^2)**	
		Existing	**Project**
1*	3601 W 105th St.	3500	0.9
2*	10529 Yukon Ave S.	1283	1.7
3*	10629 Yukon Ave S.	500	23.8
4*	10500 Yukon Ave S / South Property Edge	245	34.0
5*	10500 Yukon Ave S / South Property Edge	250	49.7
6	10500 Yukon Ave S / East Property Edge	281	2502.5
7*	3401-3405 W 104th St	29610	26.8
8*	3409 W 104th St	15580	3.0

Table 3 - Summary of Calculated Off-Site Luminance

*Residential Sensitive Receptor

Based on this analysis, the Project design infers that while there will be an increase in lighting impact visibly, the proposed lighting system has been carefully monitored/curated to minimize the severity of said increase. The Project's proposed lighting fixtures will create additional glare because there are no existing sports field lights being utilized on the existing Project Site, however their placement and aiming have been crafted to reduce the negative impacts on surrounding sites to a level that is far below any of the measurable thresholds. The Project complies with all applicable lighting regulations, and the Project is well below the LAMC threshold of two footcandles of additional light at any adjacent sensitive receptor.

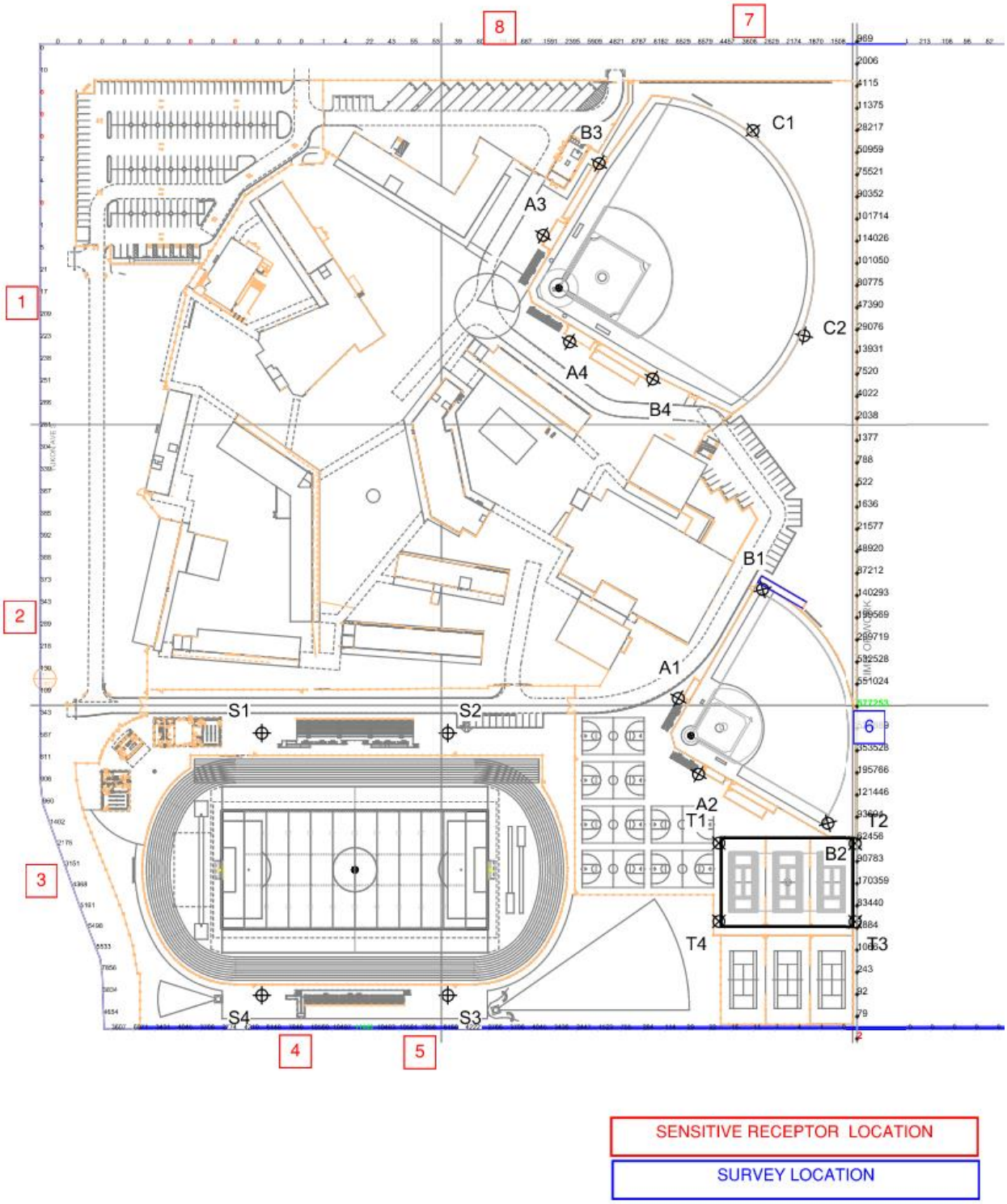


Figure 9 – Off Site Luminance

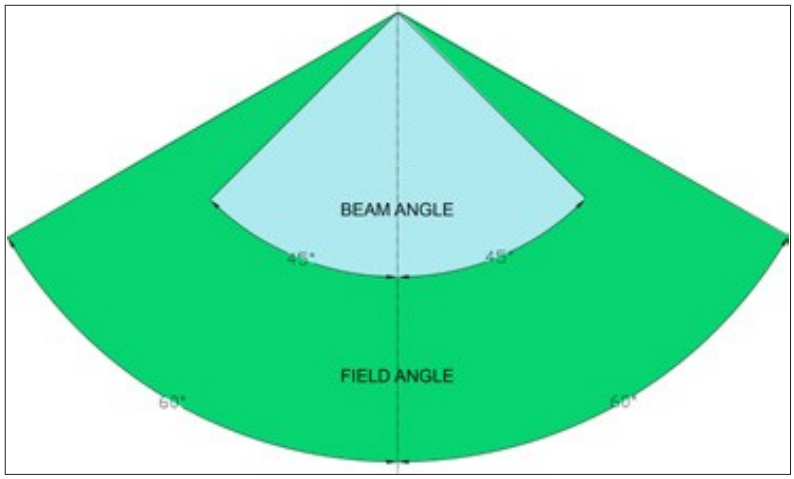
9. Conclusion

Implementation of the state-of-art lighting installation, including highly specialized optics and physical glare control, would ensure that the lighting of the Project is tailored to adhere to all applicable regulations and guidelines. Because the Project would meet and not exceed the lighting standards established under the LAMC, it would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area. Therefore, impacts related to light and glare would be less than significant.

10. Appendix 1

Definitions

Beam Angle: The angle between the two planes of light where the intensity is at least 50% of the maximum intensity at center beam.



Candela: Basic unit for measuring luminous intensity from a light source in a given direction. A common candle emits light with a luminous intensity of roughly one candela.

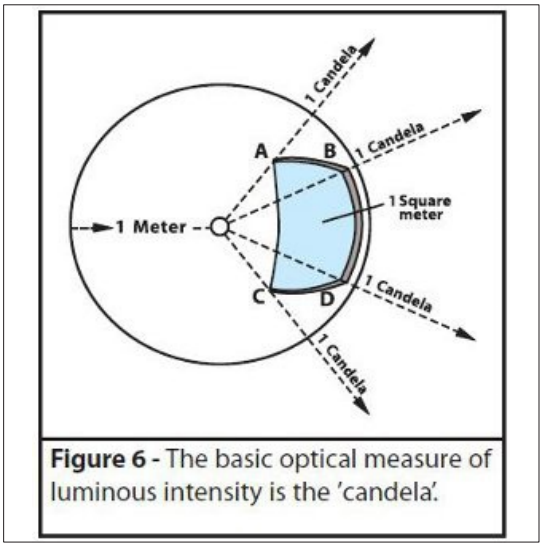


Figure 6 - The basic optical measure of luminous intensity is the 'candela'.

Field Angle: The angle between the two planes of light where the intensity is 10% (or less) of the maximum intensity at center beam.

Footcandle (fc): An imperial unit of measurement for illuminance, abbreviated as fc. The unit is defined as the amount of illumination the inside surface of an imaginary 1-foot radius sphere would be receiving if there were a uniform point source of one candela in the exact center of the sphere.

Footlambert: A Lambertian unit of luminance equal to (1/π) candelas per square foot. Equal to 3.426 candela/sq.m.

Glare: The sensation produced by luminances within the visual field that are sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort, or loss in visual performance or visibility.

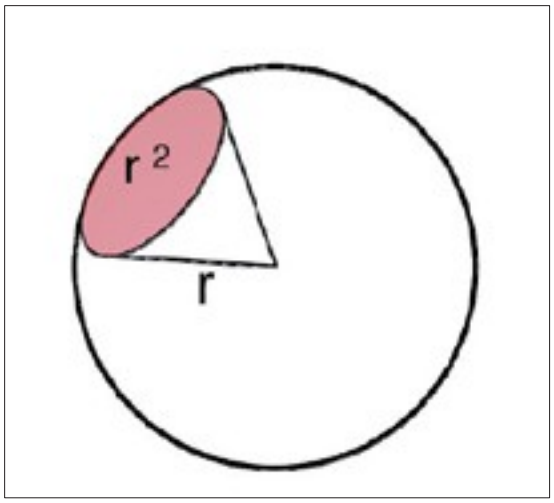
Illuminance: The intensity of light falling at a given place on a lighted surface; the luminous flux incident per unit area, expressed in lumens per unit of area.

Intensity: This is the candlepower, or concentration, of light emitted in a given direction. Measured in Candelas / sq. meter.

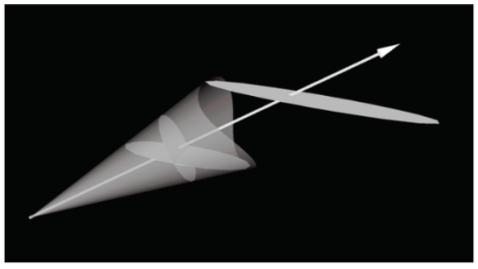
Lumen: A lumen is the basic unit of light, a measure of the perceived power of light. The lumen is defined in relation to the candela by 1 Lumen = 1 candela x 1 steradian.

Luminance: The quantitative measure of brightness of a light source or an illuminated surface, equal to lumen per unit solid angle emitted per unit projected area of the source or surface, measured in candela/sq. meter. This is the brightness measured from a particular angle of view.

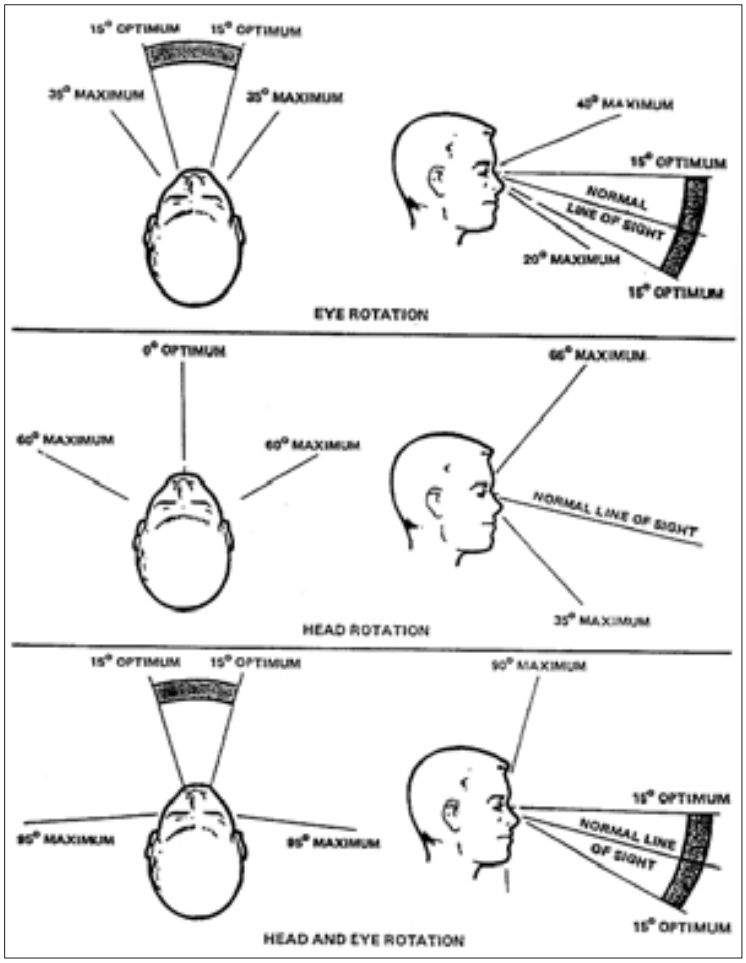
Steradian: A description of two-dimensional angular spans in three-dimensional space, analogous to the way in which the radian describes angles in a plane.



Solid Angle: a measure of the amount of the field of view from some particular point that a given object covers. That is, it is a measure of how large the object appears to an observer looking from that point. The point from which the object is viewed is called the *apex* of the solid angle, and the object is said to *subtend* its solid angle from that point.



Visual Field: The space or range within which objects are visible to the immobile eyes at a given time. Also called field of vision.



Visual Angle: The angle formed by two rays of light, or two straight lines drawn from the extreme points of an object to the center of the eye.

11. References

Illuminating Engineering Society – The Lighting Handbook 10th Edition

Los Angeles Municipal Code
https://codelibrary.amlegal.com/codes/los_angeles/latest/lamc/0-0-0-107363

California Environmental Quality Act
https://opr.ca.gov/ceqa/

Los Angeles River – River Improvement Overlay
http://zimas.lacity.org/documents/zoneinfo/zi2358.pdf

2019 California Title 24 - Building Energy Efficiency Standards (For Residential and Nonresidential Buildings).
http://www.energy.ca.gov

Candela Definition table
http://www.roadvista.com/retroreflection-measurement/

Field of Vison Image
http://hsimed.gtri.gatech.edu/guidelines/wd_video.php

Luminous Measurement-Technique
http://www.gamma-sci.com/