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From: Dr. Darcie Chinnis
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Project: Chaminade College Prep Lighting
Analysis
#220848.000

Sent via: E-Mail

Regarding: Technical Lighting Analysis

1. Executive Summary

Chaminade College Preparatory School has proposed the construction of new recreational fields and supporting facilities at the parcel of land on the NW corner of Saticoy St. and Woodlake Ave. This existing location consists of a commercial shopping center and associated surface parking.

The purpose of this analysis is to provide information regarding the existing lighting conditions at the proposed project site and to provide analysis of the proposed lighting design to assess if it is anticipated to create "a new source of substantial glare" per CEQA requirements.

Review of the existing lighting conditions showed very low light levels with minimum light spill onto immediately adjacent residential properties and greater spill into adjacent public right-of-ways.

Calculations provided by the manufacturer for the proposed lighting conditions demonstrate that, while the proposed lighting will result in increased maximum intensity (glare potential) and spill light in many locations, the values are anticipated to remain under the thresholds of significance.

2. Project Description

2.1. Existing use

The existing use of the proposed site is a single-story, multi-tenant commercial property. The central building is surrounded by asphalt surface parking on the east, south, and west sides, and asphalt loading dock and support spaces on the north side.

Residential neighborhoods abut the project site immediately to the north, while the site is flanked by two streets, Woodlake Ave. on the east and Saticoy St on the west and south.

2.2. Anticipated use

The proposed site is anticipated to be used by the school for recreational purposes which would include the construction of an outdoor soccer field, baseball field, and indoor swimming facility with exterior pool. The addition of two surface parking lots is anticipated as well.

3. Metrics and Threshold of Significance

3.1. Metrics:

- **Maximum Intensity** Maximum intensity is used to capture the apparent brightness of a light source as viewed from a distance. Maximum intensity, measured in units of candela, is used to evaluate the glare potential of a lighting installation. Maximum intensity is measured using a two-part method, combining luminance measurements taken with a meter with high-dynamic range photography analysis.

Anticipated intensity can also be captured in proposed designs through extensive modeling exercises which rely on manufacturer-provided photometric data which has been developed using laboratory measured light output from discrete luminaires.

For the purpose of this analysis, units of intensity (candela, or cd) and luminance (candelas per square meter, or cd/m²) are used interchangeably. Per photometric standards, all luminance measurements were conducted at a distance of more than 5x the largest dimension of the measured source, which creates a mathematical equivalence between intensity and luminance.

- **Light Spill** Light spill is used to capture the amount of spill light at a discrete point and is often referred to as "Light Trespass". Light spill is the illuminance (measured in units of footcandles or lux) falling on a horizontal or vertical surface, meter or calculation point, and is used to evaluate the impact of a lighting installation on another location. Spill light is measured using an illuminance meter. For reference, a full moon on a clear night typically produces about 0.01 footcandle (fc).

3.2. Thresholds of Significance:

Per the City of Los Angeles CEQA guide, the analysis must determine if the project "would create a new source of substantial glare which would adversely affect day or nighttime views in the area." To provide this analysis, thresholds of significance must be determined and are proposed to be the following:

- **Maximum Intensity** Section 93.0117 of the Los Angeles Municipal Code, "Lighting Impacting Residential Property" states that "No person shall construct, establish, create, or maintain any stationary exterior light sources that may cause [property containing a residential unit] to...receive direct glare from the light source."

Direct glare is defined as glare "resulting from high luminance or insufficiently shielded light sources that is in the field of view."

There is an exemption from the above restriction for tennis court exterior lighting provided that the luminaire has a light intensity of less than 25,000cd/m². It is assumed that the cutoff metric of 25,000cd/m² can be applied to other sporting field and facilities besides exclusively tennis.

- **Light Spill** Section 93.0117 of the Los Angeles Municipal code states that "Light Sources shall be designed and maintained so as to produce not more than two footcandles of illumination as measured at the property line of the nearest residentially zoned property..."

4. Existing Condition Analysis

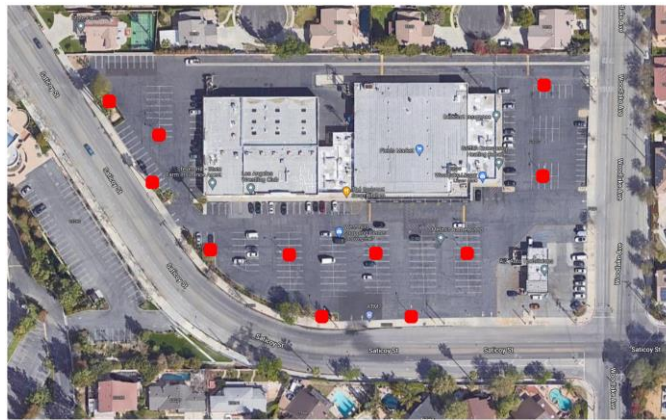
4.1. Site Visit Conditions

A site visit was conducted by HLB Lighting Design on 6 February 2023. At the time of the measurements the temperature was 56°F with clear skies and 35% humidity. Sunset time was 5:29pm Pacific Standard Time. Measurements commenced at 7:03pm Pacific Standard Time.

4.2. Existing lighting conditions

Existing lighting at the proposed site is mainly provided by three main sources:

- Dropped-lens (aka “sag lens”) non-cutoff pole-mounted parking area lights (see Figure 1 and Figure 2))
- Full-cutoff wall-mounted lights on the north side of the western portion of the building (see Figure 3)
- Non-cutoff wall-mounted lights on the north side of the eastern portion of the building (Fields Market, Figure 4)



■ Approximate location of existing pole-mounted parking lot lighting

Figure 1: Approximate location of existing pole-mounted parking lot lighting



Figure 2: Google street view showing relationship between pole and adjacent residential property in the Northeast corner of the site



Figure 3: Google street view showing the full-cutoff wall-mounted lighting on the north side of the existing commercial building at the eastern end



Figure 4: Google street view showing the non-cutoff wall-mounted lighting on the north side of the existing commercial building at the western end

4.3. Equipment

All luminance measurements were taken using a Sekonic L-758 light meter, as shown in Figure 5.



Figure 5: Light meter used for luminance and illuminance measurements

All photographs were taken using a Canon EOS Rebel T6i with an 18-55mm IS SM lens kit and a 24.2 megapixel CMOS sensor as seen in Figure 6. Camera allows for fully manual modes, including manual focus capabilities.



Figure 6: Camera used for photography

4.4. Receptor Site Identification

Five sensitive receptor sites were identified to capture a full picture of the directional impact of the proposed sports and to specifically provide measurements at adjacent existing residential properties. These receptor site locations are identified in Figure 7.

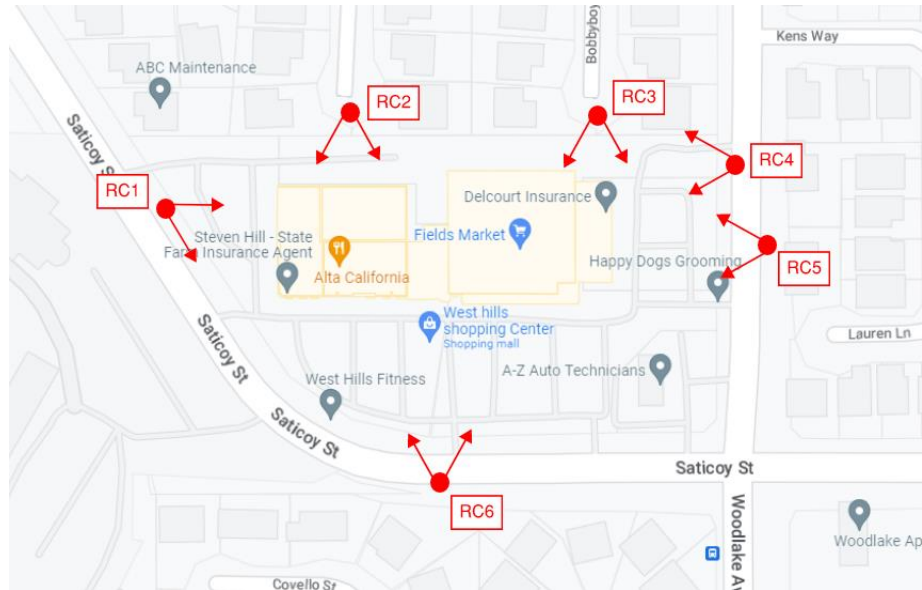


Figure 7: Receptor Site Locations

Receptor Site 1 is located at the NW corner of the proposed site along Saticoy St. (Figure 8).



Figure 8: Receptor Site 1

Receptor Sites 2 (Figure 9) and 3 (Figure 10) are located in the two residential cul-de-sacs that immediately abut the project site on the North at the end of Melba Ave. and Bobbyboyar Ave.



Figure 9: Receptor Site 2



Figure 10: Receptor Site 3

Receptor Sites 4 (Figure 11) and 5 (Figure 12) are located along Woodlake Ave to the east of the property.



Figure 11: Receptor Site 4



Figure 12: Receptor Site 5

Receptor Site 6 (Figure 13) is located immediately South of the site along Saticoy St.



Figure 13: Receptor Site 6

4.5. Receptor Site Measurements

The Receptor Sites were first visited during the day to establish a reference daytime photograph and identify ideal location for nighttime photographs and measurements. After dark, luminance and illuminance measurements were taken at each Site to capture values for existing light spill and glare.

4.6. Maximum Intensity Measurements

To measure maximum intensity, a typical HDRI procedure was employed which consisted of taking a series of bracketed photographs taken at optimal exposures from underexposed to overexposed. Photos were taken by mounting to a tripod so that each image was taken from the same mounting height (5'6") and orientation. Exposures were manually adjusted by varying aperture speed to achieve a step of +/- 1EV. A minimum of seven images were taken at each receptor site location.

Additionally, a reference image was taken for each view. These reference images were taken at the approximate height and orientation of the HDR images. These reference images were used to calibrate the final images.

Finally, a series of luminance measurements were taken at each Receptor Site. The luminance meter was once again located at approximately the same height of the camera. A minimum of two luminance values were taken at markpoints (objects) which could be used to calibrate the final images. These values and markpoint locations were identified on the reference images.

4.7. Maximum Intensity Analysis

The bracketed exposure photographs taken were then used to assess the existing maximum intensity at each Receptor Site and to produce a false-color image showing the scale of measured intensities in the field of view. Both Adobe Photoshop and hdrscope were used to perform the HDR calibration and extract relevant data and images.

4.8. Maximum Intensity Results

The following HDR falsecolor images were developed using the outlined process and demonstrate the maximum intensity (cd/m²) at each Receptor Site.

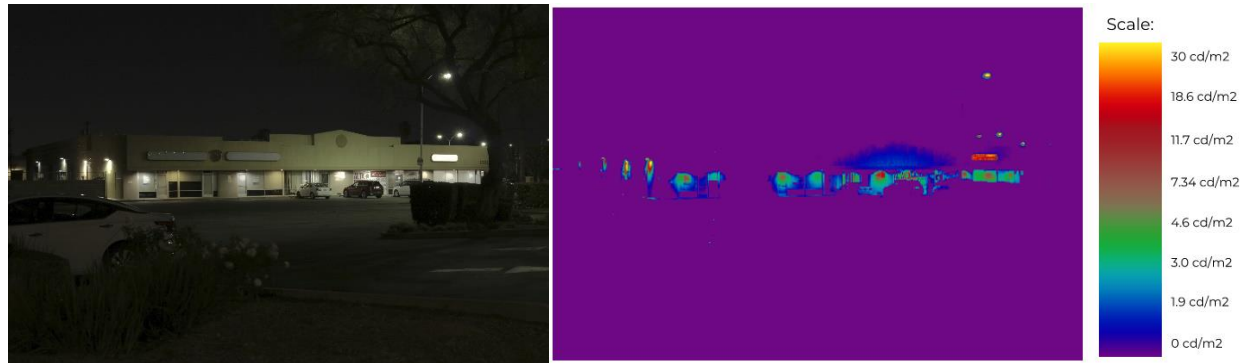


Figure 14: Maximum intensity at Receptor Site 1



Figure 15: Maximum intensity at Receptor Site 2



Figure 16: Maximum intensity at Receptor Site 4

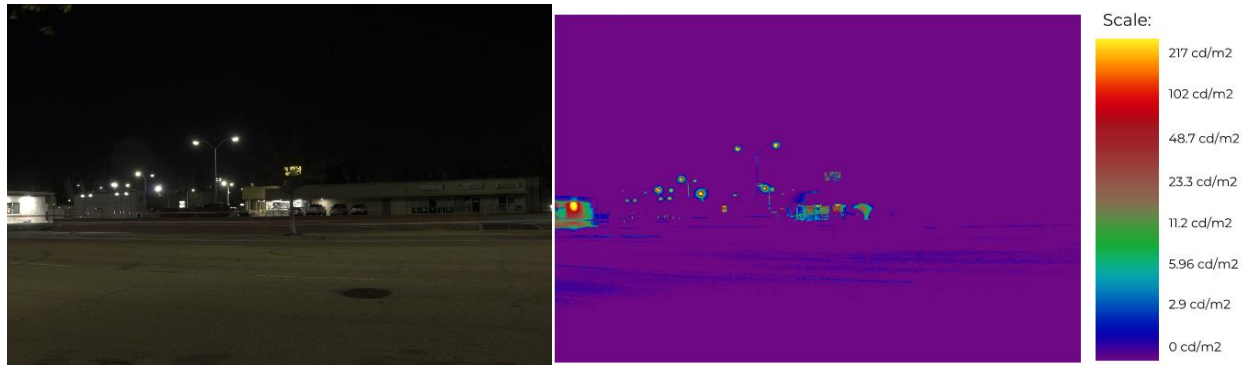


Figure 17: Maximum intensity at Receptor Site 5



Figure 18: Maximum intensity at Receptor Site 6

Note that the average image luminances at Receptor Site 3 were too low for the image analysis software to produce a falsecolor image. Table 1 contains the maximum intensity values for all Receptor Sites.

Maximum Intensity, [cd/m²]

Receptor Site	Maximum Intensity
1	30
2	170
3	267*
4	170
5	217
6	256

Table 1: Measured maximum intensity

*Since no falsecolor HDR image was able to be produced at this location, maximum intensity value is based on luminance measurements taken in the field.

4.9. Spill Light

To measure spill light, four sets of vertical illuminance measurements were taken with the illuminance meter at a height of approximately 5'-6" above ground level at each receptor site. Additionally, four sets of horizontal illuminance measurements were taken with the illuminance meter at grade at each receptor site. Multiple measurements were necessary to provide accurate accommodations for conditions caused by variables such as traffic, pedestrians, etc. Averages of measured values are shown in Table 2.

For Receptor Sites 2 and 3, measurements were taken at the property line (fence) location, with the vertical spill light measured immediately above the ~6' tall privacy fence to capture the property line condition rather than the spill into the cul-de-sac. For receptor sites 5 and 6, which are located across the public right-of-ways from the property, horizontal measurements were not recorded since the points are offset from the property line.

Vertical & Horizontal Light Spill, [fc]

Receptor Site	Average Vertical Illuminance (Ev)	Average Horizontal Illuminance (Eh)
1	1.45	3.7
2	0.8	1.28
3	0.77	1.3
4	3.8	3.55
5	2.5	n/a
6	2.9	n/a

Table 2: Average measured vertical and horizontal spill light at Receptor Sites

Additionally, horizontal and vertical illuminance measurements were taken along the property line at the east side of the project site and the south side of the project site, shown in **Error! Reference source not found.**

Property Line Light Spill

	Vertical Illuminance (fc), Max	Vertical Illuminance (fc), Min	Horizontal Illuminance (fc), Max	Horizontal Illuminance (fc), Min
East Property Line	19	1.5	6.6	1.2
South Property Line	25	1.2	21	1.9

Table 3: Maximum and minimum vertical and horizontal spill light along property lines

5. Analysis of Proposed Design

5.1. Proposed Sports Lighting Design

Lighting design analysis for proposed sport field design and adjacent pool was conducted by the proposed lighting manufacturer. The proposed lighting design for the sports field calls for 8 poles supporting sport lighting equipment surrounding the recreational field. These poles would range in height from 70'-90' and contain between 5 and 10 directional luminaires per pole. These luminaires are mounted at varying heights and range from 500W-1,430W. Additionally, four smaller poles are proposed to be located at the exterior pool. These poles

would range in height from 40'-50' and contain 3 luminaires each. These luminaires range in wattage from 400W-580W. All proposed luminaires are LED with a standard 5700K color temperature, 75CRI, and estimated lifespan of L90 >120,000hrs.

5.2. Proposed Light Levels and Metrics

Maximum Intensity Maximum intensity was calculated by the manufacturer to capture potential brightness at glare. Calculation points were placed along Saticoy St, which bounds the property to the south and west, with the points specifically located on the sidewalk across the right-of-way and closest to the existing residential. Calculation points were also placed along the north property line, abutting the existing residential properties. The reported maximum intensity values are summarized in Table 4.

	Maximum Intensity (Cd)
Saticoy St – Sidewalk on Opposite Side	11,448
North Property Spill	24,736

Table 4: Anticipated maximum intensity reported by manufacturer

Spill Light The anticipated illuminance, both horizontal and vertical, along the various property lines were reported by the manufacturer to capture potential spill light.

Additionally, horizontal illuminance calculation points were placed extending beyond the property line to the north to capture potential spill light onto the adjacent residential properties. These calculation points were placed at grade with a spacing of 5.0' x 5.0', extending approximately 160' to the north of the property line. The reported values are summarized in Table 5.

	Maximum Horizontal Illuminance (fc)	Maximum Vertical Illuminance (fc)
Saticoy St – Sidewalk on Opposite Side	0.72	1.27
North Property Off-Site Spill	1.9	n/a

Table 5: Maximum vertical and horizontal spill light for proposed lighting

5.3 Comparison to CEQA Thresholds

Maximum Intensity The maximum intensity values for the proposed design are 11,448 cd and 24,736 cd at the Saticoy St. and Norther property lines respectively. These values both fall below the established threshold of significance of 25,000cd/m2.

Light Spill The maximum spill light value for the calculation points are reported to be 0.72fc along Saticoy St and 1.9fc to the north. These values fall below the threshold of significance of 2fc of illumination at the property line of the nearest residentially zoned property.

6. Conclusion

In conclusion, the proposed sports lighting design does demonstrate an increase in both spill light and maximum intensity in comparison to the existing lighting conditions. However, the proposed design does not exceed the threshold of significance outlined for maximum intensity nor does it exceed the threshold for spill light for the land immediately adjacent to the property lines.