East Harbor Island TopGolf Lighting Analysis

HLB Lighting Design

6 March 2025

HLB Lighting Design
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1. Executive Summary

Topgolf has proposed the construction of a new sports entertainment venue and outdoor driving-range at the parcel of land on the East Harbor Island between North Harbor Dr. and Liberator Wy. This existing location consists of a rental car facility.

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 light or glare which would adversely affect day or nighttime views in the area."

Assuming the incorporation of a minimum 8.9' tall fully opaque "blocking obstruction" on the east side of the property as a mitigation measure, the lighting is not anticipated to create a new source of substantial light or glare based on the identified standards for significance.

2. Project Description

2.1. Existing use The existing use of the proposed site is a rental car facility and San Diego International Airport temporary construction staging facilities. The lot is surrounded by Harbor Police Headquarters and Sheraton Hotel to the west, Safe Harbor Marina to the south on the south side, US Coast Guard to the east, and San Diego International Airport Cargo Facility on the north side. No residential uses abut the property.

The site is flanked by two streets, North Harbor Dr. on the north and Liberator Way on the west and south.

2.2. Anticipated use The proposed site is anticipated to be used by Topgolf for recreational purposes which would include the construction of an outdoor driving range and a three-level sports entertainment venue. The addition of one surface parking lot is anticipated as well.

Additional improvements include the re-alignment of Liberator Way and development of a waterfront park and promenade.

3. Relevant Codes and Standards

The following codes and standards are applicable to the project:

- **California Title 24 Part 6**

  Title 24 Part 6 provides mandatory requirements for all interior and exterior lighting and controls. These include limits to installed lighting power density and lighting controls requirements.

- **California Title 24 Part 11, also known as "CalGreen"**

  CalGreen's non-residential mandatory measures include caps on "BUG" ratings of luminaires. However, sports lighting is considered "exempt" from the "BUG" rating limitations.

- **City of San Diego Outdoor Lighting Regulations in Section 142.0740 of the Land Development Code**

  This purpose of this development code is to minimize negative impacts from lighting from developments on surrounding property.

- **Commission Internationale de l'Eclairage (CIE) 150:2017 "Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, 2nd Edition"**

  This relevant international standard provides quantitative guidelines for limiting light spill and glare, CIE's standard 150:2017 provides specific thresholds scaled by ambient brightness.

4. Measurement Point Identification

Five measurement points were identified to capture a full picture of the directional impact of the proposed sports lighting and to specifically provide measurements at adjacent existing properties and roadways.

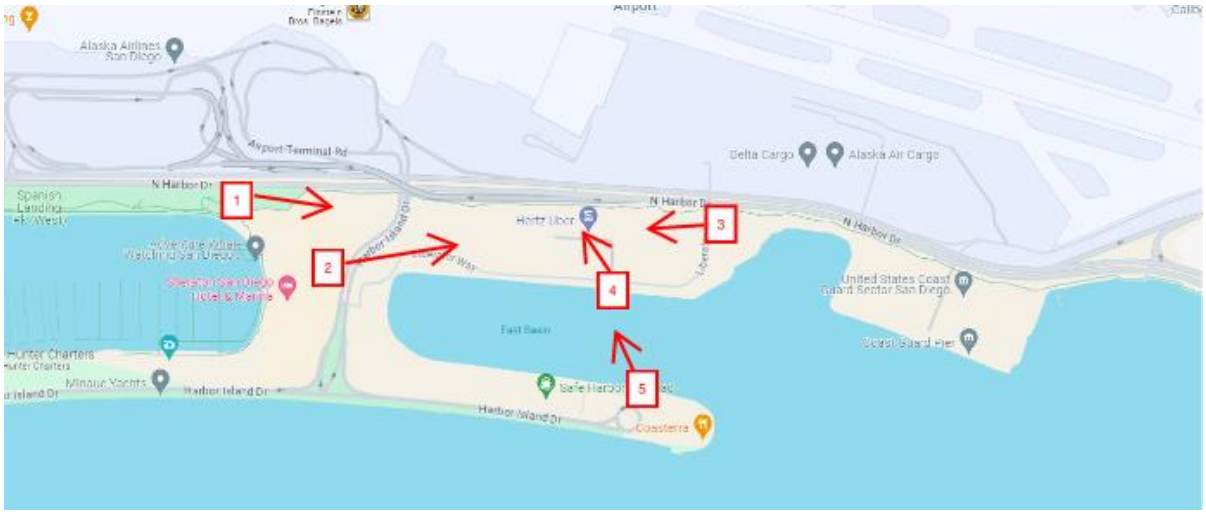


Figure 1: Measurement Point Locations

Point 1 is located in the Cancer Survivors Park to provide an assessment of the potential impact of the proposed lighting on a nearby public amenity. Point 2 is located at the property line of the Sheraton Hotel to capture the potential impact of the proposed lighting on hotel. Point 3 is located at the intersection of Liberator Way and North Harbor Drive facing west, and is intended to capture the potential impact of the proposed lighting on vehicular, pedestrian, and bicycle traffic travelling along North Harbor Drive. Per CIE 150:2017, "Effects on road users (e.g. motorists, cyclists, pedestrians) normally involve a reduction in the ability to see caused by disability glare from bright light sources. The apparent contrast of objects against their backgrounds will be lowered, rendering them less visible or even invisible, especially if the environment is intrinsically dark." Point 4 is located along Liberator way to the south of the property and is intended to capture the potential impact of the proposed lighting on the marina located in the East Basin. Finally, Point 5 is located across the basin at the Marina, and is intended to capture the potential impact of the proposed lighting on the water



Figure 2: View from Measurement Point 1



Figure 3: View from Measurement Point 2



Figure 4: View from Measurement Point 3



Figure 5: View from Measurement Point 4



Figure 6: View from Measurement Point 5

5. Existing Condition Analysis

5.1. Site Visit Conditions A site visit was conducted by HLB Lighting Design on 3 April 2024. At the time of the measurements the temperature was 59°F with cloudy skies and 90% humidity. Sunset time was 7:10pm Pacific Standard Time. Measurements commenced at 8:03pm Pacific Standard Time.

5.2. Existing lighting conditions Existing lighting at the proposed site is mainly provided by limited sources, including:

- Dropped-lens (aka “sag lens”) non-cutoff pole-mounted street light along the northern bike path of the project site (see Figure 7)
- Flat lens pole-mounted single and double head square LED shoebox light at the northwest portion of the property (see Figure 3).
- Flat lens pole-mounted single and double head LED area light at the southeast portion of the property (see Figure 4).

- Flat lens pole-mounted single, double, and four head LED area light at the center and west portion of the property, which appear to be retrofits for low pressure sodium lamps given their geometry (see Figure 5).
- Flat lens pole-mounted street lights with external house-side shield mounted along Liberator Way (see Figure 11).



Figure 7: Google street view showing relationship between pole and adjacent bike path in the northeast corner of the site



Figure 8: Google street view showing the square LED shoebox poles on the north side of the existing rental car facility



Figure 9: Google street view showing the LED area poles on the southeast side of the existing rental car facility



Figure 10: Google street view showing the 4-head area poles on the south side of the existing rental car facility with close up view of the pole head

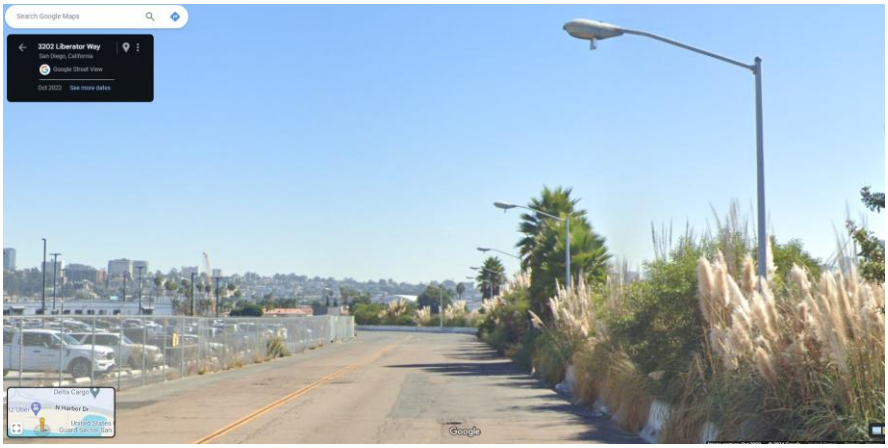


Figure 11: Google street view showing existing lighting along Liberator Way.

5.3. Equipment All luminance measurements were taken using a Sekonic L-758 light meter.



Figure 12: 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. Camera allows for fully manual modes, including manual focus capabilities.



Figure 13: Camera used for HDRI photography

5.4. Existing Conditions Measurements The Measurement Points were first visited during the day to establish a reference daytime photograph and identify ideal location for nighttime photographs and measurements. After dark, illuminance (Light Spill) and intensity (glare) measurements were taken at each Site to capture values for existing light spill and glare.

5.4.1. Light Spill Measurements

To measure light spill, five sets of vertical illuminance measurements were taken with the illuminance meter at a height of approximately 5'-6" above ground level at each Measurement Point. 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 1.

Measured Light Spill

Measurement Point	Average Vertical Illuminance, [fc]
1	0.12
2	0.41
3	0.86
4	1.0
5	0.16

Table 1: Measured vertical light spill at Measurement Points

5.4.2. Glare 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 measurement point.

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 Measurement Point. 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.

The bracketed exposure photographs taken were then used to assess the existing maximum intensity at each Measurement Point 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.

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



Figure 14: Maximum intensity at Measurement Point 1



Figure 15: Maximum intensity at Measurement Point 2

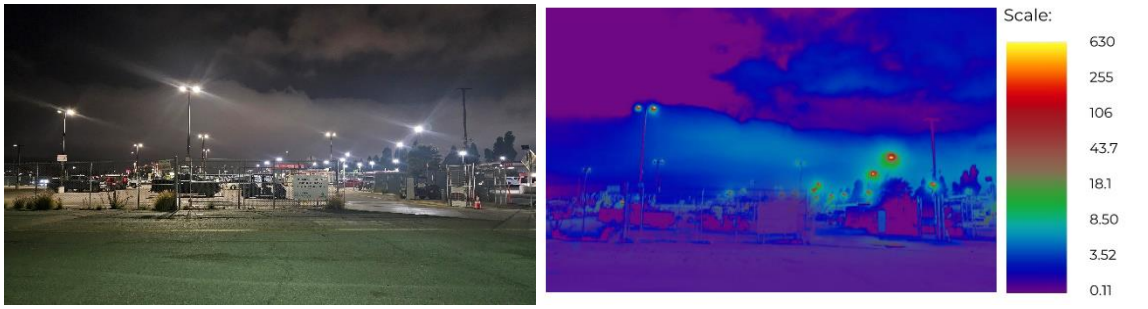


Figure 16: Maximum intensity at Measurement Point 3

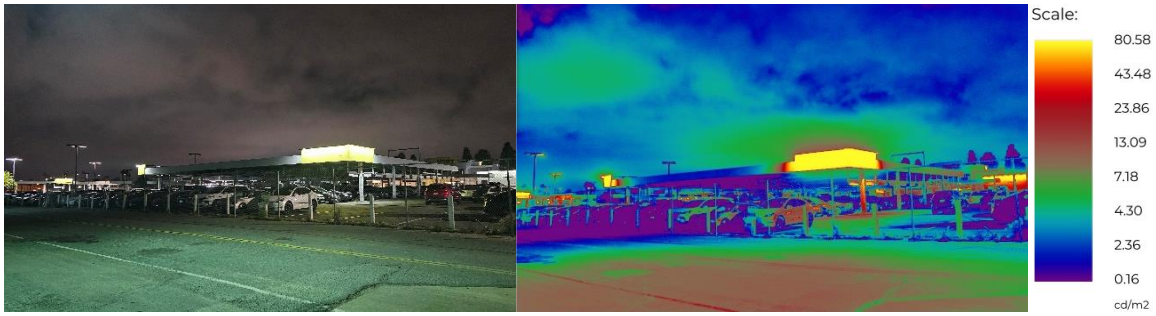


Figure 17: Maximum intensity at Measurement Point 4

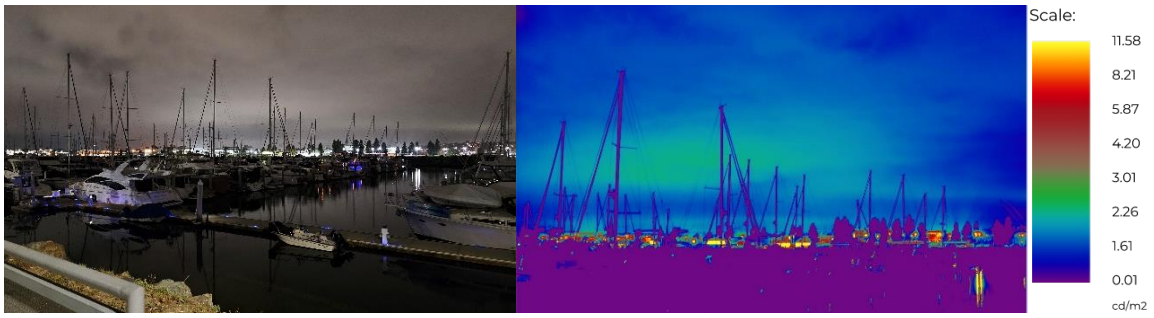


Figure 18: Maximum intensity at Measurement Point 5

Maximum Intensity, [cd/m²]

Measurement Point	**Measured Maximum Intensity, [cd/m²]**
1	130
2	4.3
3	720
4	64
5	11

Table 2: Measured maximum intensity

6. Metrics and Thresholds of Significance

The City of San Diego's requirements build on those included in Title 24 part 6. However, sports lighting is exempt from the requirements associated with mandatory shielding and glare protection. The requirements from the standards are limited to:

1. Paragraph 142.0740(c)(2): "Shields and flat lenses shall be required to control and direct the light below and imaginary horizontal plane passing through the lowest point of the fixture, except for: (E)Lighting for sports and athletic fields." Therefore, this requirement is not applicable to the project.
2. Paragraph 142.0740(c)(3): "New outdoor lighting fixtures shall minimize light trespass in accordance with the Green Building Regulations where applicable, or otherwise shall direct, shield, and control light to keep it from falling onto surrounding properties. Zero direct-beam illumination shall leave the *premises*." **This requirement is applicable to the sports lighting component of the project and is referred to below as "Direct-Beam Illumination."**
3. Paragraph 142.0740(C)(5)(B): "Outdoor lighting for the following is permitted to remain lighted after 11:00 P.M. and is exempt from the maximum Kelvin CCT and maximum lumen requirements specified in Section 142.0740(c)(4) and (c)(5)(A)."
    a. The first exemption is: "(i) Outdoor lighting used to illuminate recreational activities that are not in a residential zone may continue after 11:00 P.M. only when equipped with automatic timing devices and shielded to minimize light pollution." Since the project is not in a residential zone and will be equipped with automatic timing devices, the Kelvin CCT (color temperature) and maximum lumen requirements are not applicable to the sports lighting component of the project.
    b. The second exemption is "(ii) Illuminated on-premises signs for businesses that are open to the public after 11:00 P.M. may remain lighted during business operating hours only. Illuminated off-premises *advertising display signs* shall not be lighted after 11:00 P.M. *Signs* located both on-and off-premises shall be equipped with automatic timing devices." Since the digital displays for the project are on-premises and not advertising display signs, and will be equipped with automatic timing devices, the Kelvin CCT (color temperature) and maximum lumen requirements are not applicable to the digital displays.

Per the City of San Diego CEQA guide, the analysis must determine if the project "would create a new source of substantial light or glare which would adversely affect day or nighttime views in the area." Since the City of San Diego's municipal code does not provide quantitative criteria for analysis, the international standard CIE 150:2017 prevails.

Zone	Lighting Environment	Examples
E0	Intrinsically dark	UNESCO Starlight Reserves, IDA Dark Sky Parks, Major optical observatories
E1	Dark	Relatively uninhabited rural areas
E2	Low district brightness	Sparsely inhabited rural areas
E3	Medium district brightness	Well inhabited rural and urban settlements
E4	High district brightness	Town and city centres and other commercial areas
NOTE Regardless of the level of urban development, the recommendations for Environmental Zone 1 or 0, should be followed for all locations within 100 km of a major optical astronomy observatory. Regardless of the level of urban development, the recommendations for Environmental Zone 2 (or better) should be followed for locations within 30 km of an operating urban optical astronomy observatory, and for locations between 100 km and 300 km from a major optical astronomy observatory.		

Figure 19: CIE 150:2017 Environmental Zone definitions.

Per CIE 150:2017, the East Harbor Island area would be classified as Environmental Lighting Zone E3.

- **Light Spill** Light falling onto surrounding properties can be quantified as "light spill". Light spill is quantified as illuminance, measured in footcandles (fc) or lux. For evaluation purposes, the relevant criteria can be derived from CIE 150:2017 for zone E3 to be a maximum of **0.93 fc (10 lux) pre-curfew** and **0.19 fc (2 lux) post-curfew**.

- **Glare** The experience of glare is the experience of bright, concentrated sources of light. Maximum brightness, quantified as luminance and measured in candela per square meter, is determined by the size of the light source, the amount of light emitted, the directionality of the light, and the distance of the observer position. Glare is then further influenced by the individual experiencing the brightness, in addition to ambient lighting conditions and personal preference. At view distances at least 5x the maximum luminous dimension of the light source, intensity (measured in cd) and luminance (measured in candela per square meter) can be considered interchangeable. For evaluation purposes, the relevant criteria can be derived from CIE 150:2017 for zone E3. For the anticipated sports light fixtures described in section 5.1 below, the relevant criteria for the Measurement Points are derived as a function of the distance from the luminaire to the Measurement Point to be the following:

Glare Threshold of Significance at Measurement Points

Measurement Point	Maximum Brightness of Sports Lighting, [cd]	Maximum Brightness of Display Screen, [cd]
1	n/a	21,987
2	n/a	n/a (obscured by building)
3	1,875	n/a (no direct view)
4	757	3,750
5	2,812	n/a (no direct view)

Table 3: Glare Thresholds at Measurement Points

- **Light Spill Into Water** For this project, the light spill directly into the water is also of significant concern. For evaluation purposes, the threshold for light spill into the water is recommended to be established as equal to levels previously accepted at the nearby Rady Shell of **0.08fc (0.86 lux)**.

7. Analysis of Proposed Design

7.1. Proposed Lighting Design The lighting impact for the proposed project was analyzed based on four categories of application and impact. The hours of operation for the establishment would be Sunday through Thursday 9am to 1am, and Friday through Saturday 9am to 2am.

Sports Lighting The sports lighting design for the project is proposed to include a total of (16) building-mounted sports light fixtures mounted to the building and directed eastward along the field of play. The fixtures are all 500W LED sports light fixtures rated at 520 system watts. The fixtures have 48,000 initial luminaire lumens with a CCT of 3000K and a CRI > 80. The

fixtures are also specified with visors to shield uplighting and glare. Sports lighting would be turned "off" after business hours ("post-curfew"). The fixtures would be mounted to the structure of the building at 27ft and 42ft above grade to illuminate the back of the golf balls after contact. No fixtures are proposed to be mounted on the net poles. Targets will be illuminated internally with no direct light spill.

Display Screens The proposed project includes display screens that support the game functions of the facility and are typically located at the outfield fence facing toward the building. The type of screen provides visors on each LED to minimize off-axis glare and limit uplighting. The displays are provided with auto-brightness control that is software-driven and informed by a light sensor measuring ambient lighting in addition to schedule-based controls. The display screens max out at 7,500 cd/m^2 (nits). Operationally, based on other locations, daytime maximum brightness would be capped at 80% of output. The screens are dimmed throughout dusk to a value of 600 – 800 cd/m^2 (nits). Display screens would be turned "off" after business hours ("post-curfew").

Architectural Lighting The architectural lighting design for the building, including the parking lots, is required to comply with all provisions of Title 24, including limitations on backlight, uplight, and glare.

FAA Lighting The FAA has determined that four to sixteen poles supporting the safety netting be topped with red lights due to the project's proximity to the nearby airfield. FAA-required lights for navigation are exempt from Title 24 and all lighting regulations.

Liberator Way and Waterfront Park and Promenade Enhancements The project includes enhancements to Liberator Way and the development of a waterfront park and promenade. The lighting design for this area will require compliance with all applicable regulations and standards, and will be designed to meet thresholds set forth in this analysis.

7.2. Proposed Light Levels and Metrics This analysis is limited to the Sports Lighting and Display Screens scope. See the descriptions above for additional information on the Architectural Lighting, FAA Lighting, and Liberator Way Enhancements.

Sports Lighting Sports lighting is exempt from outdoor lighting distribution (BUG rating) limitations under Title 24 Part 6 Section 140.7.

The manufacturer of the sports lighting system provided photometric analysis of the proposed sports lighting system, including calculation of anticipated vertical light spill at the relevant Measurement Points. Note that Measurement Points 1 and 2 will not have direct view of the sports lighting and therefore will not receive any light spill from those sources.

Anticipated Light Spill at Measurement Points from Sports Lighting (Vertical Illuminance, [fc])

Measurement Point	Without Blocking Obstruction	With Blocking Obstruction
1	n/a	n/a
2	n/a	n/a
3	3.2	0.00
4	0.02	0.02
5	0.00	0.00

Table 4: Anticipated light spill at Measurement Points

Anticipated Maximum Intensity at Measurement Points from Sports Lighting

Measurement Point	Without Blocking Obstruction		With Blocking Obstruction	
	Maximum Brightness, [cd]	Direct Beam Illumination	Maximum Brightness, [cd]	Direct Beam Illumination
1	n/a	No	n/a	No
2	n/a	No	n/a	No
3	169,766	YES	n/a	No
4	0	No	0	No
5	0	No	0	No

Table 5: Anticipated Maximum Intensity at Measurement Points

Anticipated Light Spill into Water from Sports Lighting (Horizontal Illuminance, [fc])

Sensitive Area	Without Blocking Obstruction	With Blocking Obstruction
East Basin	0.00 – 0.01 fc	0.00 fc
Coast Guard Inlet	0.01 – 0.09 fc	0.00 - 0.01 fc

Table 6: Anticipated light spill into water

Display Screens The distance between the screens and Measurement Points 4 and 5 are approximately 675’ and 1,320’ respectively. At a maximum nighttime operational luminance (brightness) of 800 cd/m^2, there is no anticipated light spill at the Measurement Points.

8. Comparison to CEQA Thresholds

Direct-Beam Illumination Based on the provided data, the sports lighting is generally anticipated to be controlled to prevent direct-beam illumination onto other properties assuming the incorporation of the minimum 8.9'-tall fully-opaque shielding element on the east side of the property.

Direct-Beam Illumination at Measurement Points		
Measurement Points	**Without Blocking Obstruction**	**With Blocking Obstruction**
1	**No**	**No**
2	**No**	**No**
3	**YES**	**No**
4	**No**	**No**
5	**No**	**No**

Table 7: Anticipated direct-beam illumination at Measurement Points

Light Spill Based on the provided data, the sports lighting is anticipated to be completely obscured from view at Measurement Points 1 and 2, and the light spill is anticipated to be below the threshold of significance at Measurement Points 3, 4 and 5 assuming the incorporation of the minimum 8.9'-tall fully-opaque shielding element on the east side of the property.

Comparing Anticipated Light Spill at Measurement Points from Sports Lighting and Display Screens Without Blocking Obstruction to CEQA Thresholds and Existing Conditions

Measurement Point	**Anticipated Illuminance from Sports Lighting, [fc]**	**Anticipated Illuminance from Display Screens, [fc]**	**CEQA Threshold, [fc]**	**Existing Illuminance, [fc]**
1	n/a	**0.00**	0.93 fc	0.12
2	n/a	n/a		0.41
3	**3.2**	n/a		0.86
4	**0.02**	**0.00**		1.0
5	**0.00**	n/a		0.16

Table 8: Anticipated light spill without blocking obstruction at Measurement Points vs CEQA Thresholds and Existing Condition

Comparing Anticipated Light Spill at Measurement Points from Sports Lighting and Display Screens <u>With Blocking Obstruction</u> to CEQA Thresholds and Existing Conditions

Measurement Point	Anticipated Illuminance from Sports Lighting, [fc]	Anticipated Illuminance from Display Screens, [fc]	CEQA Threshold, [fc]	Existing Illuminance, [fc]
1	n/a	**0.00**	0.93 fc	0.12
2	n/a	n/a		0.41
3	**0.00**	n/a		0.86
4	**0.02**	**0.00**		1.0
5	**0.00**	n/a		0.16

Table 9: Anticipated light spill with blocking obstruction at Measurement Points vs CEQA Thresholds and Existing Conditions

Maximum Intensity Based on the provided data, the sports lighting is anticipated to be completely obscured from view at Measurement Points 1 and 2, and the glare is anticipated to be below the threshold of significance at Measurement Points 3, 4 and 5 assuming the incorporation of the minimum 8.9'-tall fully-opaque shielding element on the east side of the property.

The display screens are not anticipated to be visible from Measurement Points 2, 3 and 5. The glare from the display screens is anticipated to be below threshold at Measurement Points 1 and 4.

Comparing Anticipated Maximum Intensity at Measurement Points <u>Without Blocking Obstruction</u> vs CEQA Thresholds and Existing Conditions

Measurement Points	Anticipated Maximum Brightness for Sports Lighting, [cd]	Direct Beam Illumination	Anticipated Maximum Brightness from Display Screens, [cd]	CEQA Threshold for Display Screens, [cd]	Measured Maximum Intensity, [cd/m²]
1	n/a	**No**	**800**	21,987	130
2	n/a	**No**	n/a	n/a	4.3
3	**169,766**	**Yes**	n/a	n/a	720
4	**0**	**No**	**800**	3,750	64
5	**0**	**No**	n/a	n/a	11

Table 10: Anticipated Maximum Intensity Without Blocking Obstruction at Measurement Points vs CEQA Thresholds and Existing Conditions

Comparing Anticipated Maximum Intensity at Measurement Points With Blocking Obstruction vs CEQA Thresholds and Existing Conditions

Measurement Points	Anticipated Maximum Brightness for Sports Lighting, [cd]	Direct Beam Illumination	Anticipated Maximum Brightness from Display Screens, [cd]	CEQA Threshold for Display Screens, [cd]	Measured Maximum Intensity, [cd/m²]
1	n/a	No	800	21,987	130
2	n/a	No	n/a	n/a	4.3
3	0	No	n/a	n/a	720
4	0	No	800	3,750	64
5	0	No	n/a	n/a	11

Table 11: Anticipated Maximum Intensity With Blocking Obstruction at Measurement Points vs CEQA Thresholds and Existing Conditions

Light Spill Into Water Based on the provided data, the sports lighting is anticipated to have very little spill into water. For the East Basin area to the south of the site and the Coast Guard Inlet to the east of the site, light spill into the water is anticipated to be well below the threshold of significance assuming the incorporation of the minimum 8.9'-tall fully-opaque shielding element on the east side of the property Finally, due to the shielded, directional nature of the display screens, no light is anticipated to spill into the water from the screens.

Comparing Anticipated Light Spill into Water Without Blocking Obstruction from Sports Lighting and Display Screens to CEQA Thresholds

Sensitive Area	Anticipated Maximum Illuminance from Sports Lighting, [fc]	Anticipated Light Spill from Display Screens, [fc]	CEQA Threshold, [fc]
East Basin	0.00 fc	0.00 fc	0.08 fc
Coast Guard Inlet	0.09 fc	n/a	

Table 12: Anticipated light spill into water without blocking obstruction vs CEQA Thresholds

Comparing Anticipated Light Spill into Water With Blocking Obstruction from Sports Lighting and Display Screens to CEQA Thresholds

Sensitive Area	Anticipated Maximum Illuminance from Sports Lighting, [fc]	Anticipated Light Spill from Display Screens, [fc]	CEQA Threshold, [fc]
East Basin	0.00 fc	0.00 fc	0.08 fc
Coast Guard Inlet	0.00 fc	n/a	

Table 13: Anticipated light spill into water with blocking obstruction vs CEQA Thresholds

9. Conclusion

In conclusion, the proposed sports lighting design does not demonstrate an increase in either spill light and maximum intensity in comparison to the existing lighting conditions assuming the incorporation of the minimum 8.9'-tall fully-opaque shielding element on the east side of the property.

10. Glossary

Candela: The photometric unit for quantifying light intensity in a particular direction. Abbreviated "cd". Throughout this report, note that units of intensity are used interchangeably with units of luminance due to large viewing distances. See "Luminance" below.

Glare: The perceived brightness of a light source, influenced by many factors including photometric output, fixture geometry, color of light, personal sensitivity, and environmental conditions.

Glare Potential: For the purpose of this analysis, glare potential is analyzed using brightness (luminance) and candela (intensity) measurements interchangeably.

High Dynamic Range (HDR): An industry-standard methodology for capturing luminance values in a distinct field of view through the combined use of digital photography, field measurements, and analysis software.

Illuminance: The amount of light incident on a surface. Measured in imperial units of foot-candles (abbreviated "fc") or metric units of lux. 1 fc = 10.76 lux.

Light Spill: Light falling onto a surface outside of the designated property. Can be horizontal, vertical, or on a tilted surface.

Luminance: The photometric unit for brightness. Typically reported in metric units of "cd/m^2". As noted above, used interchangeably with intensity throughout this report to assess glare potential.

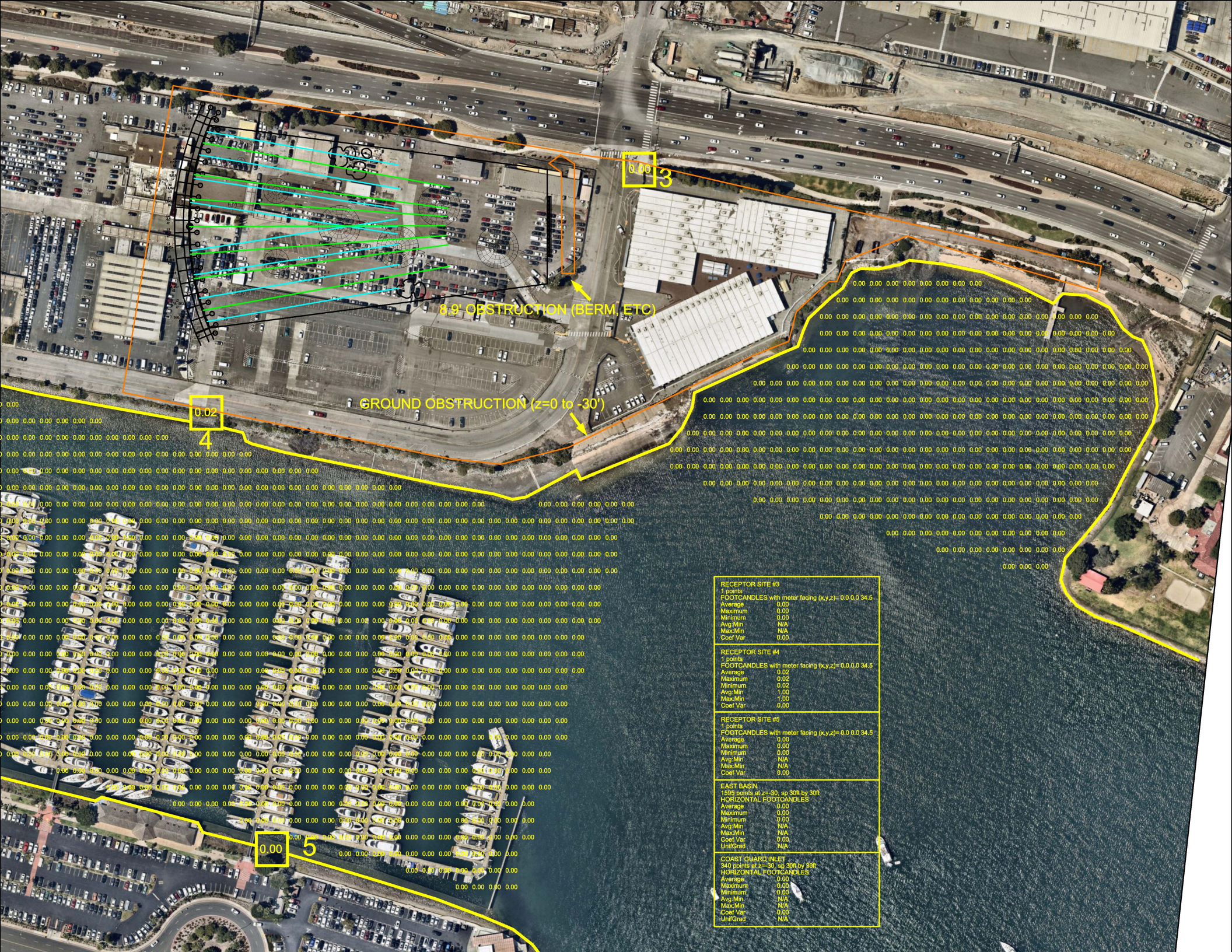
Photometric: The calculation of light.

Pre-curfew: Time during the operational period of the facility.

Pseudocolor: The use of a color scale to provide visual data mapping.

Annex 1: Sports Lighting Information

Provided by Qualite, Inc on 30 January 2025



RECEPTOR SITE #3
1 points
FOOTCANDLES with meter facing (x,y,z)= 0.0 0.0 34.5

Average	0.00
Maximum	0.00
Minimum	0.00
Avg:Min	N/A
Max:Min	N/A
Coef Var	0.00

RECEPTOR SITE #4
1 points
FOOTCANDLES with meter facing (x,y,z)= 0.0 0.0 34.5

Average	0.02
Maximum	0.02
Minimum	0.02
Avg:Min	1.00
Max:Min	1.00
Coef Var	0.00

RECEPTOR SITE #5
1 points
FOOTCANDLES with meter facing (x,y,z)= 0.0 0.0 34.5

Average	0.00
Maximum	0.00
Minimum	0.00
Avg:Min	N/A
Max:Min	N/A
Coef Var	0.00

EAST BASIN
1595 points at z=-30, sp 30ft by 30ft
HORIZONTAL FOOTCANDLES

Average	0.00
Maximum	0.00
Minimum	0.00
Avg:Min	N/A
Max:Min	N/A
Coef Var	0.00
UnifGrad	N/A

COAST GUARD INLET
340 points at z=-30, sp 30ft by 36ft
HORIZONTAL FOOTCANDLES

Average	0.00
Maximum	0.00
Minimum	0.00
Avg:Min	N/A
Max:Min	N/A
Coef Var	0.00
UnifGrad	N/A

Pole	x-loc	y-loc	height	N2HV	N4HV	Total	kw
L1	31.6	-170.9	27ft		1	1	0.5
L2	17.8	-129.2	27ft		1	1	0.5
L3	8	-86.8	27ft		1	1	0.5
L4	1.9	-43.4	27ft		1	1	0.5
L5	0	0	27ft		1	1	0.5
L6	1.9	43.4	27ft		1	1	0.5
L7	8	86.8	27ft		1	1	0.5
L8	17.8	129.2	27ft		1	1	0.5
L9	31.6	170.9	27ft		1	1	0.5
U1	24.6	-150.8	42ft	1		1	0.5
U2	8.2	-93.7	42ft	1		1	0.5
U3	1.6	-49.6	42ft	1		1	0.5
U4	-0	0	42ft	1		1	0.5
U5	1.6	49.6	42ft	1		1	0.5
U6	8.2	93.7	42ft	1		1	0.5
U7	24.6	150.8	42ft	1		1	0.5
Total				7	9	16	8.3

N2HV
GEN 3 SMALL w/BALLGUARDS & VISORS

N4HV
GEN 3 SMALL w/BALLGUARDS & VISORS

X Y Z = coords of mounting location, x y z = coords of aiming point
H = horizontal aiming angle, L(eft) or R(ight) of normal from pole
V = vertical aiming angle, degrees up from nadir

	X	Y	Z	x	y	z	H	V	type
L1	31.6	-170.9	27.0	376.8	-110.6	0	11R	86	N4HV
L2	17.8	-129.2	27.0	377.7	-68.1	0	6R	86	N4HV
L3	8.0	-86.8	27.0	375.9	-31.7	0	2R	86	N4HV
L4	1.9	-43.4	27.0	374.2	13.5	0	3L	86	N4HV
L5	0.0	0.0	27.0	374.6	-0.1	0	0	86	N4HV
L6	1.9	43.4	27.0	374.2	-13.5	0	3R	86	N4HV
L7	8.0	86.8	27.0	375.9	31.7	0	2L	86	N4HV
L8	17.8	129.2	27.0	377.7	68.1	0	6L	86	N4HV
L9	31.6	170.9	27.0	376.8	110.6	0	11L	86	N4HV
U1	24.6	-150.8	42.0	468.7	-71.3	0	8R	85	N2HV
U2	8.2	-93.7	42.0	466.1	-32.7	0	4R	85	N2HV
U3	1.6	-49.6	42.0	462.6	-16.1	0	2R	85	N2HV
U4	-0.0	0.0	42.0	460.8	1.4	0	0	85	N2HV
U5	1.6	49.6	42.0	463.5	18.1	0	2L	85	N2HV
U6	8.2	93.7	42.0	466.1	32.7	0	4L	85	N2HV
U7	24.6	150.8	42.0	468.7	71.3	0	8L	85	N2HV