

The Assessment of LVT Mobile Surveillance Units

Regarding potential lighting issues



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Report Summary

After performing background research, the collection and analysis of data, site surveys and personal witness of the nighttime lighting generated from the LiveView Technologies (LVT) corporation's mobile security units (MSUs) and its surroundings, I find there to be evidence that the lighting is having a measurable impact on and around the properties where they are deployed.

These effects include;

1. Significant light trespass onto public ways
2. Creation of a measurable visual safety hazard,
3. A quantified visual distraction for drivers, pedestrians and cyclists on nearby roadways,
4. Persistent, high intensity, strobing light that can impact people with photophobic health conditions

Top Level Results:

- In the locations surveyed, light generated by LVT units is not contained on the properties where they are installed. **Illuminance values as high as 145 lux** were measured on the public way an order of magnitude higher than most standards.
- High intensity glare from the LVT units is generating a visual hazard in the area surrounding them and on the properties they serve. The maximum acceptable Unified Glare Ratio (UGR) is 19 on a scale of 5 to 30+. The calculated **UGR at 9m in line of sight from the MSU on the public way was 45.8.**
- The **strobing percentage of 77%** at a frequency of 20Hz and **flicker percentage of 64%** at 100Hz both **violate California Title 24** code and **IEEE 1789-2015** standards for safe and healthy lighting.
- The spectrum of the strobe lights was measured with a **81.5% blue content.** Blue light of this intensity is known to create visual impairment through interocular refraction particularly in older people.

My observations are that the application and design of the lighting used on the LVT MSUs is inappropriate for public spaces according to lighting standards, local codes and accepted research. It can create potential safety and human risks. The glare and high-intensity blue light it produces can reduce visual acuity for drivers and pedestrians. There is also a risk for people who suffer from photosensitive conditions. Health risks may include photo-triggered migraines, epileptic seizures, autistic repetitive behaviors, eye strain and visual fatigue.

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Methods

I used a variety of data sources, instruments, software and processes to generate this report. I collected numerous in situ observations including calibrated photographs, photometric readings and light spectra. The following is a summary of the instruments, data and software used.

Instruments

For my evaluation of the lighting on the LVT Mobile Surveillance Units (MSUs) and their potential effects on the local environment, I used the following instruments on and around locations where they were installed and in use.

Sper Scientific 840022 Illuminance Meter - This device measures the quantity of light falling on a surface in lux. It can help determine whether proper light levels are met and quantify the amount of light trespass.

Hopocolor HPCS-330P Spectrometer - This device is used to measure the spectra of light sources as well as their illuminance (lux), color temperature (K), color rendering index (CRI), flicker and many other photometric details.

Sekonic Speedmaster L-858D-U luminance meter - This device measures the quantity of light emitted from a source which is useful in the quantification of light intensity and glare. It provides data in the SI units of candela per meter²

Canon EOS M6 Mark II digital camera - A 24MP digital camera, set to manual mode and a consistent white ("daylight") balance of 5350K (unless otherwise noted), was used to capture images of the locations. Also useful for comparative purposes.

iPhone 17 Pro Max - for high speed video capture and documentation imagery.

Note: Photographs cannot fully represent the human visual experience. The dynamic range and adaptive sensitivity of our visual system at night cannot be matched entirely with a digital camera. Photos are intended to capture and compare light sources and environments as objectively as possible. For this reason, they may appear darker or with more contrast than one would be experienced in person. In general, digital photography has a more *limited* dynamic range than human vision. Comparative photos were all captured with identical settings unless otherwise noted.

Spatial Analysis

For Geographic Information System (GIS) work I used QGIS software as well as Google Earth imagery including Google Streetview. QGIS was used for data management, inventories and spatial analysis such as determining altitude variance, distance measurements and light distribution effects.

Background Research

LVT Mobile Surveillance Units

Founded in 2005 LiveView Technologies is based in American Fork, Utah. It specializes in mobile surveillance security technology. Its primary product offering are its Mobile Security Units (MSUs) which combine video surveillance in conjunction with visible, flashing “warning” lights and audio capabilities in a mobile, self-contained unit.



Figure 1: Image of an LVT MSU posted on the Google Maps page for the LVT company.

Thousands of these units deployed in both public and private outdoor locations. According to a post on the company's website on May 6, 2024:

"With more than 4,500 users, over 363 million images, and 1.4 million video streams, LVT Units work around the clock and cost considerably less than a full-time team of security guards."

The LVT MSUs are positioned with a solar panel oriented towards the south. Persistent, blue, strobe lights are mounted on opposite faces of the main structure. A 20' (6.3m) mast with cameras, a speaker and additional lights mounted on top rises above the main structure of the MSU. Up to three of the faces of the mast also have persistent, blue strobe lights in addition to other lights not seen illuminated during field inspections. It is presumed these lights are only operated for deterrent purposes.



Figure 2: Comment posted on Google Maps and the response from LVT touting the visibility of the blue flashing lights on their MSU

From the units inspected, it was determined that the lighting technology used for the blue strobing lights on the MSUs are produced by Abrams Manufacturing. The specific model used is the TG-300-B (Figure 3). The TG-300 Grill Lights are a compact unit of three, 3W (for a total of 9W), synchronized, high-intensity LEDs. The unit utilizes Total Internal Reflection (TIR) optics to provide a concentrated, forward-facing beam with maximum straight-on brightness.

The unavoidable visibility of these rapidly flashing lights is an intended goal of LVT as the corporate response to a Google Maps comment shows (Figure 2)

T3 Series



SKU	TG-300
DIMENSIONS	3.1" X 1" X 1.5"
VOLTAGE	10-30 VDC
WATTAGE	9W
AMPS	1A
WEIGHT	3 OUNCES
LED COUNT	3 LED
WATERPROOF	IP67 RATED
COLOR TYPE	SINGLE COLOR
LIGHT SPREAD / BEAM TYPE	TIR SPREAD
AVAILABLE COLORS	

SPECIFICATIONS:

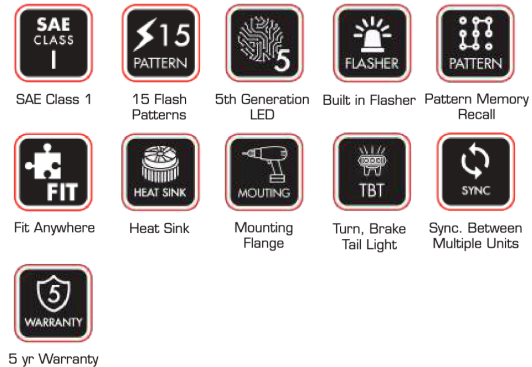


Figure 3: Abrams MFG TG-300 Grill Light Specifications

It is worth noting that the instructions provided by Abrams MFG for the TG-300 units include the following warning:

“IMPORTANT:

PLEASE READ ALL OF THE FOLLOWING INSTRUCTIONS BEFORE INSTALLING YOUR NEW ABRAMS BLASTER SERIES HIDEAWAY.

THIS PRODUCT CONTAINS HIGH-INTENSITY LEDS. DO NOT STARE DIRECTLY INTO THESE LIGHTS. MOMENTARY BLINDNESS AND/OR EYE DAMAGE COULD RESULT.”

(Highlighting added for emphasis)

Lighting Standards

IEC 62471 is an international safety standard that evaluates the photobiological safety of lamps, LEDs, and lighting systems. The potential harms categorized by Risk Group (RG) in its standards include permanent retinal damage due to the intensity and spectrum of a light source. Under this standard, the Blue Light Hazard category ranges from RG0 (exempt from restriction) through RG3, considered “High Risk” with exposure restricted to less than 0.25 seconds. From my preliminary photometrics (see below) it appears the TG-300-B falls within the range of a RG1-RG2 level source. These specifications are only valid if tested under exacting laboratory conditions and are often required to validate the safety and use in many situations. For regulatory safety reasons, this information should be provided by Abrams Mfg.

The Society of Automotive Engineers produces standards for flashing emergency lights. SAE J595 defines performance and testing requirements for directional flashing optical warning

devices. These signal lights are intended for use in “authorized” emergency vehicles. They are classified for use in three different tiers (Class 1 through 3) based on their luminous intensity (candela) output. According to the manufacturer, the Abrams TG-300-B is an SAE Class-1 warning light.

Lighting Ordinances

Although there are no uniform national laws regarding the use of strobing lights, many restrictions and regulations of their use are found at the local or state level. Additionally, the ordinances or rules limiting flicker are limited. The State of California has flicker (and subsequently, strobing, by its definition) standards within its building codes.

[California's Building Standards Code](#), known as Title 24, sets limits on the amount of flicker generated by lighting at residential and commercial properties. The Joint Appendix 8 (JA8) defines the requirements to meet the California standards and Joint Appendix 10 (JA10) sets the testing methods. Under JA8, light sources must exhibit

“less than 30% flicker for frequencies at or below 200 Hz, measured at both full (100%) and dimmed (20%) levels.”

JA10 defines the “Test Method for Measuring Flicker of Lighting Systems and Reporting Requirements”:

“This test method quantifies flicker from lighting systems ... This test method measures the fluctuation of light from lighting systems and processes this signal to quantify flicker as a percent amplitude modulation (percent flicker) below a given cut-off frequency.”

The intent of this regulation is to reduce the harms that visible flicker can cause. Since these standards specifically include “frequencies at or below 200Hz” they arguably are applicable to strobing lights as well.

Local ordinances vary from jurisdiction to jurisdiction. In Chicago, for example, municipal code 13-96-1120 states:

(a) No owner or occupant of any premises shall install, operate or permit the operation of any of the following lamps or lights in such a manner that the light is visible on any portion of the public way:

- (1) a strobe light;
- (2) a flashing or revolving light that resembles or duplicates the operation of an emergency light used on a police vehicle, fire department vehicle, ambulance or tow truck;
- (3) any type of light that, because of its brightness or direction, may interfere with the safe operation of a vehicle on the public way.

(b) No owner or occupant of any premises shall install or maintain any of the following lamps or lights in such manner that the light is directed at or illuminates the residence of another person:

- (1) a strobe light;
- (2) a flashing or revolving light that resembles or duplicates the operation of an emergency light used on a police vehicle, fire department vehicle, ambulance or tow truck;

Unfortunately, the enforcement of these regulations rarely occurs once the lighting is applied in the public environment.

Health & Light

Strobing and flickering light - particularly of high intensity and in high-contrast environments such as at night - has long been recognized as a potential health risk for many people for a variety of reasons. Some of the known health issues include seizures, vertigo, headaches, and autism sensitivity. Photosensitive seizures affect roughly 1 in 4,000 people, inducing generalized tonic-clonic (Grand mal) or absence seizures [1]. Flicker vertigo can cause disorientation, dizziness, nausea, and visual fatigue even in people without epilepsy [2]. Migraines can be triggered by rapid, high-contrast flashes resulting in severe headaches or sensory overload [3]. Potential autonomic nervous system dysfunction in those with autism which is involved in a misregulation of sensory processing and sensory dysfunction [4].

People with visually-provoked seizures have individual triggers. Bright lights that flash very quickly are the most common trigger. Lights that flash 10 to 25 (especially 15–20) times per second tend to be the most likely to trigger seizures [5].

Definition of Photometric Terms

Three related but distinct quantities are used throughout this report: illuminance, luminous intensity, and luminance. Each answers a different question, and distinguishing them is essential to understanding why a light source can be hazardous even when it does not appear unusually bright by every measure.

Illuminance (Ev, lux) is the amount of light falling on a surface, regardless of what produced it. A lux meter answers the question: “how much light is landing here?” Because illuminance depends on distance and on the total flux delivered to a point, a large, dim source nearby and a small, intense source farther away can register identical illuminance.

Luminous Intensity (Iv, candela = lumens/steradian) is the amount of light a source radiates into a given direction, expressed as flux per unit solid angle. By definition, intensity is a directional, point-source quantity — the “cone” of light leaving the source — and does not itself contain a term for the physical size of the emitter. Two sources of very different sizes can have identical luminous intensity if they send the same amount of light into the same narrow cone.

Luminance (Lv, cd/m²) is the intensity of a source divided by its own emitting (or projected) area, in the direction of view. Luminance is the only one of the three quantities that captures how concentrated the light is at its source. The value of this concentration is the parameter that best defines the physical, visual stimulus that can cause discomfort, glare and/or photophobic responses. This is why international photobiological safety standards such as IEC

62471, and glare metrics such as the Unified Glare Rating discussed later in this report, are built on source luminance rather than on illuminance or intensity alone.

Consider a 60" television (approximately 1 m²) displaying a solid white field at a luminance of 200 cd/m². Its on-axis intensity toward a viewer is ($I = L \times A = 200 \text{ cd/m}^2 \times 1 \text{ m}^2$) 200 candela. A viewer several meters away would experience a comfortable, if bright, illuminance in a dark room. Now, picture a source delivering that same 200 candela toward the viewer, but from an area of only 1 cm² instead of 1 m², like a focused LED. Because intensity is fixed at 200 cd from an area 10,000 times smaller, its luminance must be 10,000 times higher ($L = I/A = 200 \text{ cd} / 0.0001 \text{ m}^2$) 2,000,000 cd/m². A lux meter or even a candela measurement at the viewer's position would register the same reading for both sources. But the second source is vastly more hazardous, because the same quantity of light energy is concentrated into the eye in an area roughly 10,000 times smaller, creating a "hot spot" on the retina. This is why a commercial laser pointer, that may register only a few hundred lux at 1 meter, still carries warnings against direct viewing. Its total output and even its illuminance are modest, but its luminance is enormous.

The TG-300-B strobe evaluated in this report follows the same pattern. Its measured illuminance at 1 meter (145 lux) is comparable to a well-lit commercial space and, on its own, would not suggest a hazard. Its measured luminance (700,000 cd/m²), however, is orders of magnitude above the luminance of common light sources and displays. It is this figure that drives the glare and photobiological hazard findings presented in the remainder of this report.

Field Surveys

On multiple occasions both day and night during the month of July 2026 I surveyed three LVT MSUs in Chicago. One is located at the street level parking lot entrance of a CVS pharmacy. The other two are located at the street level parking lot entrance and the rooftop parking lot of a Mariano's grocery store. All three of these MSUs had nearly identical lighting configurations and all appeared to display the same lighting use at night. In all cases, the strobing lights appeared to be functioning 24-hours, both day and night.

In addition, I performed a remote analysis of an LVT MSU installed at a Walmart parking lot in the town of Woodland, California using GIS software along with visual evidence provided from local observations.

From my observations, blue flashing TG-300 lights are mounted on opposite sides of the main body of the MSU at a height just under 1 meter from grade. On the mast, raised to a height of 6.3 meters (20 feet), there are two downward pointing, white, flashing lights and at least three blue lights pointing horizontally away from the mast on cardinal sides. In addition, the top of at least one mast was equipped with an Abrams model HDS-48S 3840 lumen flood light. This light was not in use at any time of my survey. I would assume this light is only triggered in the case of a desire for increased deterrence.

Calibrated digital photography



Figure 4: MSU unit lighting on main unit and mast (left) and height of main unit strobe above ground level (right) just below eye level.

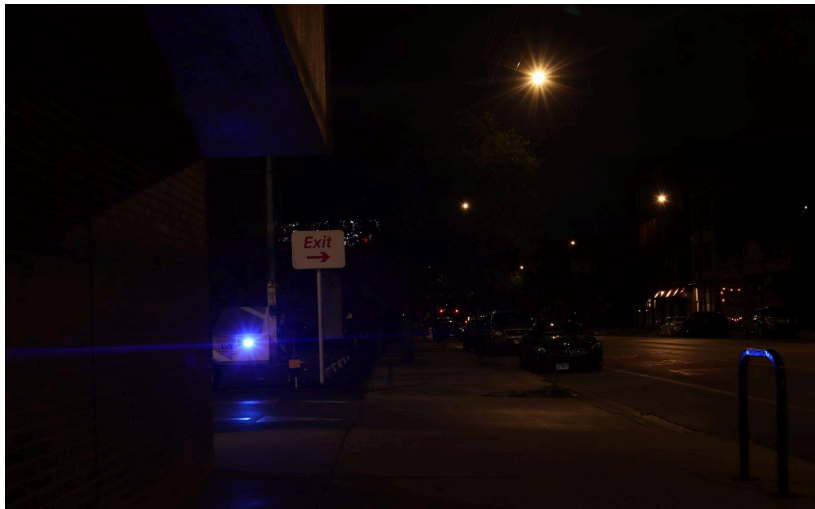


Figure 5: Comparative brightness of MSU strobe light (left) in relation to municipal street light (upper right). The strobe is of similar visual intensity to the street light which is designed to provide illumination covering more than 400m².

Video Documentation

The following screenshots are from video documents of LVT MSUs visited. The complete videos are linked in each screenshot caption.



[Video 1](#): Flashing MSU lights captured from entrance of residential building across the street from Mariano's parking lot location.



[Video 2](#): Arrangement and function of strobe lights on mast of CVS MSU



[Video 3](#): Pedestrian eye level view of CVS MSU from the public sidewalk approaching the blind exit of the parking lot.

Glare

Glare is defined by the Illuminating Engineering Society (IES) as “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](#).”

Glare can be a safety and health issue. In the case of the LVT MSUs - often located at the edge of the public way - the glare the strobe lights are generating can be visible 100s of meters away and have a quantifiable impact on roadway safety.



Figure 6: Blue Strobe Light (center) clearly visible from the roadway at a distance of more than 200m from the LVT MSU in the CVS pharmacy parking lot. Even from this distance it was visibly brighter than approaching headlights and street lights in view.

Figure 7 shows an aerial view of the CVS and the roadway (Chicago Ave.) to the east. The green circle marks the location from where Figure 6 was photographed. The blue arrow is the line of sight to the LVT MSU 219m away. The red wedge indicates the 10° spread of the peak area of luminance from the blue strobe on the side of the MSU. The length of the wedge (194m) is the distance where the Unified Glare Rating (UGR) of the light meets recommended standards. Anywhere within that wedge would classify as exceeding the recommended UGR.

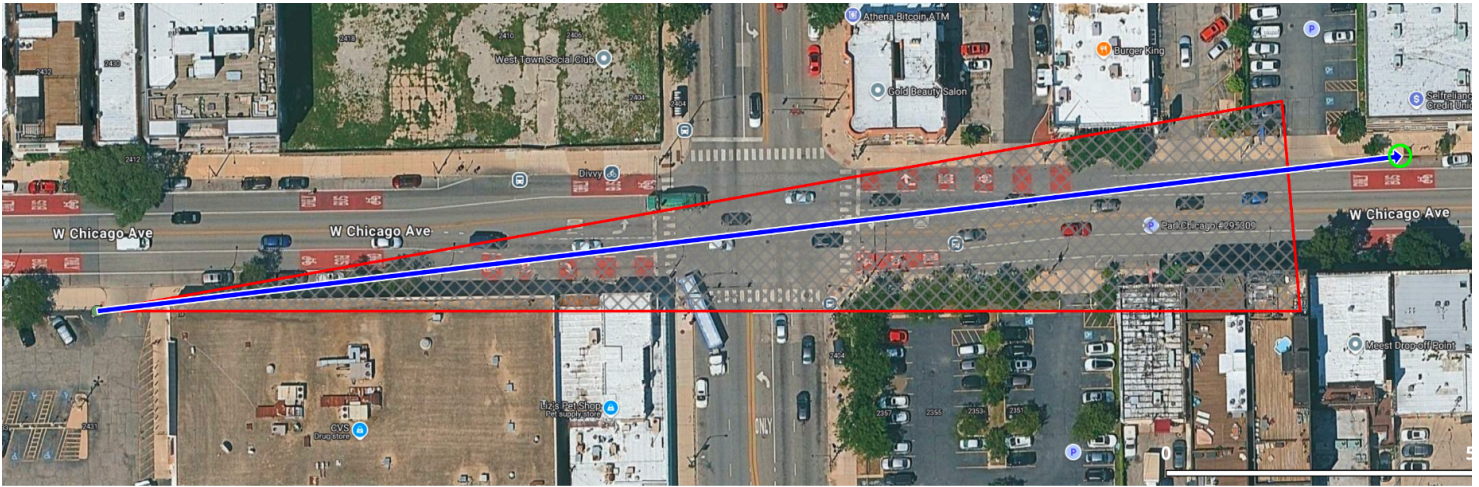


Figure 7: Aerial view of the line of site seen in above image. Location where Fig. 6 was taken (green circle) is beyond the area of “Unacceptable” glare (red arc) (Imagery ©2026 Airbus, Maxar Technologies, Vexcel Imaging US, Inc., Map data ©2026 Google)

Woodland MSU

In the case of the two LVT MSUs deployed meters from E Main Street in the Walmart parking lot at 1720 E Main Street in Woodland California, I used eyewitness accounts, collected information from representative MSUs and GIS data to approximate the potential impact on the local environment.

From a driver on E Main St, the MSU to the east is mostly obscured by trees but is still visible from the parking lot itself. The MSU to the west is visible to motorists, particularly those traveling eastbound on Main St. Due to the flat topography and relatively unobscured view from the road, the strobes on the mast of the MSU could be visible from 100s of meters to the west. Additionally, this MSU is located only 24m (80 ft) from a public bus shelter.

Figure 8 shows an aerial view of the area and roadway (East Main St.) near the Walmart MSU. The green circle marks the location of the MSU. The red, dashed arrow is the line of sight from the unit. The red wedge indicates the 10° spread of the peak area of luminance from the blue strobe on the side of the MSU. The length of the wedge (610m) is the distance where the Unified Glare Rating (UGR) of the light meets recommended standards. Anywhere within that wedge would classify as exceeding the recommended UGR. The pink, dashed arrow indicates the direction towards E. Main St. where there is a gap in the tree coverage. From eyewitness accounts, the strobe is visible to a driver traveling east-bound on Main St. [Note: this is a model example. I do not have precise knowledge of the orientation of the functioning strobes from this location. The actual direction of the beam angle may be different than what is demonstrated.]

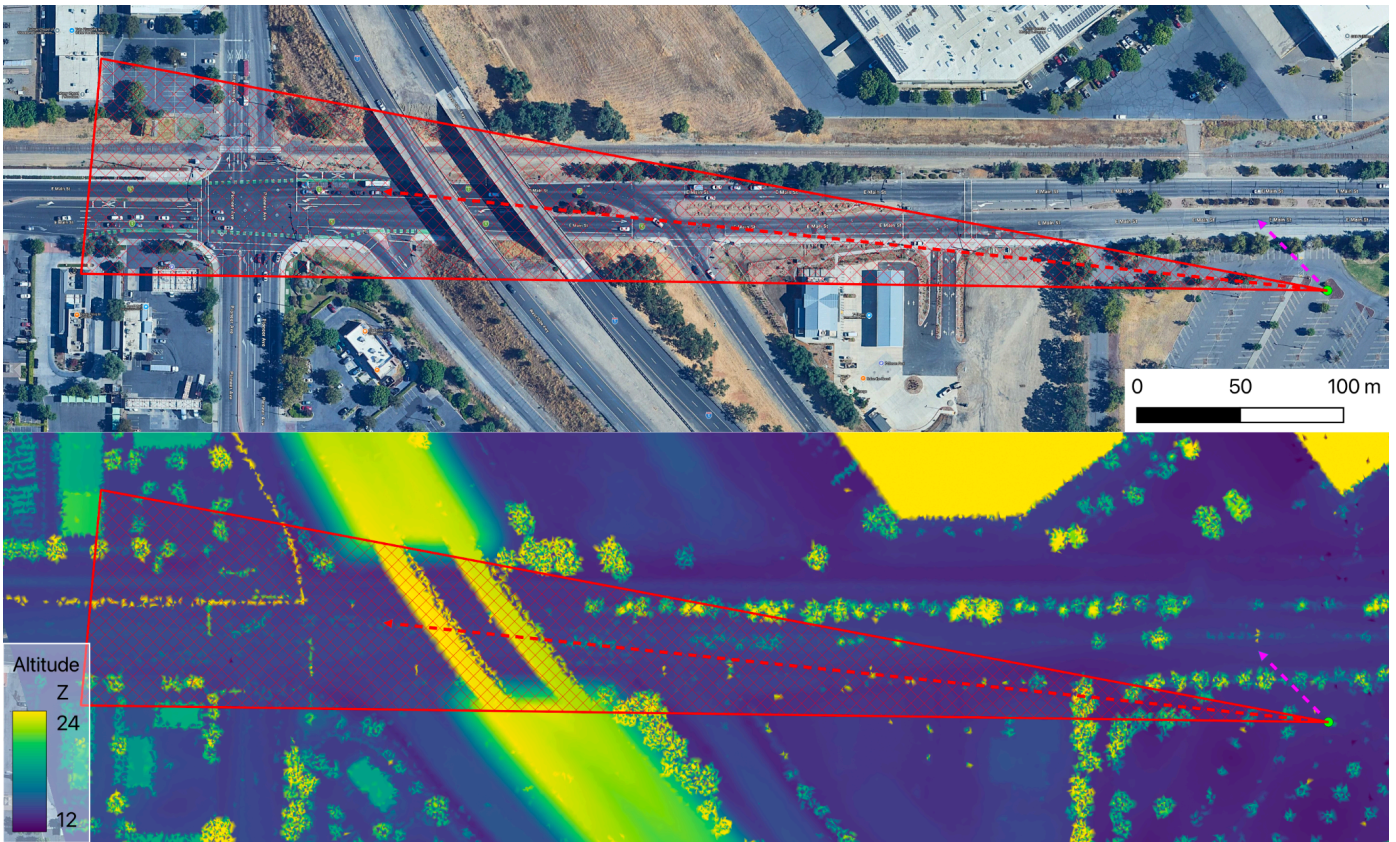


Figure 8: Woodland Walmart MSU (green dot). Direct view from Main St (pink arrow) and westward in the direction of Main St (red arrow). The red hashed arc is the 10° peak spread of the strobe to the distance where the uniform glare rating reaches an “Acceptable” level (see Results: Glare). The lower image shows a digital elevation model of the area in meters. (Imagery ©2026 Airbus, Maxar Technologies, Map data ©2026 Google)

The ground elevation where the MSU is located is 13.7m (ASL). The mast is 6.5m high. This puts the mast mounted strobe lights at an altitude of ~20m. In the immediate area this is higher than nearly all other points except some treetops, a couple buildings and the I-5 overpass.

Photometry

An [Abrams TG-300-B](#) unit was purchased to perform a controlled photometric analysis. The unit was switched to “Steady Burn” mode and powered at 12V with a calibrated DC power supply. The unit was powered on and allowed to stabilize for a minimum of five minutes.

Distribution

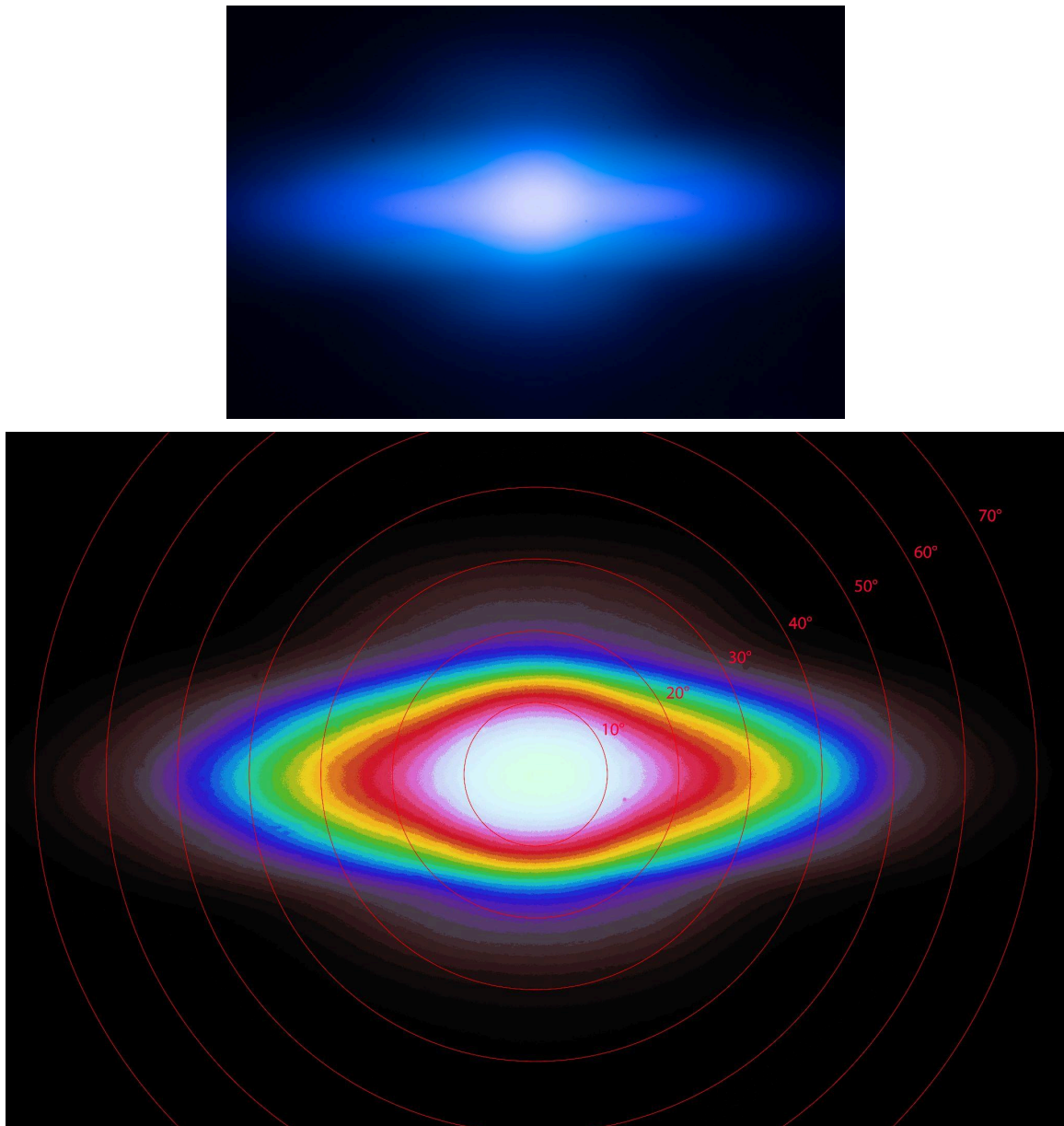


Figure 9: Visual distribution of the TC-300-B unit in true color (top) and a flat field projection of the intensity and projection angle of the light being generated (bottom).

What can be seen from this analysis (Figure 9) is that a majority of the light (60.3%) is emitted within 30° of the center line of the unit with 12% of that energy concentrated within only 10° of center. This is typical of Total Internal Reflection (TIR) optics which concentrate a forward-facing beam. Since the distribution of this light is tightly focused, an observer within line of sight of the unit is most at risk of experiencing any potential harm.

Illuminance, Luminance and Luminous Intensity

Luminance, L_v (cd/m^2), luminous intensity, I_v (cd) and illuminance E_v (lux) were measured under controlled conditions.

At 1m, the CIE photopic corrected **illuminance** value measured at the center of the emission peak is **145 lux**. For a sense of scale, IES recommended illuminance (RP-43-25) for pedestrian safety in a developed (Lz2) commercial space is 4 lux with a maximum of 8 lux. This level of illuminance is more than an order of magnitude above what should be expected in an environment such as this.

Luminance in the direction of the strobe's central peak of emission was measured as **700,000 cd/m^2** . Given that the total emission area of the three LEDs in the TG-300-B unit is 10.4cm^2 this means the total peak **luminous intensity** is **728 candela**.

Spectrum

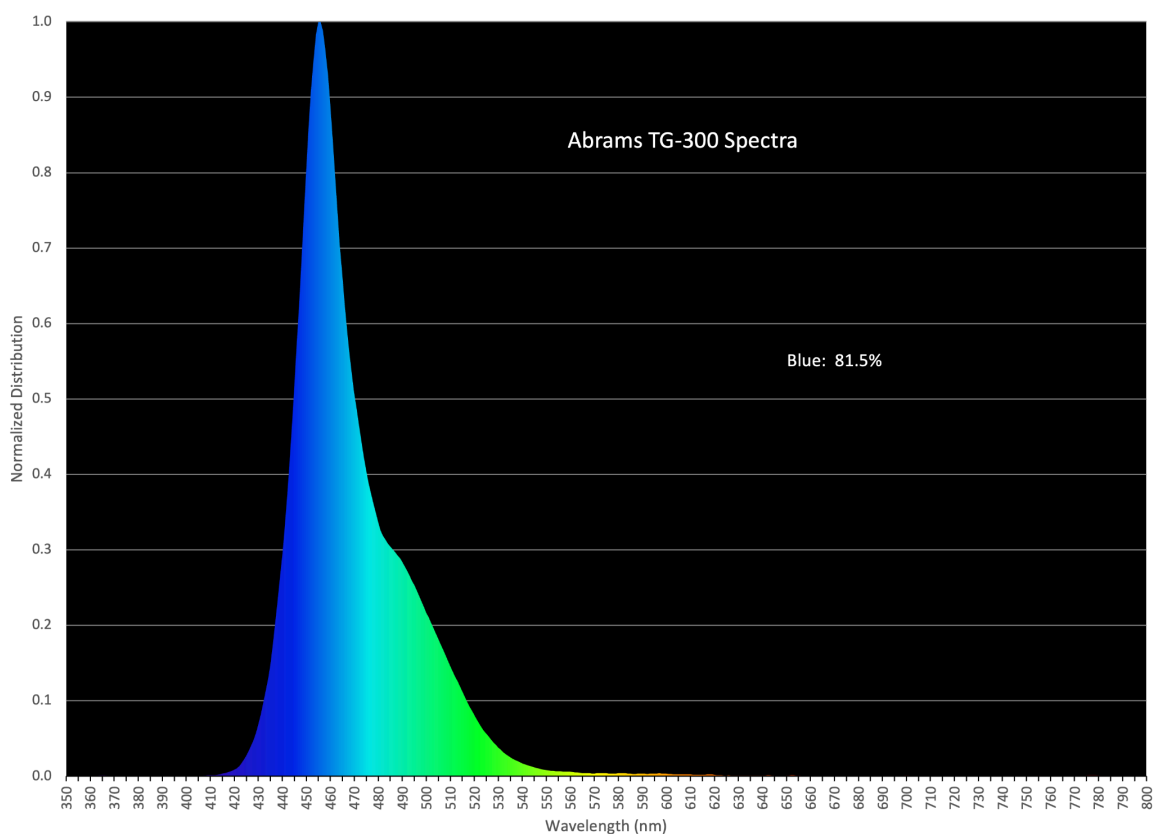


Figure 10: Spectral distribution of the TG-300-B light

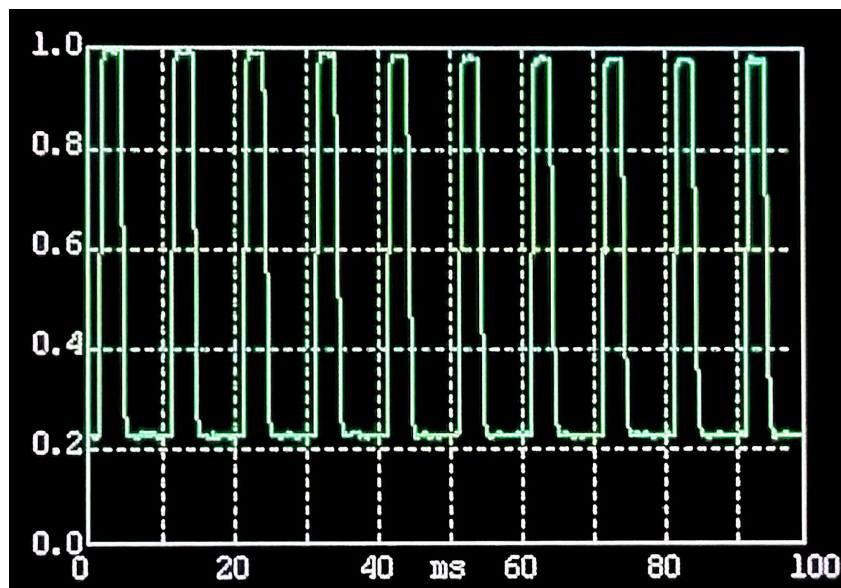
More than 80% of the light emitted by the TG-300-B strobes is in the “blue” part of the spectrum with a peak emission at 456nm. There is no equivalent CCT since this is a near monochromatic source and does not fall within any black body standard.

Temporal Light Modulation

Flicker

Flicker is high frequency pulsing in the output of a light source. In the past, flicker was common in luminaires powered by AC due to the nature of its current fluctuations. In DC-powered LEDs it is caused by the rapid “on/off” cycle occurring due to pulse width modulation (PWM) generated by the driver. It is most pronounced in LED technology that does not have a driver that compensates for this effect.

The TG-300 unit shows a strong (~64%) 100Hz flicker. This is just beyond the range of what is defined as “visible flicker” and is known to create what is called “stroboscopic flicker”.



Freq (Hz)	100.1
Flicker Percentage (%)	63.9
Flicker Index	0.24
Flicker Cycle (ms)	10.0

Table 1: TG-300 Flicker metrics with recorded Flicker profile (above)

Strobing

Different from flicker, which is generated from residual fluctuation of the power, stroboscopic patterns are designed into the function of the light. The TG-300 has the option of 15 flash patterns. The default, “P9 Quint 75 PH1”, pattern was observed being used on all the LVT units (Figure 11). This mode consists of a pattern of 5 pulses at a frequency of 20Hz followed by a 0.2

second gap. The entire pattern repeats more than twice a second. The first four pulses of the sequence have a duration of ~50ms and the fifth lasting ~200ms.

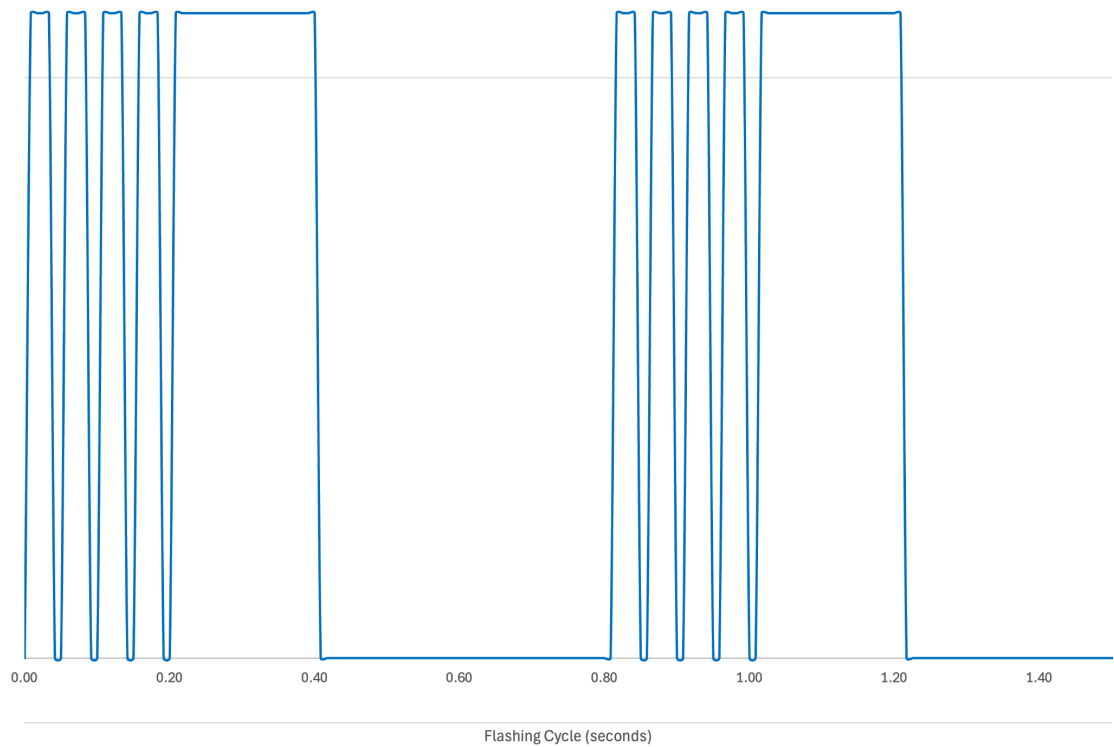


Figure 11: Strobing Profile of the TG-300 lights set to the P9 Quint 75 PH1 setting

Freq (Hz)	20.9
Flick Percentage (%)	77.4
Flicker Index	0.385
Flicker Cycle (ms)	47.85

Table 2: Strobing Properties of the TG-300

Results

Glare

The most universally accepted calculation for determining glare is the Unified Glare Rating (UGR) developed by the CIE and since updated (CIE 150:2017) and accepted by the IES (LS-6-60). It provides a method to determine the acceptability of glare in outdoor environments. The result of the calculation is a number in a range from 5 to 30+ with any value above 19 considered producing unacceptable glare (Figure 12).

UGR	Definition
10	Imperceptible
16	Perceptible
19	Just Acceptable
22	Unacceptable
25	Just Uncomfortable
28	Uncomfortable
31	Just Intolerable

$$UGR = 8 \cdot \lg \left[\frac{0,25}{L_b} \cdot \sum \frac{L_s^2 \cdot \Omega}{p^2} \right]$$

L_b = luminance of the background (cd/m²)

L_s = luminance of source(s) (cd/m²)

Ω = solid angle of light source (steradian)

p = angle from center of vision (Guth position index)

Fig. 12: UGR definitions, formula and variables

The UGR for a number of the field survey locations were calculated. Since all locations had the same source the luminance (L_s) is 700,000 cd/m². The Guth position index was always 1 since we're calculating the peak line-of-sight value. For the Chicago locations the background luminance (L_b) is a standard 3.0 cd/m² for an urban environment. For the Woodland site the value of $L_b = 0.3$ cd/m² is the standard for a suburban environment

Chicago CVS

For drivers traveling westbound towards the CVS the strobe light on the base of the MSU is clearly visible >200m away. At 90m (the intersection of two main roads) the UGR is **29.8** - far beyond the acceptable level. For a pedestrian or bicyclist crossing the parking lot entrance at 9m away, the UGR is **45.8** - this value is far beyond even the Intolerable level.

This situation is even more concerning when considering drivers, pedestrians, cyclists and others at or near an MSU whose light is immediately encroaching on a public way. For example, at the CVS location, the flashing light on the main body of the MSU is facing in the direction of the public sidewalk crossing the active, 24-hour parking lot exit. If we calculate the UGR for a pedestrian or driver exiting the parking lot 4 meters from the MSU, the result is an astounding UGR of **51.5!** This luminaire emits 100x more light than would qualify under the threshold for acceptability for glare at this distance.

Given the photometrics of the light, the distance for an acceptable UGR can be calculated. In this case, 194m is the minimum distance allowed. Any direct visibility closer than 194m is classified as unacceptable.

Woodland Walmart

For the Woodland Walmart location, an eastbound driver on Main St directly encounters the strobe ~50m from the MSU. At this distance the UGR is **41.8**. Again, far beyond the range of "Intolerable". For this scenario the calculated acceptable distance for direct line of sight would be 610m. Any direct visibility closer than 610m would be classified as unacceptable. Since the mast-mounted strobe lights are over 6m above the ground and the immediate topography is relatively flat, it is entirely conceivable that the light is visible at this distance.

Figure 13: Location of the tested and modeled scenarios in relation to the UGR scale. Note: Additional steps beyond 31 were added for context.

UGR	Definition	
10	Imperceptible	
16	Perceptible	
19	Just Acceptable	
22	Unacceptable	
25	Just Uncomfortable	
28	Uncomfortable	←CVS @ Intersection
31	Just Intolerable	
34	Beyond Definition	
37	Beyond Definition	
40	Beyond Definition	
43	Beyond Definition	←Woodland @ Main St.
46	Beyond Definition	←CVS @ Entrance

Color

Many standards give guidance for the maximum CCT recommended in outdoor spaces for safety, health and environmental protection. The IES RP-43-25 standard recommends a maximum of 3000K CCT. CIE, DarkSky International standards, as well as most recent research, is beginning to move toward a lower color temperature recommendation such as 2700 or 2200K. Most common commercial, off-the-shelf lighting falls within the range of 1800-6000K. The CCT of the LVT strobes was calculated to be greater than 12,000K. This high value is due to the near monochromatic nature of the blue light source. CCT is not a practical measure for monochromatic sources. However, the constant intensity of blue light output can create potential health risks.

This is only a common color for limited emergency lighting such as police vehicles. Some local codes and ordinances explicitly prohibit the use of lighting that emulates police emergency lights such as this.

Strobe & Flicker

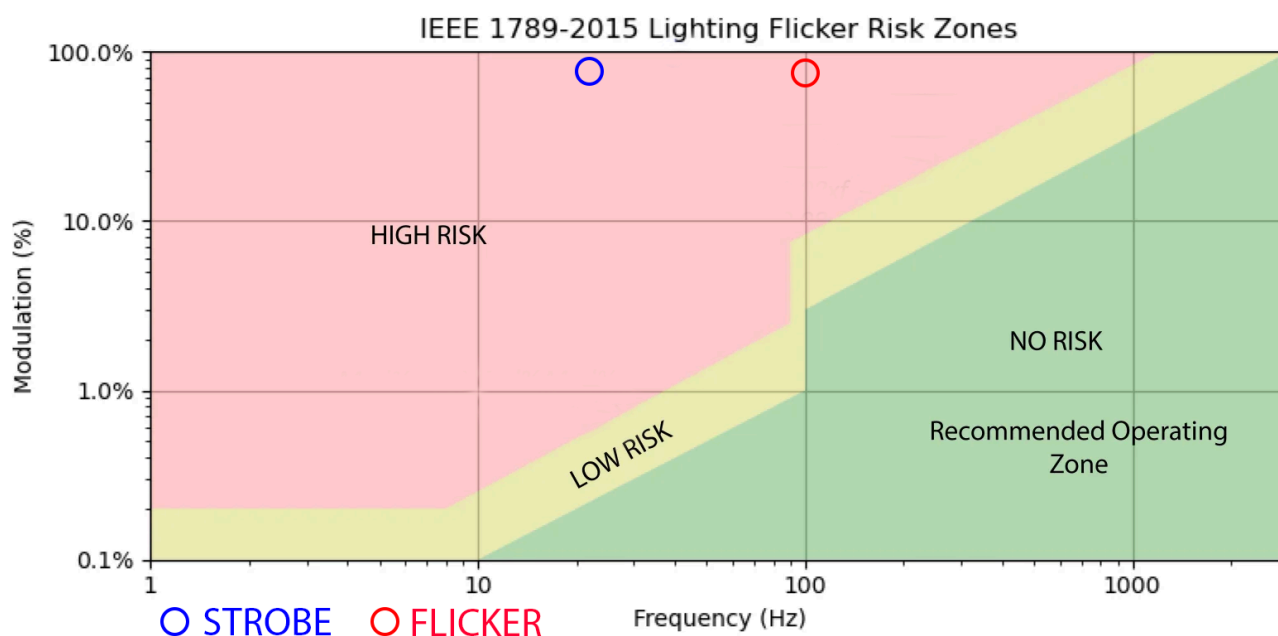


Figure 7: Strobe (blue circle) and Flicker (red circle) frequency and modulation percentage as measured from the TG-300 plotted on the IEEE 1789-2015 standard.

The 20Hz strobe frequency - in conjunction with the high percentage of modulation - places it in the highest range of risk for visually-provoked seizures in those who suffer from photophobic health issues.

The flicker produced by the TG-300 lights is in the "High Risk" category according to IEEE standards and is firmly in violation of the California Title 24 standards.

Safety

Glare, trespass, strobing and high-intensity blue light are all factors being created by the LVT MSUs. These are all known risk factors for visual interference and impairment. This becomes particularly acute in the case of motorists and pedestrians as many of these units are deployed near or at roadways, sidewalks and the public way.

Health Impacts

As has been demonstrated, the form of the lighting on the MSUs can be harmful to those with photophobic sensitive conditions. The specific issues are with:

- Concentrated, high-intensity light specifically in contrast with a dark environment
- Intense blue-rich content of light generating interocular glare
- Flicker known to induce certain photosensitive illnesses
- Strobing which is associated as a trigger to a variety health issues

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