

Lighting Design Innovations•

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Topic Memo

Topic: CARmax Wappinger Exterior Lighting – Comments Response
LDI Project Number: NY-202206
Issued By: P. Mercier
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Executive Summary

When a municipality enacts a lighting code it is responsible for compliance with the lighting code established and for the safety and security of the people and the property within the town under the lighting that follows that code.

With that in mind, the proposed lighting plan LO-155279-10B (“the submission”) for the site follows lighting industry best practices for light (illuminance) levels, uniformity, security, safety, egress, energy and sustainability. Where the Town lighting code does not appear to meet state codes or the best practice recommendations of the lighting industry, it was assumed that the Town did not intend to fail to meet state codes or lighting best practice recommendations.

In other words, where a perceived conflict exists between §240-23 Exterior Lighting and a lighting industry recognized standard, a lighting industry recommended practice, and/or a state or federal code it was presumed that the application of §240-23 Exterior Lighting was not intended to supplant the minimum requirements of lighting best practices and/or state and federal codes.

Specific to the submission, the applicant has identified that requirements of §240-23 Exterior Lighting (“this Section”) appear to be in conflict with §240-23.A *Intent and Purpose* as noted, below. Additional conflicts are noted as applicable.

Safety

- §240-23.E Intensity of Lighting requirements establish constraints that do not allow for the provision of industry recognized lighting outcomes for safety, utility, and security. Additionally, this section does not appear to comply with:

- *2020 Fire Code of New York State* (which instructs 1.0 footcandle minimum, maintained illumination as the requirement along means of egress and exit discharge), and
- *IES RP-33 Lighting for Exterior Environments* (which instructs maintained, average footcandle levels as the standard unit of measure for target illumination), and
- *IES G-1 Guide for Security Lighting For People, Property, and Critical Infrastructure* (which instructs at least 3.0 footcandle average, maintained illumination value based on the usage of this site).

Energy Conservation and Light Pollution

- §240-23.E Intensity of Lighting requirement of at or below 1 footcandle average maintained is frequently used in national and state park settings.
- §240-23.F Pole Heights does not encourage conservation of energy or reduction of atmospheric light pollution (as the restriction on pole height requires more poles and more luminaires to achieve the same lighting outcomes).

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Color Temperature

- §240-23.G Lighting plan specifications requirements establish color temperature requirements that do not maintain the established aesthetic character of the Town (as observed color temperatures within the town are higher color temperatures than prescribed and will be noticeably different). Additionally, this section does not appear to comply with:
 - International Dark-Sky Association (IDA) Fixture Seal of Approval (FSA) values for ANSI measured color temperature values reported as 3000K CCT (which is allowed to be up to 3220K actual measured value in accordance with ANSI C78.377). It is important to note that IDA is not a lighting standards organization, but collaborates with lighting standards organizations – like the IES – to further their mission to “protect night from light pollution”.

§240-23.L of the Town of Wappinger code allows for the Planning Board to waive requirements of the section “...in cases where the Planning Board determines that better site design or safety can be achieved with lighting that does not comply with Section said section.” §240-23.L allows the Planning Board to accommodate deviations from the section that would enable a lighting application to be better aligned with the intent of the section and with state and industry recognized lighting standards.

Discussion

The following information is relative to the Hardesty & Hanover review memo dated September 06, 2022 for the proposed CARmax facility in Wappinger, NY. This Topic Memo addresses item “4. Lighting”, only.

Item 4. Initiating statement about request of waivers

- The only waivers requested are specific to apparent conflicts of the sections of the code with its stated intent and/or with the internationally recognized practice standards for lighting design and application.
- The intent is to request two (2) waivers:
 - Pole height, and
 - Color temperature
- The pole height revision enabled better uniformity of lighting, fewer poles, increased property line setbacks, co-location of security cameras, and lower glare perception.
- The color temperature revision improves color rendering (for security and for sales) and is more similar to other lighting installations in the community (for maintaining the established aesthetic character of the Town).
- The submission did not request a waiver for illuminance levels because it meets the code requirement of 2 to 5 footcandle range with a 3.3 average maintained footcandle level (it is presumed that, unless otherwise stated, the requirements of this Section are presented in the target illuminance format utilized by professionals for lighting standards and lighting codes).

Item 4.a. Pole Height

- Generally speaking, pole heights that result in the luminaires being closer to the ground (that is, “shorter pole heights”):
 - Require more poles to meet illuminance and uniformity targets,
 - Create higher levels of illuminance in more locations (referred to as “hot spots” in the review memo of September 06, 2022),
 - Result in more light leaving the site in the form of “light pollution”.

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- The information provided above about shorter pole heights (more poles, more “hot spots”, more lighting leaving the site) is information that is known to lighting professionals as it is based on the physical properties of light and of current (LED) lighting technologies.
 - *IES RP-33 Lighting for Exterior Environments* and *IES G-1 Guide for Security Lighting For People, Property, and Critical Infrastructure* both discuss pole height impacts throughout.

Item 4.b. (Correlated) Color Temperature

- Correlated Color Temperature (CCT) is the color a light source appears to a viewer who is looking directly at the source (looking directly at the “light fixture”).
- CCT does not provide information about the “blue light content” of the light source.
- CCT does not provide information about how the light impacts: the site, the nature, the skyglow, the glare, or the color quality of items lit.
- Generally speaking, lower CCT luminaires have lower lumens per watt and, therefore, higher energy consumption than those luminaires with higher CCT values.
- Use of CCT is being deprecated in the lighting science community because it is misleading to the public about values and benefits. For example, knowing the CCT of a light does not tell a person how energy efficient it is, how colors of objects will appear, how much light will scatter, how much additional light pollution will be caused, how it will impact plants or animals, how much skyglow will be seen, or how much glare will be experienced.

Item 4.c. Lighting Levels (Illuminance Levels)

- The calculated illuminance levels are determined in accordance with the lighting professional practice standards which prescribe target illuminance values to be presented as **average, maintained** values for ease of comparison to those presented in codes and standards.
- The illuminance level target values presented in codes and standards are average, maintained values **unless otherwise stated**.
- Lighting professionals will presume that average, maintained illuminance values are requested by a code that does not state otherwise.
- Recognized lighting authorities, like the Illuminating Engineering Society (IES), the International Association of Lighting Designers (IALD), the National Council on Qualifications for the Lighting Professions (NCQLP), and the Commission Internationale de l’Eclairage (CIE; International Commission on Illumination) prescribe the standards by which lighting professionals calculate and report this information.
- The following lighting assumptions were made relative to illuminance levels described in §240-23.E:
 - That local code intended to align with the language and calculation processes prescribed to design professionals by recognized standards, and
 - That local code intended to align with state fire and life safety codes, and
 - That local code intended to have the safety and security of the public present on private property remain the responsibility of the property owner.
- Regarding task area calculations
 - *IES RP-33 Lighting for Exterior Environments* states, “In some applications the task may be performed over a large area, such as a **parking area**. If the task is an area, the recommended illuminance is to be achieved over that entire area, including the corners.”
 - §240-23 does not instruct applicants to indicate zones within areas that, from an illumination perspective, are treated as a singular zone of requirement by other standards and codes and in which the visual and security requirements are not disparate.

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- Regarding alignment with language and calculation processes:
 - *IES RP-33 Lighting for Exterior Environments* defines target illuminance values to be “...**average, maintained** illuminances of electric and/or daylight for the designed task area”.
 - For an average, maintained illuminance calculation some points on a point-by-point (“photometric plan”) calculation will be higher than the prescribed target number and some calculation points will be lower than the prescribed target number.
 - *IES RP-33 Lighting for Exterior Environments* continues to state, “When the task involves life safety, human-vehicular proximity and/or personal safety and security as significant concerns, recommendations are considered **minimum, maintained** illuminances...”
 - For a minimum, maintained illuminance calculation no calculation point on a point-by-point (“photometric plan”) should ever fall below the stated prescribed target number even after anticipating the loss of light from a light fixture as it ages to the point of planned “end-of-life” for the fixture.
 - *IES G-1 Guide for Security Lighting For People, Property, and Critical Infrastructure* indicates security and safety illuminance for open parking should be “...at least a **maintained average** of 32lx (3.0 fc) on the pavement...”
- Regarding alignment with state fire and life safety codes: *2020 Fire Code of New York State* prescribes, “The means of egress illumination level **shall be not less than 1 footcandle** (11 lux) at the walking surface.” Further, for exit discharge, “Illumination shall be provided along the path of travel for the exit discharge from each exit to the public way.”
 - Local AHJ can supersede, however, previous experience with compliance requirements of AHJ in other municipalities indicates that a minimum of 1.0 foot-candle, maintained, at grade from building egress to public right of way is required.
- Regarding the illuminance requirement of at or below 1 footcandle: this constraint is frequently utilized for low circulation areas in park settings (municipal, state, and national). Our experience with this design constraint includes municipal riverfront parks, state parks (like Niagara Falls State Park) and national parks (like Banff National Park).

Item 4.d. BUG Ratings

- §240-23.G indicates that the lighting specifications shall include BUG Ratings.
- The BUG Ratings are included on luminaire specification sheets (the “lighting specifications”) for the luminaires specified on the photometric plan submitted for the site. Luminaire specification sheets will be provided.
- A column for BUG Ratings could be added to the luminaire product description contained on the plan. It is noted, however, that doing so may be misleading to a person who is interested in comparing products, projects, or sites and who is not familiar with BUG Ratings.
- Use of the BUG Rating system for luminaires that cannot affect areas beyond the property line (for example, luminaires that are more than 2 times the mounting height inside of a property line) can result in less energy efficiency.