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Topic:CARmax Wappinger Exterior LightingLDI Project Number:NY-202206Issued By:P. MercierDate of Topic Report:02 August 2022

Discussion

This information is relative to the revision of the exterior lighting design for the proposed CARmax facility in Wappinger, NY. Adjacencies for the proposed location are roadways (one of which has street lighting) and a septic drain field (also known as a leach field) for a development. This lighting design narrative document, summarizes the points of discussion shared at the Town Planning Board meeting on Wednesday, July 06, 2022 and provides context for the design revisions as they relate to the intent of the 2022 proposed amendment to the Town of Wappinger, NY zoning legislation, Article V Regulations Applicable to All Districts, Section 240-23 Exterior Lighting.

General Discussion

- 1. Exterior lighting ordinances are an important document for conveying community matters of interest and importance relative to lighting. Perspectives on neighbors, the night sky, the environment, energy consumption, sustainability, and the business community can all be expressed in exterior lighting ordinances.
- 2. Typically, exterior lighting ordinances offer applicants two paths to demonstrate compliance:
 - a. Prescriptive: lighting feature "checklist style"
 - b. Performance: demonstration of designed solution that meets the intent of the code/ordinance.
- 3. Definitions of terms and phrases utilized in this narrative are provided to ease understanding of the reader and are intended for use when interpreting design compliance with the Town intent. The definitions provided are colloquial in nature and used in ordinary, familiar lighting conversation and are not intended to be formal scientific definitions of these terms*. (*for scientific definitions, ANSI/IES LS-1-21 Nomenclature and Definitions for Illuminating Engineering should be referenced.)

Definitions for terms and phrases utilized in this narrative:

- a. ANSI American National Standards Institute
- b. IES Illuminating Engineering Society
- c. IDA International Dark Sky Association
- d. Illumination lighting or light
- e. Illuminance the amount of light per unit of area; measured in foot-candles or lux. For exterior environments surrounding a building and for parking, horizontal illuminance values are measured at grade with a photometer.
- f. Light Pollution an expression for energy (in the form of light) that leaves the site, unobstructed, toward the sky.
- g. Light Trespass an expression for energy (in the form of light) that leaves the site, unobstructed, over the site property line.

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- h. Lumen the international unit of luminous flux. In other words, the amount of light emitted by a light source (lamp or luminaire). The source lumen value is measured by a goniophotometer or an integrating sphere in a laboratory.
- i. Luminaire an instrument that provides electric light. Also known as a "light fixture".
- j. Mounting Height the measured length from the finished grade to the bottom of the lens (the closest point of light emission to the finished grade from the luminaire). Mounting height is important for light pollution considerations.
- k. Pole Height the measured length from finished grade to the top of the pole on which a luminaire is mounted. Pole height may not provide information about luminaire location relative to grade. See "Mounting Height".
- Recommended Illuminance Targets The average, maintained illuminances of electric light for the designed task area. The values provided in ANSI/IES standards are average, maintained illuminance targets. Target thresholds identified in codes and ordinances are average, maintained illuminance targets to align with national standards target recommendations without requiring conversion.
- m. Uniformity A ratio used to express the "evenness" of light on the site. Uniformity is important to understand the ability of the human visual system to see and to adapt appropriately. ANSI/IES standards provide the uniformity recommendations as a ratio of "Avg to Min" and "Max to Min"; where "Avg" is average illuminance value on the site, "Max" is maximum illuminance value on the site, and "Min" is minimum illuminance value on the site.

Design Narrative

Lighting Design Innovations was engaged to review the proposed amendments to the Town of Wappinger zoning legislation Article V Section 240-23 Exterior lighting and to recommend revisions to the exterior lighting plan submission for the proposed CARmax location in the Town. The design efforts described below are associated with this revision.

Design Intent

The goal of the lighting design revisions is to align the exterior site lighting with the Town's objectives to maintain and protect the scenic and aesthetic character of the Town while providing nighttime illumination for safety, security, and functionality of the CARmax location.

- Design Goals
 - Create a safe, visual environment for the retailer.
 - Classified as "high security" based on visual obstructions normally on the site (for example, cars, which when parked obstruct clear views of the site extents) and the value of the inventory.
 - Recommended Illuminance Target: 5 foot-candles average maintained, maximum, for high security.
 - Maximize energy conservation by selecting luminaires and lumen outputs to provide low average light levels and appropriate uniformity.
 - Minimize glare and light trespass from electric light sources on the site. Moonlight illuminance levels are approximately 0.1 foot-candles and electric light contributions at this level and below cannot be distinguished from naturally occurring ambient light levels.
 - Minimize light pollution contribution while considering the vision, security, energy, and glare concerns.

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- Design Approach
 - Luminaire lumen outputs and placements were selected to provide appropriate uniformity (in other words, reduce the bright areas and dark areas). These adjustments also lowered the average illuminance levels at grade and maximized energy conservation.
 - Luminaire standard features and optional features have been selected to minimize glare and light trespass. For example, the addition of the glare shield reduces the view of the actual light source, within the luminaire, from adjacent properties.
 - Light pollution contribution from the site is caused by the reflection of light off the horizontal surfaces when direct (downward facing) luminaires are utilized. Luminaires mounted closer to the reflecting surfaces (in this case, lower above finished grade mounting heights) cause morelight to be reflected from the site (in other words, more light pollution) than do luminaires mounted farther away.
 - Light pollution contribution from the site was explored by comparing multiple luminaire outputs and mounting heights. Reduction of light pollution contribution was achieved by selecting the optimized scenario.
- Design Parameters of the Revision Exterior Lighting
 - Correlated Color Temperature: 3500 K (optimizes energy savings, reduces number of luminaires, aligns with CCT on other Town buildings)
 - Pole Height: 19'-0

(Represents a 17'-0 pole on 2'-0 base; optimizes energy savings, reduces the number of luminaires on the site, and reduces light pollution. A waiver approval would be required for this mounting configuration.)

- Luminaire Mounting Height: 18'-6 (minimizes light pollution contribution from site, reduces number of luminaires, optimizes energy savings)
- Site Generated Electric Light Illuminance on Site: 3.3 fc average maintained (meets ordinance requirement of 5.0 maximum)
- Site Generated Electric Light Illuminance at Property Line: 0.1 fc average, maintained (meets ordinance intent as this falls below naturally occurring light levels in areas immediately surrounding the site)

This lighting design narrative represents the author's interpretation of information available, relative to the aforementioned topic, as of the date of the narrative. Please contact us with additional questions regarding the topic or the information presented within.

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