

SEACOAST UNITED MAINE CAMPUS PROPOSED SOCCER FIELD LIGHTING
Falmouth, Maine

November 5, 2018 Page 1 of 2

1. RECOMMENDED ILLUMINANCE LEVELS ON THE PLAYING FIELDS

The *Illuminating Engineering Society of North America (IESNA)* publishes recommendations for sports lighting in RP-6-15 Sports and Recreational Area Lighting. The *IESNA* lists recommended illuminance levels for soccer fields according to the classification of play. For high school activities RP-6-15 identifies three classes as being appropriate for consideration: Class II, Class III, and Class IV. Class II and Class III levels are based on competition play as well as the number of spectators. Class III play is defined as: "competition play with facilities up to 2000 spectators".

For each of these classifications of competition the *IESNA* lists the following recommended average illuminance levels, as well as illuminance uniformity ratios (maximum-to-minimum).

	Average (footcandles)	Uniformity (maximum-to-minimum)
Class II	50 FC	2.0-to-1
Class III	30 FC	2.5-to-1
Class IV	20 FC	3.0-to-1

The application that was reviewed includes a lighting design which provides a horizontal average illuminance measured at three feet above the field as 34.1 footcandles for field 1, and 34.2 footcandles for field 2. The design maximum horizontal illuminance is listed in the submittal as 39 footcandles for both fields. The design minimum horizontal illuminance listed in the submittal is 28 footcandles for both fields. The resulting maximum-to-minimum illuminance unity is 1.4-to-1.

It should be noted that the calculated illuminance levels that have been included in the submission have been prepared with an anticipated light loss factor for lamp output depreciation over time ($\pm 92\%$), and for dirt accumulation ($\pm 95\%$). Accordingly, initial illuminance levels will likely be slightly higher than those calculated. Calculation with these light loss factors is important to assure that the proper light levels will be provided over time.

REVIEW COMMENT: The proposed horizontal average illuminance on the playing fields is consistent with recommended levels. The proposed uniformity of illuminance is also consistent with recommended levels.

2. ILLUMINANCE BEYOND THE PLAYING FIELDS

Illuminance directed beyond the playing fields can present two possible unacceptable illuminance conditions. Excessive horizontal illuminance beyond property lines is known as *light trespass*. This is not permitted according to the *Falmouth Code of Ordinances*. The calculations submitted in the application indicate that the proposed lighting design does not produce any significantly measurable horizontal illuminance level at three feet above the property lines.

The second consideration for lighting directed beyond the playing fields is that of the potential for vertical illuminance at property lines. Whereas horizontal illuminance is measured parallel with the ground, vertical illuminance is measured perpendicular to the ground (pointed in the direction of the playing fields). While there may be little or no horizontal illuminance that might be measured at a property line, this does not mean that there might not be *light trespass* by virtue of light being measured vertically at the property line. The calculations submitted in the application indicate that the proposed lighting design does not produce any significantly measurable vertical illuminance level at three feet above the property lines.

In addition to the concern of *light trespass* across property lines, there is also a concern that must be considered for glare in terms of objectionable brightness which might be seen off-site. This can occur from luminaires that are aimed well above a field where their surface brightness can be viewed from a distance. Luminaire output can be evaluated in terms of their luminous intensity (measured in candela). When direct luminous intensity can be viewed in values greater than 500 candela, the potential for a degree of objectionable glare becomes considerable. The calculations submitted in the application indicate that the proposed lighting design does not produce candela values greater than 500 candela at three feet above the property lines. According to the proposed design, values exceeding 500 candelas at three feet above grade are limited to within approximately 200 feet of the edge of the playing fields.

REVIEW COMMENT: The proposed lighting design adequately limits the impact of lighting across property lines.

3. ASTRONOMIC LIGHT POLLUTION

Astronomic light pollution can occur by several means. Excessive lighting levels at grade are reflected skyward which can be a contributing factor. As explained in Comment #1, the proposed lighting does not exceed recommended levels.

A second factor that can contribute to light pollution is that of poorly shielded luminaires which direct light upwards toward the sky. The proposed luminaire have top shields that address this issue.



MUSCO LIGHTING
TLC –LED LUMINAIRE

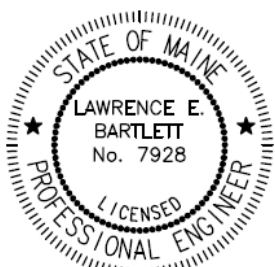
A third factor is that of the mounting height of luminaires. Luminaires mounted at excessive heights illuminate a significant amount of water vapor and dust particles in the air, which reflect light back toward the sky. The proposed lighting design calls for the luminaires to be installed at a height of 80 feet above the playing field, with a pole set-back dimension from the field of approximately 13 feet. As the luminaire mounting height decreases, and/or as the pole set-back increases, the aiming angle of luminaires becomes more horizontal. Providing luminaires that are aimed downward toward the field greatly reduces the potential for glare as may be viewed off-site. Therefore, while it is advantageous to keep mounting heights to a practical minimum, installing luminaires at low heights can result in objectionable glare. The best solution is to obtain a balance between the two considerations.

REVIEW COMMENTS: The proposed luminaires appear to provide adequate shielding to mitigate astronomic light pollution.

Given the set-back dimension of poles and that of the playing fields, the proposed 80-foot mounting pole heights seem reasonable. By lowering the pole height the aiming angles for luminaires would not be advantageous in terms of glare control.

4. OTHER ISSUES

REVIEW COMMENTS: The board should confirm the manufacturer’s warranty for equipment and LED lamps. Also, if lighting controls are desired (i.e. times when lights are to be turned off), this should be stipulated as part of the Board’s findings.



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