

### **3.5 Lighting Plan**

#### **A. Introduction**

This Section covers the intent and design of lighting in connection with the subdivision of land within NAS South Weymouth, for streets, open spaces, buildings, parking lots and other miscellaneous uses that require lighting.

Plans and designs for all lighting plans and fixtures in connection with the subdivision of land in NAS South Weymouth shall be approved by the Applicable Subdivision Board.

This outdoor lighting guideline was created to develop general guidelines for redevelopment in NAS South Weymouth. These guidelines provide general direction for outdoor public and private lighting installations and include recommendations for:

- Luminaire requirements
- Hours of operation
- Street and pedestrian lighting requirements
- Lighting plan
- Waivers
- Exemptions

The recommendations are based upon recommended practices developed by the IESNA.

This lighting guideline also provides recommendations for outdoor lighting for the following other uses:

- Parking area and buildings areas
- Subdivision lots
- Other lighting types

## B. Purposes and Goals

Outdoor lighting provides illumination for a variety of needs. The purpose of public street lighting is to illuminate the public streets so as to define them for safe travel by vehicular traffic. A secondary purpose is to illuminate especially hazardous spot locations such as pedestrian crosswalks and public safety devices such as fire alarm boxes and fire hydrants.

Quality outdoor lighting involves selecting the correct equipment, not over lighting, providing uniform lighting and minimizing glare and other forms of non-productive light.

Outdoor lighting installed on private property by the Applicant shall also conform to the design criteria of this document. Buildings may be illuminated at night for reasons of safety and recognition. Architectural lighting can include floodlighting, outlining and spotlighting. New or substantial replacement of outdoor lighting of public buildings will be in conformance with these design criteria. This policy is not intended to supersede the requirements of the Massachusetts State Building Code.

These Regulations provide further guidance to Applicants in implementing minimum requirements for lighting for development. Inappropriate and poorly designed or installed outdoor lighting causes unsafe and unpleasant conditions, limits residents' ability to enjoy the nighttime sky and results in unnecessary use of electric power. However, some outdoor lighting is appropriate in areas such as civic, commercial and industrial centers. The following regulations aim to ensure appropriate lighting where needed while minimizing its undesirable side effects.

## C. Outdoor Public Lighting

Outdoor Public Lighting shall refer to any lighting that is within the right-of-way. Any lighting not within the right-of-way shall be considered private outdoor lighting.

### (1) General Guidelines for Public Improvements

- Design outdoor public lighting to provide a uniform distribution of light without compromising safety and security.
- Design roadway lighting systems in accordance with IESNA RP-8 (ANSI)—Roadway Lighting and Chapter 22 in the IESNA Lighting Handbook, as the same may be amended.
- Select high-efficiency light fixture whenever possible.
- Select light fixtures that are comparable in height and frequency with other public street lights in the area.
- For public pedestrian walkways and plazas (where required by the Applicable Subdivision Board), use lights in three (3) foot to

four (4) foot bollards. The Applicable Subdivision Board will determine if the bollard lights are required at the time of review.

- Outdoor public lights shall be located to avoid conflict with driveways, loading docks, accessibility ramps or other physical improvements where the light fixture would be in conflict with the intended use of the physical improvement.
- Minimum ADA pedestrian access clearance shall be maintained with outdoor public light placements.

(2) General Installation

- When an outdoor public lighting installation is being modified, extended, expanded or added to, the entire outdoor lighting installation shall be subject to the requirements of this Section.
- Expansion, additions, or replacements to outdoor public lighting installations shall be designed to avoid harsh contrast in color and or lighting levels, and conform to existing lighting design.
- Electrical service to outdoor public lighting fixtures shall be underground and installed in a conduit system.
- Proposed lighting installations that are not covered in this section may be approved by the Applicable Subdivision Board as needed.
- All lighting installation work and equipment shall conform to the requirements of all applicable codes.

(3) Luminaire Requirements

(a) Control of Glare

- Light levels shall not exceed 0.5 Foot Candles at any property line. This subsection does not apply if any property line that separates two or more lots or parcels under common ownership or similar adjacent uses, including:
  - (i) Multiple and single lots held in common ownership and separate ownership that are subject to a common site plan approval, and
  - (ii) Contiguous parcels, with or without an approved site plan (common to both or separate), that share common access or parking.
- Any luminaire with a lamp or lamps rated at a total of MORE than 1800 lumens, and all flood or spot luminaries with a lamp or lamps rated at a total of MORE than 900 lumens, shall not emit more than two and one-half percent

(2.5%) direct light above a horizontal plane through the lowest direct-light-emitting part of the luminaire.

- Any luminaire with a lamp or lamps rated at a total of MORE than 1800 lumens, and all flood or spot luminaires with a lamp or lamps rated at a total of MORE than 900 lumens, shall be mounted at a height equal to or less than the value  $3 + (D/3)$ , where D is the distance in feet to the nearest property boundary. The maximum height of the luminaire shall not exceed forty (40) feet.
- Street lighting should meet or provide lower light levels and Uniformity Ratios than those recommended in the IESNA Recommended Practice Manual: Lighting for Exterior Environments (RP-33).
- Street lighting should be designed such that all exterior luminaires with more than 1,000 lumens are shielded and all luminaires with more than 3,500 initial lumens shall meet the Cutoff IESNA Classification.

#### (4) Light Shielding Requirements

##### (a) Luminaries

- Regardless of lumen rating, luminaries shall be equipped with whatever additional shielding, lenses, or cutoff devices are required to eliminate light trespass onto any abutting lot or parcel and to eliminate glare perceptible to persons on abutting land.
- Flood or spot luminaires shall be Cutoff if they are 900 lumens or more and shall not be aimed greater than forty-five (45) degrees from horizontal.

##### (b) Lamps

- Lamp types shall be selected for optimum color rendering as measured by their color rendering index (CRI), as listed by the lamp manufacturer. Lamps with a color rendering index lower than fifty (50) are not permitted. This paragraph shall not apply to temporary decorative lighting which may include colored lamps, such as holiday lighting. Commercial Lighting shall meet minimum IESNA illumination levels while not exceeding IESNA Uniformity Ratios and average luminance recommendations.
- Any temporary outdoor lighting that conforms to the requirements of this Section is permitted.

(5) Hours of Operation

- Public street lighting shall use photoelectric control for operation. Lighting shall automatically turn on when ambient natural lighting becomes less than 1.6 times the illuminance design value or 1.5 foot-candles, whichever is higher, and is automatically turned off when sufficient daylighting is available or the lighting is no longer needed.

(6) Street and Pedestrian Lighting Requirements

(a) Lighting Types

There are three basic lighting types for streets and ways in NAS South Weymouth:

- (i) Street Lighting shall have street light fixtures that are pole-mounted lights a maximum of forty (40) feet tall, spaced as required to meet light level standards as specified herein ("Street Lighting").
- (ii) Village Center District lighting shall have light fixtures that are post-top or multi-lamp mounted metal halide at fifteen (15) to twenty-five (25) feet tall, spaced as required to meet light level standards as specified herein ("Village Center Lighting").
- (iii) Pedestrian Lighting shall have light fixtures that are post-top mounted metal halide at twelve (12) to fifteen (15) feet tall, spaced as required to meet light level standards as specified herein ("Pedestrian Lighting").

- Street light poles shall be rated to carry the fixtures, supports, and appurtenances in an eighty (80) mph wind with 1.3 gust factor.

(b) Lighting Type Placement

- The Parkway, Shea Boulevard, the Truck Connector and the Access Road shall have Street Lighting.
- On the Parkway, Shea Boulevard, and the Truck Connector, Pedestrian Lighting shall be located on the planting strip adjacent to the paved pedestrian portion of

the sidewalk. The lights should not be placed along the center of the planting strip, but instead on the side located furthest from the roadway, immediately adjacent to the paved, pedestrian portion.

- Main Street shall have Village Center Lighting located along the center of the curb zone.
- All Secondary Streets shall have Pedestrian Lighting located along the center of the curb zone/planting strip.
- Street lights shall not be located in corner clear zones.

The following lighting levels shall be provided for each roadway classification:

Street Type	Minimum Average Foot Candles	Average/Minimum Uniformity Ratio	Minimum Spacing (in feet)	Maximum Spacing (in feet)
Parkway	1.0	3:1	75	150
Main Street	1.0	3:1	50	100
Shea Boulevard	.6	4:1	75	150
Secondary Streets	.4	6:1	100	200

Lighting for each street type shall be staggered on both sides of the street at the spacing specified for the street type.

(7) Intersection Lighting Design Parameters

A street light shall be installed at each intersection to provide adequate light. The following regulations shall apply:

- Street lights shall be single fixture units providing sufficient light to adequately illuminate the intersection and any marked crosswalks.
- Sodium Vapor or Mercury Vapor lamps shall not be used.
- Light posts shall be located a minimum of two (2) feet from the edge of pavement, but in no case should light poles be located in ditch lines, impede pedestrian or vehicular travel or conflict with traffic signals.

Per the IESNA guidelines (as published in ANSI/IESNA, RP-8-00 - American National Standard Practice for Roadway Lighting, 2000, as the same may be amended), intersection lighting design should provide the following:

- (a) Major/Major Intersection Classification with Low Pedestrian Traffic:
  - Average maintained horizontal illuminance should be at least 1.8 foot-candles; and

- Average to minimum Uniformity Ratio should be no more than 3.0.
- (b) Major/Collector Intersection Classification with Low Pedestrian Traffic:
- Average maintained horizontal illuminance should be at least 1.5 foot-candles; and
  - Average to minimum Uniformity Ratio should be no more than 3.0.
- (c) Major/Local Intersection Classification with Low Pedestrian Traffic:
- Average maintained horizontal illuminance should be at least 1.3 foot-candles; and
  - Average to minimum Uniformity Ratio should be no more than 3.0.
- (d) Collector/Collector Intersection Classification with Low Pedestrian Traffic:
- Average maintained horizontal illuminance should be at least 1.2 foot-candles; and
  - Average to minimum Uniformity Ratio should be no more than 3.0.
- (e) Collector/Local Intersection Classification with Low Pedestrian Traffic:
- Average maintained horizontal illuminance should be at least 1.0 foot-candles; and
  - Average to minimum Uniformity Ratio should be no more than 3.0.
- (f) Local/Local Intersection Classification with Low Pedestrian Traffic:
- Average maintained horizontal illuminance should be at least 0.8 foot-candles; and
  - Average to minimum Uniformity Ratio should be no more than 3.0.

(8) Light Loss Factor

In designing a lighting system it is the standard practice to use a factor to reduce the amount of initial lumens that a new lighting system will generate. Factors such as dirt depreciation and lumen depreciation are taken into account, so the lighting design will more accurately simulate the lighting conditions that can be expected over a period of time. The Corporation has identified the following light loss factor for use on intersection lighting systems:

- Light Loss Factor (LLF) = 0.81.

D. Lighting Plan

(1) General

- Within all subdivisions, street and pedestrian light stanchions shall be located at the entrance to and at all intersections within subdivisions and shall be installed in accord with the procedures required by the applicable utility provider.
- All multifamily, mixed use and Nonresidential Development subdivisions shall provide additional street and pedestrian light stanchions spaced in accordance with standards routinely used by the applicable utility provider.
- Public streetlights shall be installed as required by the Applicable Subdivision Board. If not specified, the Applicable Subdivision Board will determine the locations of public street lights. Public street lighting shall be provided by the Applicant and be in full operation before the first building or residence is occupied. The construction and operating costs of said public street lights are to be borne by the Applicant until acceptance of the street as a public way.

(2) Public Lighting Plans

The Applicant shall submit to the Applicable Subdivision Board sufficient information, in the form of an overall public street lighting plan, to enable the Applicable Subdivision Board to determine that the applicable provisions will be satisfied. The lighting plan shall include at least the following:

- A vicinity map showing the general location of the site drawn to the required scale and a street lighting plan showing the locations of public street lights. The scale of the lighting plan shall be no less than 1-inch=100-feet for ease of reading. The lighting plan shall include a table that indicates the location of the light on the

street relative to the closes cross street, the voltage of the street light and the type of street light being proposed.

- Specification (details) for all proposed lighting fixtures including photometric data, designation as IESNA Cutoff fixtures, Color Rendering Index (CRI) of all lamps (bulbs), and other descriptive information on the fixtures.
- Proposed Mounting Height of all street lighting fixtures and operation hours.
- Analyses and luminance level diagrams showing that the proposed installation conforms to the lighting level standards in this Section.
- Location of proposed power source.
- Size conduits considering all conductor adjustment factors required.
- Lighting branch circuit voltage shall not be greater than 277VAC
- Use copper conductors that have been sized with consideration to adjustment factors for voltage drop, ambient temperature, raceway fill, harmonics, and future loading. Aluminum conductors are not acceptable.
- Use minimum No. 12 AWG for lighting branch circuit wiring.
- Provide individual fusing for each luminaire. Use “breakaway” type fused connectors located in the pole handhole.
- Identify all lighting branch circuit conductors at each accessible location using color-coding that is consistent with that on the site.
- Provide lighting circuit voltage drop calculation. Maximum voltage drop from power source to the furthest light shall not exceed three percent (3%).

If any subdivision proposes to have installed street or common or public area outdoor lighting, the final subdivision definitive plan shall contain a statement certifying that the applicable provisions of these Regulations shall be adhered to.

No changes or modifications in approved street lighting plans may be proposed without the specific written approval of the Applicable Subdivision Board, as provided for in Article 2.7N.

Should any public street light fixture or the type of light source therein, be changed after the permit has been issued, a change request must be submitted to the Applicable Subdivision Board, or a designee of the Applicable Subdivision Board, for his/her approval, together with adequate information to assure compliance with these Regulations, which must be received prior to substitution.

(3) Outdoor Private Lighting Plans

(a) General Guidelines for Private Improvements

- All outdoor private lights and illuminated signs shall be designed, located, installed and directed in such a manner as to prevent objectionable light trespass, and glare across, the property lines and or Disability Glare at any location on or off the property. The “maintained horizontal luminance recommendation” and design calculation procedures set by the IESNA shall be observed.
- Design outdoor private lighting to provide a uniform distribution of light without compromising safety and security.
- The total cutoff of light should be no more than 0.5 ft candles at the property lines of the parcel to be developed. Adjacent to residential property, no direct light source will be visible at the property line at ground level or above.
- Select lighting levels and fixtures that are complementary to the general architectural style of the development and surrounding neighborhood.
- Light fixtures should be compatible in scale to proposed or surrounding buildings.
- Lighting should not conflict with shade trees within landscaped islands, planting strips, and open spaces.
- For private pedestrian walkways and plazas, lights in three foot to four foot high bollards should be used where appropriate. The Applicable Subdivision Board will determine if the bollard lights are required at the time of review. Pedestrian scale lights should be shatter resistant and vandal proof. Lights should not emit excessive heat to cause burns.
- Lights shall be located to avoid conflict with tree canopy. Select lower Mounting Heights of less than twenty (20) feet or below the canopy of trees, rather than high mounted fixtures which may create shadows or dark spots.
- Lights shall be located to avoid conflict with driveways, loading docks, accessibility ramps or other physical improvements where the light fixture would be in conflict with the intended use of the physical improvement.
- Except for lighting of loading areas, service areas, and for architectural emphasis, floodlighting is prohibited. Floodlights are not permitted for the illumination of parking or outdoor product display areas.

(b) General Installation

- When an outdoor private lighting installation is being modified, extended, expanded or added to, the entire outdoor lighting installation shall be subject to the requirements of this Section.
- Expansion, additions, or replacements to outdoor private lighting installations shall be designed to avoid harsh contrast in color and or lighting levels, and conform to existing lighting design.
- Electrical service to outdoor private lighting fixtures shall be underground.
- All outdoor private lighting equipment should be kept outside of the right-of-way.
- Proposed lighting installations that are not covered in this Section may be approved if the Applicable Subdivision Board finds that they are designed to minimize glare, do not direct light beyond the boundaries in excess of 0.5 foot-candles of the area being illuminated or onto adjacent properties or streets, and do not result in excessive lighting levels. The Applicable Subdivision Board will determine what constitutes excessive light levels are for each subdivision.
- All lighting installation work and equipment shall conform to the requirements of all applicable codes.

(c) Luminaire Requirements:

(i) Control of Glare

- Light levels shall not exceed 0.5 Foot Candles at any property line. This subsection does not apply at any property line that separates two or more lots or parcels under common ownership or similar adjacent uses, including:
  - (a) Multiple and single lots held in common ownership and separate ownership that are subject to a common subdivision definitive plan approval, and
  - (b) Contiguous parcels, with or without an approved site plan (common to both or separate), that share common access or parking.
- Any luminaire with a lamp or lamps rated at a total of MORE than 1800 lumens, and all flood or spot

luminaires with a lamp or lamps rated at a total of MORE than 900 lumens, shall not emit more than two and one-half percent (2.5%) direct light above a horizontal plane through the lowest direct-light-emitting part of the luminaire.

- Any luminaire with a lamp or lamps rated at a total of MORE than 1800 lumens, and all flood or spot luminaires with a lamp or lamps rated at a total of MORE than 900 lumens, shall be mounted at a height equal to or less than the value  $3 + (D/3)$ , where D is the distance in feet to the nearest property boundary. The maximum height of the luminaire shall not exceed twenty-five (25) feet.

(d) Light Shielding Requirements

(i) Luminaries

- Regardless of lumen rating, luminaries shall be equipped with whatever additional shielding, lenses, or cutoff devices are required to eliminate light trespass onto any street or abutting lot or parcel and to eliminate glare perceptible to persons on abutting land.
- Flood or spot luminaries shall be Cutoff if they are 900 lumens or more.

(ii) Lamps

- Lamp types shall be selected for optimum color rendering as measured by their color rendering index (CRI), as listed by the lamp manufacturer. Lamps with a color rendering index lower than 50 are not permitted. This paragraph shall not apply to temporary decorative lighting which may include colored lamps, such as holiday lighting. Commercial lighting shall meet minimum IESNA illumination levels while not exceeding IESNA Uniformity Ratios and average luminance recommendations.
- Any temporary outdoor lighting that conforms to the requirements of this Section is permitted.

(e) Hours of Operation

- Private street lighting may use photoelectric control for operation. Lighting shall automatically turn on when ambient natural lighting becomes less than 1.6 times the

