



CITY OF CAMBRIDGE

Community Development Department

IRAM FAROOQ
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Community Development

To: Richard C. Rossi, City Manager

From: Iram Farooq, Assistant City Manager for Community Development

CC: Lisa Peterson, Lisa Hemmerle

Date: June 15, 2016

Re: Outdoor Lighting Ordinance Update

Please find attached the recommendations of the Outdoor Lighting Task Force that address the potential detrimental impact of outdoor lighting and propose solutions that diminish existing problems and address problems that may be created by new development.

A. TASK FORCE CHARGE

In 2013, the City Manager appointed the Outdoor Lighting Task Force ("Task Force") in response to the City Council's Policy Order O-29, which requested that the City Manager create a short term task force to consider drafting a municipal ordinance related to outdoor lighting.

The Task Force met eighteen (18) times between December 2013 through April 2016 to identify issues, explore potential solutions and draft recommendations to improve outdoor lighting on public, and private residential and commercial properties throughout the City of Cambridge. The Task Force consisted of four (4) members of the public representing residents, a large property owner/developer, the original petitioner, as well as four (4) City staff members including representatives from the Inspectional Services Department, License Commission, Electrical Department, and the Community Development Department.

The City engaged a lighting consultant, Parsons Brinkerhoff, to provide technical expertise and guidance to the Task Force. This process required extensive coordination and integration among the Task Force, City staff, and the lighting consultant, engaging the community at each of the meetings throughout the process.

B. BACKGROUND AND CONTEXT

The recommendations are a reflection of balancing multiple goals: providing sufficient lighting for public safety, limiting excess lighting for protection of the night sky and broader environmental impacts, informed by the context of discussions taking place nationwide. The goal of good lighting standards is to improve nighttime visibility, create a pleasant ambiance, maintain safety in Cambridge neighborhoods, while being considerate of others.

While it is important to have adequate lighting in the City to ensure that people can go out after dark, excessive lighting can also have negative impacts such as light trespass, glare, light pollution and energy waste. In their discussions related to a zoning petition on outdoor lighting, the City Council, Planning Board and City staff supported the need to assess the customary characteristics of lighting and

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ensure negative impacts are mitigated, while ensuring full enjoyment and safety of Cambridge's citizenry. These include:

Lighting for Public Safety – Proper lighting provides better visibility at night and creates a sense of security for pedestrians. This safe environment allows residents and visitors to enjoy neighborhood activities without the fear of criminal activity that takes place in poorly lit areas. However, over-lighting outdoor areas can create shadows that hide potential dangers and glare that blinds the pedestrian. The proposed lighting standard recommends consistent lighting levels to direct light to the areas intended to be illuminated without hindering visibility.

Protection of the Night Sky – Light pollution is the scattering of artificial light in the night sky as a byproduct from an inefficient light fixture. Light emitted beyond the surface intended to be illuminated contributes to the cumulative glow that blocks the night from view in urban settings and causes negative impacts to wildlife that are disrupted by artificial light. The proposed lighting standards include a limit to the amount of light that shines above the horizontal plane of each fixture and more efficiently illuminate the intended surface.

Broader Environmental Impacts – Excessive light uses energy in an inefficient manner. The City's campaign to reduce the community's carbon foot print includes energy conservation as a cornerstone for this environmental platform. Reducing light levels throughout the City conserves electricity which limits the use of fossil fuels and the production of greenhouse gases. The proposed lighting ordinance recommends lumen levels that may reduce power consumed by higher wattage bulbs by 25-50%.

C. RECOMMENDATIONS

1. **Outdoor Lighting Ordinance:** The principal recommendation is to create a new Outdoor Lighting Ordinance. The proposed ordinance represents a comprehensive effort to meet Task Force goals in a dense, varied, urban environment especially due to the proximity of some residential and commercial properties. With some exceptions, the proposed ordinance would regulate all outdoor lighting in the City of Cambridge. Major elements of the proposed ordinance include:
 - All outdoor lighting installed after the proposed ordinance is adopted would be required to comply with the new standards. The standards of the proposed ordinance would also apply to a substantial renovation of an existing building or property. The rationale of the Task Force in recommending a municipal ordinance instead of a change to the Zoning Ordinance was so that existing properties would not be "grandfathered in" and would have to comply with the new standards.
 - Pre-existing outdoor lighting would be required to comply with the new standards within five (5) years from the adoption date of the proposed ordinance. However, property owners would also be required to make certain improvements in the interim, such as changing a light bulb to a lower lumen level or adjusting the direction of a light fixture. This was

a compromise between several Task Force members. It provides the public, particularly homeowners and small property owners, sufficient time to come into compliance with the standards, while requiring changes to offer relief from more egregious lighting in the interim.

- Flashing or intermittent light and laser light would be prohibited by the proposed ordinance. This was suggested by Task Force members in response to a new rooftop lighting structure with flashing light and changing colors on a recent development that caused several community members to request mitigation. In most instances, this type of lighting does not align with the city's design objectives.
- A Light Color Standard of a maximum of 3,500 Kelvin would be included in the Ordinance for all outdoor lighting except for that used in façade and landscape lighting. The City converted its 5,000 streetlights from high-pressure sodium to LED lamps in 2014. They have a color temperature of 4,000 Kelvin. In addition, the City converted 2,000 park/pedestrian scale lights; they have a color temperature range of 3,000-3,500 Kelvin. As color temperature drops, light bulbs become less energy efficient. LED technology is evolving fast, and the Task Force proposed 3,500 Kelvin as lightbulbs in this color spectrum are now starting to be available. The Task Force wished to balance a desire for a warmer temperature and to avoid energy waste.
- Inspectional Services Department would be the enforcement agency for the proposed ordinance, would monitor complaints, and oversee waiver of the ordinance standards when necessary.
- Administrative waivers from ordinance standards could be authorized by the Commissioner of ISD where there is either a demonstrably unreasonable hardship on the applicant or the standards would be materially detrimental to the applicant's health, safety, or welfare. The draft ordinance proposes two compliance paths: either the Prescriptive Standard or a Performance Standard. Both Standards are based on the Model Lighting Ordinance (MLO), a nationally recognized standard, created by the Illuminating Engineering Society and the International Dark Sky Association to address light pollution and provide communities with a consistent process that reduces light pollution and glare using consistent lighting practices.
 - o The Prescriptive Standard would contain precise and easily verifiable requirements for lumen output and fixture design that limit glare, uplight, light trespass, and the amount of light that can be used. This simple method would likely be used by most homeowners and small property owners.
 - o The Performance Standard would allow greater flexibility and creativity in meeting the intent of the proposed ordinance. This Performance Standard follows the U.S. Green Building Council's Leadership in Energy Environmental Design ("LEED") Light Pollution Reduction ("LPR") credit. Note: The LEED LPR is based

directly on the MLO standards mentioned above. We would expect this method to be used by larger developers and it would require a licensed architect or engineer. Those using the Performance Standard would follow specific lighting standards under the LEED LPR credit within districts established in the Zoning Map Lighting Zones (see attached map: “Lighting Zones”). LEED LPR credit recognizes five Lighting Zones, Lighting Zone 0 to 4. Lighting Zone 2 (“LZ2”) and Lighting Zone 3 (“LZ3”) are the two zones appropriate for Cambridge. Lighting Zones 0 and 1 are designed for low light suburban areas and Lighting Zone 4 is for high ambient lighting levels, e.g. Times Square in New York City. Lighting Zone 2 is proposed for residential districts of the City and Lighting Zone 3 would be appropriate for more commercial/mixed use districts (refer attached map).

In addition, the proposed ordinance creates a 100 foot buffer where LZ3 is adjacent to LZ2, meaning properties in LZ3 must comply with LZ2 standards along that boundary.

2. **Suggested Changes to Special Permit Application and Article 19:** To supplement the proposed ordinance and provide for more fine-grained review of lighting in large projects, changes are recommended to special permit application requirements and Article 19 (Project Review Special Permit) of the Zoning Ordinance. The purpose would be to:
 - Ensure that special permit project submittals include information about proposed outdoor lighting, including façade and landscape lighting.
 - Require new rooftop lighting for certain buildings to be reviewed by the Planning Board.
 - Strengthen reference to design guidelines and references to outdoor lighting to support the Planning Board’s review of outdoor lighting, including on facades and rooftops.
3. **Education and Outreach:** The Task Force recommends that educational and outreach measures be taken with a two-fold purpose:
 - 1) Provide information to residents and business about the ordinance once it is adopted and how to comply.
 - 2) Provide ‘good neighbor’ information to help people understand how small changes on their property could enhance the quality of life for their neighbors.

The Task Force recommendations could be implemented by City Staff through a multifaceted outreach and education campaign. This could include a new landing page on the Inspectional Services Department (ISD)’s website specifically for the Outdoor Lighting Ordinance, upon adoption, and include information about the ordinance, how to file a complaint, and how to file for a waiver. The City could have online and printed materials, including a “Good Neighbor” brochure which will could be used for outreach to residents, businesses, property owners, facility managers, developers, designers, electricians, realtors, contractors, etc., about the new standards. The City could also offer advice and technical assistance on complying with the

proposed ordinance standards. In the short term, CDD would continue to act as the point of contact for questions regarding the proposed ordinance allowing ISD to build capacity and take over this responsibility.

D. FINAL COMMENT

A wide range of topics were raised during the Task Force meetings. While all of the Task Force members' opinions and those raised during public comment were considered, not all ideas could be incorporated into the recommendations. The Task Force worked diligently to balance a multitude of goals within the context of a dense urban area -- minimizing outdoor lighting and related impacts, environmental sustainability, safety, not creating a burden for homeowners and small property owners, and creating a fair and implementable ordinance.

The proposed ordinance is based on nationally recognized standards and best practices created by the Illuminating Engineering Society, the International Dark Sky Association, and the U.S. Green Building Council. The standards proposed are comprehensive, offering a simplified, prescriptive standard for residents and small businesses, while allowing for additional design creativity for large property owners using a more complex, performance standard. The proposed standards can be easily implemented while not creating an undue burden on residents and small business owners. Overall, Task Force members' recommendations will lower light levels in the city to protect the night sky, while allowing the city to be lit appropriately for public safety and quality of life.

The following supporting documents are attached to this memo:

- Outdoor Lighting Task Force Memo
- Proposed Outdoor Lighting Ordinance
- Map of proposed Lighting Zones for Cambridge
- Draft Good Neighbor Brochure

To: Richard Rossi, Cambridge City Manager

Cc: The Honorable, The City Council

Date: June 14, 2016

From: Outdoor Lighting Task Force

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Bob Woodbury

The Outdoor Lighting Task Force, composed of residents, property owners, business representatives and City staff, has held eighteen meetings since its launch in December 2013. With input from other City staff and the City's lighting consultants, the Task Force examined options for regulating outdoor lighting outside the public way and developed a Draft Outdoor Lighting Ordinance. Some Cambridge residents with concerns about lighting, and several local experts in lighting, architecture, and law also attended multiple Task Force meetings and made valuable contributions to this effort. We concluded our work with the submission of a final draft, dated May 2, 2016, to the City's Director for Economic Development.

The primary concern of the Task Force has been to set outdoor lighting guidelines that enhance the health, safety, and well-being of those who live and work in the City, while minimizing unwanted light trespass onto adjacent properties as well as glare that can compromise nighttime visibility. We also sought to promote aesthetic lighting design that enhances our urban environment, while limiting sky glow and conserving energy, in harmony with our natural environment.

The principle that all of us have the right to protection from the intrusion of unwanted light into our interior and exterior living and working spaces is what motivated dozens of Cambridge residents to attend numerous meetings and hearings on the subject of light trespass beginning in 2009. In 2011, and again in 2013, Charles Teague filed a zoning amendment to expand protections from light trespass and glare to all residents using simple language and clear guidelines, and to provide an easily accessible complaint process. After voting down the amendment in 2013, the City Council instructed the City Manager to develop a new lighting ordinance.

The Outdoor Lighting Task Force reviewed relevant provisions of the Cambridge Zoning Ordinance and heard citizen concerns such as those cited in the Teague Petition. With input from the City's lighting consultants, the Task Force reviewed industry standards and recent changes in lighting technology and luminance measurement. We had

occasional, indirect input from the City's Law department through CDD staff, but we have not been privy to its review or to changes and accompanying rationales following the completion of our work. Compliance with and enforcement of Ordinance provisions were discussed with input from the Inspectional Services Commissioner and others.

The proposed Outdoor Lighting Ordinance includes a Color Standard and the option to apply either a Prescriptive Standard or a Performance Standard. These provide specific guidelines for implementation by residents, businesses, property owners, lighting designers, and contractors. Task Force members all agree that the City should require immediate compliance for new lighting equipment installations and at least partial compliance for existing installations with certain readily achievable modifications. All currently existing outdoor lighting must be brought into full compliance within five years, and we encourage early, voluntary adoption of the standards.

Certain types of lighting are exempted under specific circumstances, usually with the caveat that light trespass and light pollution are to be minimized. The Task Force also provided a conditional Administrative Waiver application process for property owners who can demonstrate undue hardship in coming to full or immediate compliance. Applications for Administrative Waivers will receive thorough review by the Commissioner of Inspectional Services along with input from notice recipients and in consideration of their concerns.

Additional recommendations:

- Launch a public education campaign including educational materials in print and on the internet to inform residents, businesses, property owners, facility managers, developers, designers, electricians and other contractors about the new Standards and about "good-neighbor" lighting design principles. The City should also be prepared to offer advice and technical assistance on complying with the Standards set forth in the Outdoor Lighting Ordinance.
- Provide the Inspectional Services Department with necessary funding and resources for adequate staffing levels, including evening hours, technical training in outdoor lighting protocols, instrumentation, and other assets required for ISD to implement and enforce in a timely manner the Outdoor Lighting Ordinance as well as existing provisions concerning outdoor lighting in the Zoning Ordinance.

- Provide on the City's website an easy-to-find-and-use submission form and a responsive feedback system for inquiries and complaints about non-compliant lighting.
- Make adjustments to the Zoning Ordinance, Article 19 "Project Review" text to ensure that the Planning Board includes a review of outdoor lighting plans, including rooftop lighting, in its review of projects requiring Special Permits. However, since this revision will apply to only one or two dozen new building projects of 50,000 sf or larger each year that are required to apply for Special Permits, but not to all existing large buildings or to smaller buildings or additions that do not go through the Special Permit review process, the Task Force also recommends the following:
 - As soon as possible find a way to limit and restrict bright superfluous facade and rooftop lighting and other potentially inappropriate light installations that might otherwise be construed as allowed under this Ordinance's Performance Standard. As these concerns rose late in the deliberation process, the Task Force decided to address them on a preliminary basis by including in the Performance Standard the provision that "even if approved and certified, should the lighting as installed and maintained be determined in violation of the light pollution and light trespass protections intended by this Ordinance, then that lighting shall be considered in violation of this Ordinance. "We felt it necessary to give fair notice to all property owners and developers that the City intends to enforce the intended protections of the Ordinance, even as powerful new lighting technologies become available.
 - Inform the Planning Board, the Board of Zoning Appeal, and the Historical Commission of the lighting design standards set forth in the ordinance to ensure members of these commissions and boards have the necessary information to review outdoor lighting proposals and compliance with the proposed Ordinance. And, because this is a highly technical area of regulation, provide expert advice and consultants for these volunteer boards, as appropriate and necessary, to allow them to fulfill their responsibilities.
 - Establish an expert review panel that identifies significant buildings, monuments, public spaces and streetscapes and that recommend alternative or new lighting designs to accentuate their historic and aesthetic value.
 - Form a committee to review the concerns of residents affected by light trespass and light pollution from indoor light sources.

- Though the Ordinance is required to exempt certain categories of lighting such as those operated by the City or by a state or federal entity, we recommend that the City make every effort to itself abide by the spirit and intent of this Ordinance to minimize light trespass and light pollution, and to exert whatever influence it may have to encourage other exempt entities to comply to the extent possible.
- Finally, since lighting technology, industry standards, and factors such as the LEED Light Pollution Credit will continue to evolve, we encourage the City to monitor the effectiveness of the Ordinance and to periodically review its impact and effectiveness as well as emerging compliance and enforcement issues.

We ask that you, your successor, the Ordinance Committee, and the City Council act with due dispatch to review, recommend, and implement this Ordinance. Since much of the wording and organization has gone through intensive study and multiple iterations to ensure balance and consistency, conformance with technical specifications, and attention to significant stakeholder concerns, we urge you to apply considerable caution and consult with Task Force members before making changes.

The Task Force offers our thanks to City staff members and consultants who generously contributed time, insights, and expertise to our discussions.

In addition, we are indebted to Cambridge residents and others who shared their professional and personal experience, frustrations, and hopes at our meetings.

Respectfully submitted,

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Chapter 15.22 Outdoor Lighting

Section 15.22.010 Short Title. This Ordinance may be cited as the “Outdoor Lighting Ordinance” of the City of Cambridge (the “City”).

Section 15.22.020 Purpose. The purpose of this Outdoor Lighting Ordinance is to regulate outdoor lighting, as defined in this Ordinance, in the City, the intent being to permit an amount of outdoor lighting that is appropriate to allow for the safe use and enjoyment of outdoor areas, while also mitigating light trespass and glare to abutters and the public at large, reducing light pollution, and promoting energy conservation.

Section 15.22.030 Definitions.

- A. **Administrative Waiver** means a partial or complete waiver of the requirements of this Ordinance according to the procedures set forth in Section 15.22.060.
- B. **Building thermal envelope** means the basement walls, exterior walls, floor, roof, and any other building elements that enclose conditioned space or provides a boundary between conditioned space and unconditioned space.
- C. **Commissioner** means the Commissioner of Inspectional Services of the City of Cambridge Department of Inspectional Services or, if that position is vacant, the person designated to act in his or her stead.
- D. **Conditioned space** means an area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent conditioned space.
- E. **Correlated color temperature (“CCT”)** means a specification of the color appearance of the light emitted by a lamp, relating its color to the color of light from a reference source when heated to a particular temperature, measured in Kelvin (“K”).
- F. **District** means a section of the City for which the zoning regulations governing the use of land, the use of buildings and premises, and the permitted height of buildings, and the area of open space about the buildings are uniform.
- G. **Façade lighting** means illumination of exterior surfaces of buildings for the enhancement of their nighttime appearance, achieved by shining light onto building surfaces, or by internal or external illumination of translucent building surfaces.
- H. **Glare** means light entering the eye directly from light fixtures, or indirectly

from reflective surfaces that causes visual discomfort or reduced visibility.

- I. **Illuminance** means the density of the luminous flux incident on a surface; it is the quotient of the luminous flux by the area of the surface when the latter is uniformly illuminated.
- J. **Lamp** means a source of optical radiation, often called a “bulb” or “tube,” such as incandescent lamps, fluorescent lamps, high-intensity discharge (“HID”) lamps, and low pressure sodium (“LPS”) lamps, as well as light-emitting diode (“LED”) modules and arrays.
- K. **Landscape lighting** means lighting of trees, shrubs, or other plant material, as well as water features and sculptural objects.
- L. **Laser** means a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation which is also a term that originated as an acronym for "light amplification by stimulated emission of radiation".
- M. **Light fixture** means a complete lighting unit consisting of one or more lamps together with the parts designed to distribute the light, to position and protect the lamps and to connect the lamps to the power supply. Sometimes this includes ballasts or drivers, and photocells.
- N. **Light trespass** means lighting that falls beyond the boundaries of the property it is intended to illuminate.
- O. **Lighting** means electric, man-made, or artificial lighting. See “lighting equipment.”
- P. **Lighting equipment** means equipment specifically intended to provide gas or electric illumination, including, but not limited to, lamp(s), luminaire(s), ballast(s), poles, posts, lens(es), electrical wiring, and related structures or other necessary or auxiliary components.
- Q. **Lighting plan** means a site plan depicting the property lines of all properties for which lighting is proposed, the location and specification of all exterior light fixtures to be installed within the property, their lumen values, mounting heights, shielding, directionality and controls, protections provided to minimize light pollution, other relevant site conditions, and any additional information required to demonstrate compliance with applicable standards.
- R. **Light pollution** means adverse effects of lighting, as defined in this Ordinance, including, but not limited to, glare, light trespass, sky glow, energy waste, compromised safety and security, and impacts on the nocturnal environment.

- S. **Lighting Zone (“LZ”)** means an area or district within which particular lighting standards apply as set forth in this Ordinance. Lighting Zones are based on the U.S. Green Building Council’s Leadership in Energy Environmental Design (“LEED”) Light Pollution Reduction (“LPR”) credit v4 BD+C four lighting zones and are delineated by reference to the Districts established in the Zoning Map of the City of Cambridge Zoning Ordinance (“Zoning Districts”). For the purposes of this Ordinance, only Lighting Zone 2 (“LZ2”) and Lighting Zone 3 (“LZ3”) are allowed in the City.
- T. **Lighting Zone 2 (“LZ2”)** means Low Design exterior lighting so that all site and building-mounted luminaires produce a maximum initial illuminance value no greater than 0.10 horizontal and vertical foot candles (1.0 horizontal and vertical lux) at the LEED project boundary and no greater than 0.01 horizontal foot candles (0.1 horizontal lux) 10 feet (3 meters) beyond the LEED project boundary. LZ2 includes primarily residential districts, neighborhood business districts, light industrial areas with limited nighttime use and residential mixed-use areas. Document that no more than 2% of the total initial designed fixture lumens (sum total of all fixtures on site) are emitted at an angle of 90 degrees or higher from nadir (straight down). LZ2 includes all Zoning Districts not listed under Lighting Zone 3.
- U. **Lighting Zone 3 (“LZ3”)** means Medium Design exterior lighting so that all site and building-mounted luminaires produce a maximum initial illuminance value no greater than 0.20 horizontal and vertical foot candles (2.0 horizontal and vertical lux) at the LEED project boundary and no greater than 0.01 horizontal foot candles (0.1 horizontal lux) 15 feet (4.5 meters) beyond the site. LZ 3 includes all other areas not included in LZ2, such as commercial/ industrial, and high-density residential. Document that no more than 5% of the total initial designed fixture lumens (sum total of all fixtures on site) are emitted at an angle of 90 degrees or higher from nadir (straight down). LZ3 includes the following Zoning Districts: Residence C-3; C-3A or C-3B; Office 2, 2A or 3; Business B or C; Industry B, B-1, B-2 or C; Special Districts 1, 3, 4, 4A, 5, 6, 7, 8, 11, 15 and any other Special Zoning District whose general zoning limitations derive from one of the previously listed base Zoning Districts; Mixed-Use Development District: Kendall Square (“MXD”) and Cambridgeport Revitalization Development District (“CRDD”); all Planned Unit Development (“PUD”) Zoning Districts and Alewife Overlay Districts (“AOD”).
- V. **Lumen** means the unit of measure used to quantify the amount of light produced by a lamp or emitted from a light fixture (as distinct from “watt” or other measure of a lamp’s power consumption).
- W. **Lux** means the SI (International System of Units) unit of illuminance. One lux equals one lumen per square meter and is approximately equal to 1/10 of a foot candle.

- X. New lighting** means lighting for areas not previously illuminated, or newly installed lighting of any type, except for replacement lighting or lighting repairs.
- Y. Notice Recipients** means the applicant for an Administrative Waiver, abutters to the property for which the Administrative Waiver is sought, owners of land directly opposite on any public or private street or way, and abutters to the abutters within three hundred feet of the property line of the applicant as they appear on the most recent applicable tax list from the City's Assessing Department.
- Z. Outdoor lighting** means lighting equipment installed within the property line and outside the building thermal envelope of a subject property, whether attached to poles, the building thermal envelope, building structures, the earth, or any other location, and any associated lighting control equipment, including façade and landscape lighting.
- AA. Partly shielded light fixture** means a light fixture with opaque top and translucent or perforated sides, designed and maintained to emit most light downward.
- BB. Public art** means art in any media that has been planned and executed with the intention of being staged in the physical public domain, usually outside or in publically accessible buildings that are open to all.
- CC. Replacement lighting** means lighting equipment, fixtures, or parts, including lamps installed in order to replace existing lighting equipment.
- DD. Seasonal lighting** means lighting in use for not longer than a six-week period in any calendar year.
- EE. Shielded directional light fixture** means a fixed or adjustable light fixture that also contains a shield, hood, cowl, louver, or baffle to minimize direct view of the lamp.
- FF. Substantial renovation** means work area as defined in the building permit that is 50% or more of the Gross Floor Area of the building or 50% of the exterior wall area of the building.
- GG. Sky glow** means the brightening of the nighttime sky that results from scattering and reflection of artificial light by moisture and dust particles in the atmosphere, caused by light directed or reflected upwards or sideways, and which reduces ability to view the night sky.
- HH. Unshielded light fixture** means a light fixture capable of emitting light in any direction.

Section 15.22.040 Effective Date. This Ordinance shall take effect three (3) months from the date of enactment.

Section 15.22.050 General Requirements.

- A. Conformance with all Applicable Codes.** The provisions of this Ordinance shall be interpreted and applied at all times consistently with the provisions of all applicable federal, state, and local laws, rules, and regulations, including, but not limited to, applicable sections of the Massachusetts Building Code, the Cambridge Zoning Ordinance, and the Cambridge Municipal Code. Nothing in this Ordinance shall relieve property owners of the obligation to comply with all other applicable federal, state, and local laws, rules, and regulations.
- B. Applicability.** Except as set forth in this Ordinance, all outdoor lighting installed after the effective date of this Ordinance shall comply with the requirements of this Ordinance. This includes, but is not limited to, new lighting equipment, light fixtures, replacement lighting, or any other lighting whether attached to structures, poles, the earth, or any other location. Except as otherwise provided in this Ordinance, all outdoor lighting installed prior to the effective date of this Ordinance shall be altered or changed so as to comply with these requirements within five (5) years of the effective date of this Ordinance. Nothing in this Ordinance shall be construed so as to extend a five-year compliance period to lighting already regulated under existing codes and zoning provisions.
- C. Interim Modifications.** Upon the effective date of this Ordinance, property owners shall make improvements to eliminate or minimize light trespass on other properties by: (1) replacing one or more lamps within an existing light fixture to be in conformance with the Prescriptive Standard's lumen limitations and Light Color Standard of this Ordinance; and/or (2) changing the shielding and direction of elements of an existing fixture to be directed downward and/or away from other properties.
- D. Light Color Standard.** Correlated color temperature of any outdoor light source shall not exceed 3500 Kelvin unless introduced as part of a façade or landscape lighting scheme used exclusively for the decorative illumination through color of certain building façade or landscape features.
- E. Substantial Renovation.** If any substantial renovation of an existing building or property occurs after the effective date of this Ordinance, then that property shall be required to meet the Standards set forth in this Ordinance.
- F. Laser Light Ban.** Laser light is strictly prohibited for outdoor use unless otherwise exempted in this Ordinance.

- G. Flashing or Intermittent Light.** Any lighting which flashes, moves, or incorporates rapid color or intensity changes is prohibited unless otherwise provided in this Ordinance.
- H. Prescriptive and Performance Standards.** All outdoor lighting must comply with the Light Color Standard and either the Prescriptive Standard or the Performance Standard, as set forth below. For properties with building(s) totaling 10,000 square feet or larger of Gross Floor Area as defined by the Cambridge Zoning Ordinance, a lighting plan must be submitted to the City of Cambridge Inspectional Services Department (the "ISD").

1. Prescriptive Standard

Outdoor Lighting Category	Maximum - Allowed Lumens Light	Maximum Height	Shielding and Direction
Unshielded or partly shielded light fixture placed not less than 4 feet apart.	315	12 feet above the surface of the area to be illuminated	Not applicable
Up to two unshielded or partly shielded light fixtures located in a main entry area, placed not less than 4 feet apart.	630	12 feet above the surface of the area to be illuminated	Not applicable
Shielded directional light fixtures, placed not less than 4 feet apart, for entries, walkways, and façade lighting.	1,050	12 feet above the surface of the area to be illuminated.	All light fixtures shall be located, aimed, and shielded so as to minimize light pollution and light trespass across property boundaries. Light fixtures for entries and walkways shall emit light in a downward direction only.

Shielded directional light fixtures for parking areas, driveways, or outdoor loading bays.	1,260	14 feet above the surface of the parking area, driveway or loading bay	All light fixtures shall be located, aimed, and shielded so as to minimize light pollution and light trespass across property boundaries.
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2. Performance Standard.

In order to apply the Performance Standard, permit applicants must submit a lighting plan and accompanying calculations that demonstrate compliance with the U.S. Green Building Council’s Leadership in Energy Environmental Design (“LEED”) Light Pollution Reduction (“LPR”) credit v4 BD+C. Once installed, actual compliance to the LPR credit must be certified by a registered architect or professional engineer licensed in the Commonwealth of Massachusetts and such certification must be submitted to the ISD. Even if approved and certified, should the lighting as installed and maintained fail to meet the Light Color Standard and/or the minimum LEED LPR Credit requirements, and be determined to be in violation of the light pollution and light trespass protections in this Ordinance, then that lighting shall be considered in violation of this Ordinance. For properties in Lighting Zone 3 (“LZ3”) that are adjacent to Lighting Zone 2 (“LZ2”), compliance with the LZ2 Light Trespass requirements in the LEED LPR credit v4 BD+C must be shown for portions of the property that lie within 100 feet of LZ2. Where the Lighting Zone boundary occurs within a public street, the 100 feet shall be measured from the centerline of the street. Where the Lighting Zone boundary lies within a lot, the 100 feet shall begin at the lot line that divides the subject lot from another lot in a different Lighting Zone.

I. Exemptions from Applicability. Property owners are encouraged to make good faith efforts to achieve near or partial compliance with the provisions of the Ordinance, including minimizing light trespass and light pollution; however, exemptions from the provisions of the Ordinance are as follows.

1. Lighting within public ways for the principal purpose of illuminating public ways.
2. Lighting for public parks or public art that is accessible to the general public and is commissioned, owned, or operated by the City or by a state or federal entity, or that is otherwise required by special permit, or law.

3. Lighting for public monuments, statuary, or the national flag in cases where compliance with the Standards of this Ordinance are specifically prohibited by law or conflicting with superseding requirements.
4. Lighting of historic buildings that has been reviewed by and has received a Certificate of Appropriateness from the Cambridge Historical Commission.
5. Lighting solely for signs as regulated under Article 7 of the Cambridge Zoning Ordinance.
6. Lighting for theatrical or television production or performance areas, if an electrical permit has been received from the ISD.
7. Lighting for work areas at construction sites, if an electrical permit has been received from the ISD.
8. Underwater lighting in swimming pools and other water features.
9. Seasonal lighting as defined in this Ordinance.
10. Lighting that is only used under emergency conditions.
11. Lighting required by federal, state, or local laws, rules or regulations.
12. Lighting for sports facilities, including, but not limited to, outdoor conditioned or unconditioned rinks, open courts, fields, and stadiums. All light fixtures shall be directed and shielded in a way that minimizes light trespass and sky glow. Lighting for the playing surfaces and spectator areas must be turned off after the activities have ceased or 11:00 PM, whichever is earlier.
13. Lighting as otherwise required or requested by the City for purposes of safety or security.
14. Lighting undertaken as a result of a City-appointed or City-authorized expert review panel to identify significant buildings, monuments, public spaces and streetscapes, and to recommend alternative or new lighting designs to accentuate their historic and aesthetic value, while preserving this Ordinance's intent to minimize light pollution and light trespass.

Section 15.22.060 Administrative Waiver. The Commissioner shall have the authority to grant a partial or complete waiver ("Waiver") of the requirements of this Ordinance according to the following procedures:

- A. Any applicant seeking a Waiver from all or some of the requirements of this Ordinance shall file an application with the ISD describing in detail with supporting information and documentation the nature, duration, location, specifications, and other particulars of the waiver being sought. The Application for a Waiver must

demonstrate that: (a) bringing the source of light for which the Waiver is sought into full compliance with this Ordinance would constitute a demonstrably unreasonable hardship on the applicant, as balanced against the potential impacts on Notice Recipients as defined in this Ordinance; or (b) bringing the source of light for which the Waiver is sought into full compliance with this Ordinance would result in conditions that are materially detrimental to health, safety, or welfare. The applicant may also provide for consideration an alternative plan(s) that demonstrate(s) their ability to substantially mitigate the negative effects of non-compliance.

- B.** The ISD shall give written notice of any Application for a Waiver to each Notice Recipient as defined in this Ordinance, including specific information on the nature, duration, location, and specifications and other particulars of the Waiver being sought, at least 14 days in advance of any decision on the Waiver application. Any Notice Recipient who claims that he/she or occupants of his/her property would be adversely affected by a grant of the Waiver may file a statement and materials with the ISD containing information to support his/her claim.
- C.** In determining whether to grant or deny the Waiver and what, if any, conditions and limitations (including a time limit) to impose, the Commissioner shall determine whether the applicant has demonstrated that: (a) bringing the source of light for which the Waiver is sought into full compliance with this Ordinance would constitute a demonstrably unreasonable hardship on the applicant; or (b) bringing the source of light for which the Waiver is sought into full compliance with this Ordinance would result in conditions that are materially detrimental to the health, safety, or welfare of persons or property affected. The Commissioner shall place on public file a copy of the application for the Waiver, all accompanying submissions and the decision, including all conditions and limitations, and the reasons for granting or denying the Waiver, as well as any other documentation associated with the process.
- D.** Waivers shall be granted in writing to the applicant and shall contain all conditions and limitations, including any time limit on the activity. Noncompliance with any provision or condition of the Waiver may result in its termination by the Commissioner.
- E.** Any Waiver may be reviewed, adjusted, terminated or repealed by the Commissioner at any time after two years, unless a longer time is specified in the Waiver, or in the event of noncompliance with any provision or condition of the Waiver.
- F.** The Commissioner may issue guidelines further defining the procedures to be followed in applying for a Waiver and the criteria that will be considered by the Commissioner in deciding whether to grant a Waiver. The Commissioner may impose a Waiver application fee.

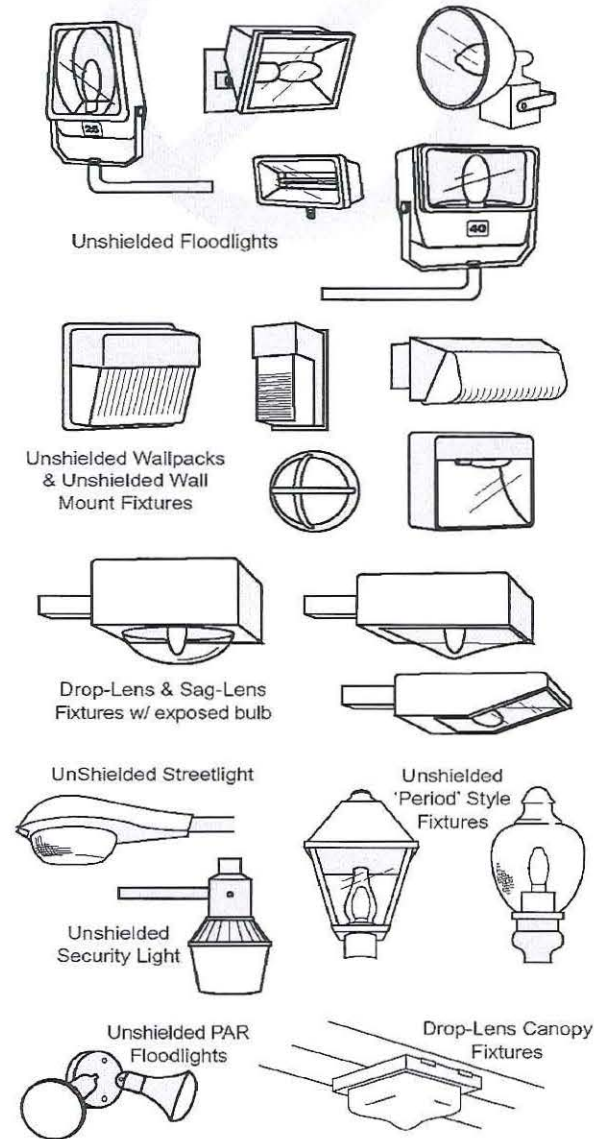
Section 15.22.070 Enforcement.

- A. Enforcement Officials.** The Commissioner or her/his designee shall be the authorized enforcement personnel charged with the enforcement of the provisions of this Ordinance.
- B. Complaints.** The Commissioner or his/her designee shall receive and respond to complaints of noncompliance with the Ordinance.
- C. Violations.** The Commissioner or his/her designee may order and specify remedial actions to be taken by a violator of this Ordinance to achieve compliance, or issue citations, pursuant to G. L.c. 40, § 21D, for violations of these provisions, assessing fines of three hundred dollars for each such violation. Each day such a violation continues shall constitute a separate offense. Additionally, any person found to be in violation of any of the provisions of this Ordinance may be prosecuted for a misdemeanor and upon conviction thereof shall be fined three hundred dollars for each such misdemeanor.
- D. Injunction.** As an additional remedy, any outdoor lighting installed or maintained in violation of any provision of this Ordinance may be subject to abatement summarily by a restraining order or injunction issued by a court of competent jurisdiction.
- E. Suspension or Revocation of Permit.** As an additional remedy, the Commissioner or his/her designee hereunder may summarily suspend, and after a hearing may revoke, any license or permit, including a building, demolition, or electrical permit.

These types of fixture designs
DO NOT comply in all locations.

Unacceptable / Discouraged

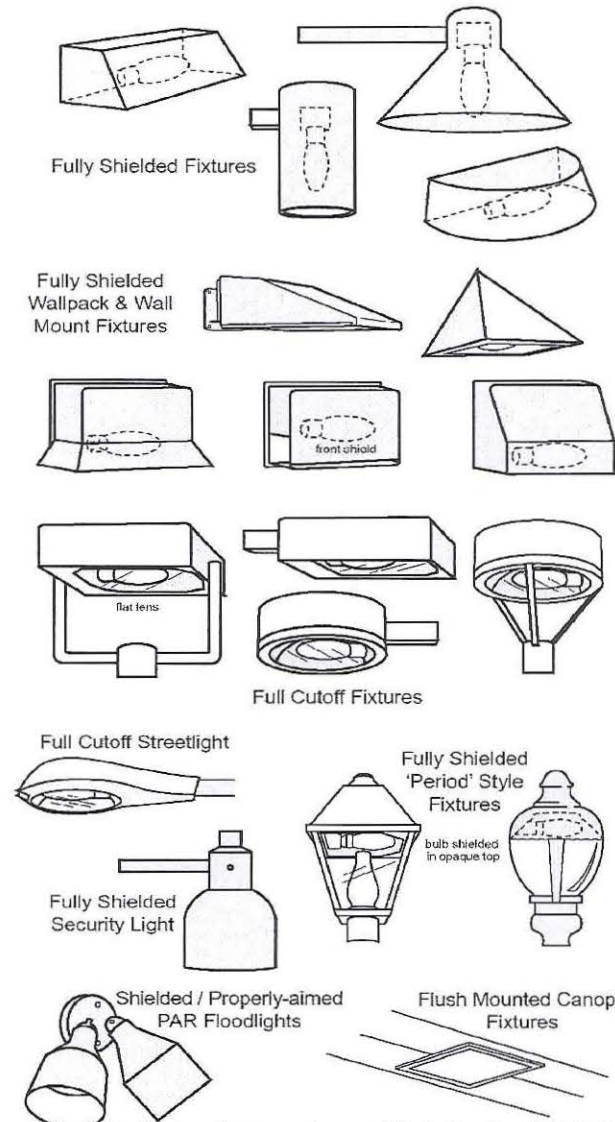
Fixtures that produce glare and light trespass



These types of fixture designs
DO comply in all locations.

Acceptable

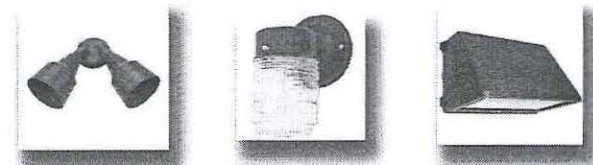
Fixtures that shield the light source to minimize glare and light trespass and to facilitate better vision at night



This illustration courtesy of Bob Crelin / NELPAG

Good Neighbor Lighting

Lighting Requirements and Practices in Cambridge



City of Cambridge
DRAFT: 4/1/2016

Photo by Jeffrey Berg

