Beth Israel Deaconess Medical Center

A teaching hospital of Harvard Medical School

Beth Israel Deaconess Medical Center
Lighting Standards
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Lighting plays a vitally important role in hospitals by providing for the visual comfort of patients, staff and visitors and fostering a healing environment. Quality lighting can reduce energy consumption, improve staff performance and enhance the patient experience. This document will define how to efficiently and effectively illuminate Beth Israel Deaconess Medical Center (BIDMC) utilizing sustainable practices. Concepts from IESNA RP-29-06 "Lighting for Hospitals and Health Care Facilities" are included.

Long term energy costs far outweigh installation, periodic re-lamping, and maintenance costs in most lighting. Control of long term energy costs includes:

- Providing the proper quality and quantity of light to meet user needs as documented by recognized national standards[1], and the appropriate building codes[2] or, in some instances, as determined by empirical information.
- Selection of efficient lighting fixtures.
- Controlling lighting so that it is on when needed and minimized or off when a space is unused, unoccupied or, where practical, lends itself to photocell control due to the presence of adequate natural light.

For all projects that include a lighting or space usage change, lighting analysis shall be prepared by the responsible architect, engineer or lighting design professional and delivered to the Energy Manager (independent of deliveries to BIDMC Project Managers) at the earliest possible time or immediately upon any change for review and acceptance. Lighting power analysis shall be completed using Visual™ or an approved equal. The lighting analysis shall include the point by point, reflected ceiling plans, power density, cut-sheets, etc. for all light fixtures and lighting controls (sensors, photocells, timers, etc.) to be considered. The cut-sheets shall show the efficiency and spacing criteria of each fixture to be considered.

Automatic controls (sensors, timers, photocells, etc.) will be incorporated into lighting work covered by this policy. As a minimum in all appropriate areas, controls will turn off or reduce the lighting to lowest allowable level when a space is unoccupied or inactive. For all projects where lighting is affected, controls are a required element.

The Energy Manager is available to advise and assist in lighting projects.

[1] Examples include ANSI/IESNA RP-29-06 "Lighting for Hospitals and Health Care Facilities", and other publications by the Illuminating Engineering Society of North America (IESNA).
[2] Including ASHRAE 90.1, the National Electric Code and the Massachusetts State Building Code.

1. General Lighting Standards

The following standards are to be followed by architects, engineers and lighting professionals, as well as BIDMC staff, who are designing new and upgraded lighting for spaces at BIDMC and associated off-site facilities. The purpose of these standards is to provide consistent, high quality lighting for each space while minimizing the costs for operation, types of fixtures, and maintenance.

1.1. Lighting Fixtures

1.1.1. LED fixtures are preferred for most lighting systems. See the approved standard light fixtures in Appendix 1.

1.1.1.1. LED fixture efficiencies should be at least 100 lumens per Watt. Fixture efficiencies shall be verified by photometric testing provided by the manufacturer

1.1.1.2. The LED's shall be 3500K and at least 80 CRI.

1.1.1.3. All exterior and maintenance area LEDs shall be 4000K and at least 70 CRI.

1.1.1.4. The general lighting fixtures in operating rooms shall be 3500K. Other fixtures in operating rooms shall be 4100K and at least 82 CRI to match halogen lamps in surgical lighting fixtures.

1.1.2. Lighting fixtures may be surface mounted, recessed, or pendant-mounted. The fixture style will be selected to deliver most efficiently the needed light, given physical space constraints (ceiling heights, and types, etc). Fixtures shall be selected based on the following considerations. See Appendix 1 for approved standard light fixtures.

1.1.2.1. Light distribution and efficiency

1.1.2.2. Ease and accessibility of lamp, fixture, and driver exchange

1.1.2.3. Appearance

1.1.2.4. Durability of lenses, grills, covers, etc when subjected to cleaning and lamp replacement

1.1.2.5. Speed of delivery by distributor

1.1.2.6. Designs that inhibit the collection of dust, dirt, insects and cobwebs are preferred

1.1.2.7. Long term availability of repair parts such as lenses, latches, etc.

1.1.3. The use of architectural and special lighting fixtures shall be avoided. In the event that a special need arises, these fixtures will be evaluated against the criteria found at 1.1.1-4 by the Energy Manager. Every effort shall be made to minimize the number of fixture and lamp types used throughout the facility.

1.1.4. Indirect fixtures should be avoided.

1.1.5. Recessed can lights should be avoided because they are inefficient. Retrofitting existing can lights to LED is acceptable.

1.1.6. Wall-wash fixtures will only be considered for highlighting art work or plaques.

1.1.7. Exit signs shall be LED with red lettering. Lithonia LED exit sign 120/277 volt Model # LQM S W 3 R 120/277 M6.

1.2. Lamps

1.2.1. BIDMC accepts RemPhos, Sylvania and GE LED lamp manufacturers in retrofit applications.

1.2.2. Two (2) foot LED lamps are acceptable if there is no room for four (4) foot lamps or if they are otherwise impractical.

1.2.3. All lamps shall be LED 3500K and at least 80 CRI except that linear LED lamps in operating rooms shall be 4100K and 85 CRI to match other lamps in surgical lighting fixtures. Additionally, all exterior lamps shall be 4000K. Lamps should have over 100 lumens per watt efficiency.

1.2.4. Metal Halide lamps are not acceptable.

1.3. Lighting Circuits

1.3.1. New lighting circuits shall be designed to maximize every opportunity to save energy through the use of lighting controls.

1.3.2. Perimeter lighting shall have daylight sensors to reduce lighting output when ambient light is adequate up to 18 feet from the window light source in non-patient care areas. Circuiting to allow alternate or dual switching in corridors, conference rooms, open offices and other large areas may provide significant additional savings with automatic or manual controls.

1.4. Light Levels

1.4.1. Light levels shall generally adhere to IES Guidelines.

2. Lighting Controls

BIDMC uses only Sensor-Switch lighting control products for interior occupancy and photocell applications. The nLight® system shall not be installed in any new or renovated area. The Energy Management office is available to advise and assist in lighting projects requiring controls.

The objective of automated lighting control is to minimize energy use during periods when spaces have low use or are not in use. This may be achieved through a combination of occupancy and daylight sensors and controls and/or programmable scheduling through local or building control systems.

Lighting controls must be carefully matched to the space and occupancy patterns to be successful. Large and or odd shaped areas may require multiple sensors to ensure acceptable operation. Individually controlled fixtures with occupancy and daylight controls are not acceptable in most spaces. Switch box mounted sensors must cover the entire space and function reliably during periods of "quiet" occupancy (extended phone calls, reading, etc.). Dual technology sensors provide greater reliability. If this can not be assured even with a dual-tech sensor, then a ceiling or wall mounted sensor should be used. Large areas such as labs will use ceiling mounted and multiple sensors as needed. All areas should take advantage of day lighting wherever possible: labs, rest rooms, corridors, stairwells, and lobbies. Rest rooms controls in particular must insure there no "false offs" while the facility is occupied.

2.1 Occupancy sensors shall be used in accordance with code requirements. The following locations must be considered for occupancy sensor control for new or renovated spaces:

2.1.1 Occupancy sensors shall be used in offices, conference rooms, storage areas, work rooms, closets, etc. where applicable.

2.1.2 Occupancy sensors shall not be used in maintenance closets or other areas where safety or security may be seriously jeopardized if the lighting is unexpectedly turned off.

2.1.3 As required by code, photocell controls shall be used in areas which have sufficient daylight during certain periods of the day. The controls shall be placed so that some or all of the lights are dimmed or turned off during such periods. Patient space and exam rooms may be dimmed, but not full off.

2.1.4 Fixtures with autonomous integrated lighting controls should be avoided. The preferred method is to use separate occupancy space sensors.

2.1.5 Switch body colors shall be white or ivory. Gray is allowed in Shapiro building only.

2.2 Desired characteristics of the lighting control system include:

2.2.1 Manual-on (Automatic when required) when a room, space or facility is occupied or in use.

2.2.2 Automatic-off, if the occupant fails to turn off lights when the occupancy or use ends.

2.2.3 Use the appropriate sensors to prevent false offs.

2.2.4 Automatic daylight adjustment where required by code and where possible/practical.

2.2.5 Local override in special purpose spaces, where needed.

2.2.6 Return to automatic operation without user action when occupancy in overridden areas ends.

2.3 Low voltage switching is permissible.

2.4 The nLight® system is not to be installed in any new or renovated area.

3. Incentive Opportunities

Electric Utility companies, including Eversource and National Grid pay incentives to customers who use qualifying lighting products. This can amount to a considerable amount of money to offset the cost of any qualifying lighting project whether it is new construction, renovation or retrofit.

3.1. Attention must be paid to the opportunity for collecting incentives for superior lighting designs.

3.2. Familiarity with the utility company incentive/rebate programs is required.

3.3. The architect, electrical engineer or lighting professional shall prepare the incentive submittal. The Energy Manager shall review, approve and submit the required utility company paperwork.

APPENDIX 1

GENERAL LIGHTING FIXTURES			
DESCRIPTION	MANUFACTURER	CATALOG NUMBER	NOTES
LED Exit Signs	Lithonia	LQM S W 3 R 120/277 M6	
2'x2', 2x4', 1'x4' Ceiling Grid	Remphos	RPT-LEDPANEL-size-33L-840-G2	either fixture is permissible
	MARK Lighting	WHSPR-size-2000LM-35K-90CRI-DARK-MVOLT-SWC-CL80	
Exterior Lights	Remphos	RPT-TOUGHDRUM-13IN-2200LM-4000K-options	either fixture is permissible
		RPT-LEDCF-3100LM-4000K-options	
Mechanical and Electrical Rooms	Lithonia	ZL2N-L48-2000LM-MDD-MVOLT-40K-60CRI-WH	
CAN Lights or Downlights	GE	Lumination LRX	retrofit only

LIGHTING RETROFITS			
DESCRIPTION	MANUFACTURER	CATALOG NUMBER	NOTES
LAMPS	Remphos, Sylvania, or GE	As Applicable	Lamp replacement dependent on the fixture

PATIENT ROOMS			
DESCRIPTION	MANUFACTURER	CATALOG NUMBER	NOTES
1’x4’ Recessed Liner LED Fixture	MARK Lighting	WHSPR-size-2000LM-35K-90CRI-DARK-MVOLT-SWC-CL80	
1’x4’ Surface Mounted Linear Fixture	MARK Lighting	S4LWID-4’-1N35-2N35DC-EZB-DCT-120-LMES20	

DESCRIPTION	MANUFACTURER	CATALOG NUMBER	NOTES
6”x4’ Recessed Linear LED Fixture	MARK Lighting	SL6L-QS-LOP-4FT-RLP-ceiling trim-80CRI-35K-600LMF-MIN1-ZT-voltage	review options on spec sheet for correct configuration
2’x2’ Recessed Linear LED Fixture	MARK Lighting	WHSPR-size-2000LM-35K-90CRI-DARK-MVOLT-SWC-CL80	
2’X2’ Recessed Linear Wet Location LED	Lithonia	2WRTL-F-L24-3000LM-OAW-AFL-MVOLT-EZ1-35K-90CRI-WH	
CAN Lights or Downlights	GE	Lumination LRX	
Slot Pendant, Surface, Wall	MARK	Slot 2 or 4, Pendant, Direct, Indirect or Direct-Indirect	choose options on spec sheets