16500-H: INTERIOR LIGHTING

Applicability:

The information expressed herein is unique to UMHHC owned, operated, and leased facilities, and are intended to supplement the University of Michigan's Architecture, Engineering, and Construction (UMAEC), design guidelines 16500. All information presented in the referenced UMAEC guideline applies to UMHHC facilities, unless explicitly stated otherwise below. Where differences and/or conflicts exist between the supplemental information noted below, and the information in the UMAEC guideline, this supplementary information shall take precedence.

All UMHHC buildings shall have energy efficient lighting systems that are easily and efficiently controlled and maintained. The lighting shall be designed in accordance with all applicable codes. It shall also address the special Ergometric needs of noted occupants...i.e., low glare lighting in VDT areas.

Standards

Use the following additional standard for illumination design:

1. 2007 Minimum Design Standards for Health Care Facilities in Michigan – Table 8 Illumination of Health Care Facilities.
2. 16550 – ‘Lighting Controls Systems’

In general, the lighting level used when designing shall be at the level noted in Table 8. If the lighting levels noted elsewhere in these guidelines, or the levels required by other governing standards and authorities is higher – use the higher value.

Lights, Lighting Levels, and Controls

1. The most energy efficient lighting sources, consistent with color quality requirements of the occupancy, shall be used. T8 fluorescent lamps shall be used in all buildings.
2. The designer shall use a Light Lumen Depreciation (LLD) of .7 (70%) of the overall fixture to reflect the spot relamping procedures normally used in UMHHC facilities
3. All normal-power lighting is to be switched. Emergency-power lighting is to be switched only in non-public areas.
4. Use 277 volt power for fluorescent and HID lighting whenever this voltage is present in the building. Exception: Under counter (task) lighting shall be 120-volt.
5. In patient rooms, and other areas where patients will be on their back, install indirect type lighting - unless physical constraints of the space prevent its use. (This is needed to keep the uncomfortable glare of direct lighting out of the eye of the recumbent patient.)
6. When ceiling heights are 8’ 6” or more, in non-patient areas, evaluate the advisability of using indirect lighting.
7. Special lighting situations, such as the need to provide vertical foot candles for fixed or moveable shelves; or the need for low glare lighting for VDT applications; shall all be carefully and individually designed - do not 'cookbook' such areas.
8. In all patient/diagnostic rooms, and select other rooms, the fluorescent lamps shall be 5000K, instead of the 3500K normally specified. All lighting, regardless shall have a CRI of at least 85
9. Invasive Procedure Rooms
   a. Shall utilize standard 5000K fluorescent lighting on dual level switching.
   b. Provide a minimum of one (preferably more) luminaries powered from the emergency power system.
   c. One or more of those fixtures on emergency power shall also have an emergency battery back-up installed. This battery will prevent the room from going totally black during a power outage until the generator starts (this is also an MDCH requirement).
10. Surgery Suites:
a. In 'standard' surgery suites, use 5000K fluorescent fixtures to meet lighting needs as required by codes and these guidelines
b. In surgery suites needing green lighting, defined by lead surgeon on design team, use 6-lamp fixtures. The inner four lamps shall be 5000K on dual level switching. The outer two lamps shall be green lamps, or a separate lighting control system allowing different 'scenes' as required by the surgery under way.
c. In operating rooms and invasive procedure rooms, provide a minimum of one (preferably more) luminaries powered from the emergency power system. Also, one half of the sterile field light fixtures on emergency power shall also have an emergency battery back-up installed. Battery backup will prevent the room from going totally black during a power outage (this is also an MDCH requirement).

11. In patient rooms, the one fixture above the bed, shall be a three in one (3 in 1) fixture, This fixture combines room ambient lighting, reading light, and exam light functions into one fixture.
   a. This fixture shall have four F40TT biax lamps, with one lamp on for room ambient lighting, two on for reading, and all four on for exam purposes.
   b. The ambient lighting function of this fixture shall be controlled by the switch at the door that also controls other light fixtures in the room.
   c. The reading and exam light functions will be at the headwall; the reading light function shall also controlled by the nurse call pillow speaker. Contact FP&D electrical engineer for more information on circuiting and control.
   d. Other fixtures in the room shall be 'standard' type to meet the function of ambient room lighting.

12. Patient rooms shall have low, wall mounted night lights installed to allow patients and staff to move safety in the room when the main lighting is off during the evening. Provide 1 foot-candle at least around bed, path to bathroom, and path to door. Full coverage is a plus.

13. Radiology reading rooms shall:
   a. Provide with standard illumination for cleaning and repairs.
   b. They shall also be provided with very low level lighting system to facilitate their reading of the images on the video screens. LED light seems to be a good source for this lower level lighting. Provide 2 to 4 foot-candles at work surface.

14. The newer T5 lamps types of lamps may only be used when an equivalent fixture, to meet the needs is not available in T8. In cases where T5 must be specified, it shall be T5HO only. T5HO fixtures shall be specified with EOL (end of life) feature as part of the ballast.

15. Where dimmable lighting is needed, use dimmable fluorescent fixtures, typically compact fluorescent type. Alternately LED lighting may be installed in dimmable applications.

16. The battery back-up for lighting shall:
   a. Include a remote (from fixture) monitor noting status of battery system. Typically these are mounted on wall near fixture, mounted at 80” +/- 6” AFF
   b. The battery light will come on even if the switch for said fixture is turned off.
   c. Design so as to provide:
      i. In surgery suites and invasive procedure rooms, provide20 foot-candles in center of room (at table), with a minimum of at least 1 foot-candle elsewhere in the room.
      ii. In other areas, meet requirements for egress lighting.

Energy Efficiency

1. Commonly unoccupied, or low-occupancy, rooms are to have occupancy sensors. Carefully consider manufacturer's requirements regarding placement of occupancy sensors. Automatic lighting controls shall not be installed in areas where patient care is rendered, or in areas where an automatic shutoff would potentially endanger the safety or security of the room or building occupant.
   a. Occupancy sensors shall be installed in the following room types:
      i. Offices
      ii. Storage/Supply Rooms
      iii. Auditoriums, conference and class rooms (take special care in the design of these rooms and carefully coordinate with the AV consultant/supplier)
      iv. Staff, Office, and Public restrooms
      v. Electrical and communication rooms.
vi. Janitor closets
vii. 
viii. Break Rooms
ix. Copy Rooms
x. Locker Rooms
xi. Staff Lounges
xii. Room types not included in this list shall be evaluated for potential occupancy sensor installations per the requirements of SID-D.

b. Occupancy sensors shall be dual technology style devices which incorporate both passive infrared motion and either microphonic or ultrasonic occupancy detection. Ultrasonic devices shall operate at frequencies that do not interfere with proper hearing aid operation. Sensors in restrooms or locker rooms with lavatory or shower stalls must include microphonic detection as the second sensing technology. Single technology passive infrared sensors shall be allowed in Janitor Closets, Utility/Communication Rooms, or in rooms immediately adjacent to a regularly active area without a door or wall separation. The microphonic or ultrasonic sensor element shall be able to be easily deactivated if desired to convert the sensor into a single technology passive infrared sensor.

c. Wall switch mounted occupancy sensors shall be allowed only if all of the following criteria are met:
i. The switch location results in adequate room sensing coverage free of blockages or obstructions, and will not detect occupancy from adjacent spaces through windows or potentially open doors.
ii. The room is less than 400 square feet.
d. Wall switch mounted sensors shall be set for “Manual On” operation for offices, and shall be set for “Auto On” operation for all other spaces.
e. All occupancy sensors, except wall switch mounted sensors, shall be provided with an auxiliary low voltage dry contact for potential tie-in to DDC or other building control systems.

2. Corridor lighting is to be alternate-switched to allow reduced lighting in the evenings or energy emergencies. All normal-power corridor lighting is to be controlled by keyed switches in the corridors. Emergency-power egress lighting will not be switched in corridors.

3. Lighting in atriums, and other areas with high daylight levels, is to be automatically controlled to reduce artificial light when natural lighting is available – daylight harvesting. Note: Life safety (egress) lighting excluded from daylight harvesting.

4. All lighting, other than emergency egress lighting noted above, shall be locally switched. Switching of lights at panel is not acceptable.

5. When multiple lighting levels are needed, approach problem from multiple light level switching. If this does not meet need, use dimmable fluorescent. On multi-lamp fixtures, dim only the middle one or two lamps (in three and four lamp fixtures).

6. Incandescent lighting is to only be used when dimming and high CRI is a requirement. Exceptions to this restriction could be lighting for works of art, the gift shop, Executive offices and pre-approved conference rooms.

Materials

1. The lenses of lighting fixtures are to be of virgin acrylic (meeting MSFM standards), glass or other materials approved by MSFM.
2. Lighting fixtures in patient/visitor/staff areas will have a sound rating of A or better.
3. Dimming Systems
   a. Centralized dimming systems shall be used where the wattage of the space exceeds the 2000 watt capacity of outlet box mounted dimmers or where special use dictates multiple systems and scenes. The control units shall be flush mounted in finished areas or surface mounted in mechanical or electrical rooms. Remote control stations shall be flush mounted within the room space as shown on the plans. Wireless remote controllers are allowed.
   b. The main controller shall be equipped with input/output ports as required to interface with building management systems and systems monitoring. It shall have solid state
controls solid-state relays. It shall be capable of dimming incandescent and/or fluorescent lights as shown on plan.

4. Local Sourcing
   a. Whenever possible, select fixtures, lamps and ballast available from local distributors.
   b. Avoid sole sourcing whenever possible.

**Flexibility and Maintainability**

1. Lighting systems in open office areas are to be designed to allow the arrangement of the furniture layouts to change with minimum change in lighting systems.
   a. Preferably, this is to be accomplished by using a sufficient number of fixtures to provide even lighting throughout (i.e., more fixtures with fewer lamps per fixture).
   b. Alternatively, the fixtures will be wired with sufficient flex conduit to allow the fixture to be moved one or two ceiling tiles in any direction.

2. Custom fixtures are to be specified only when prior approval is given by the UMHHC Project Manager.

3. When lighting is installed in coves, provide a minimum of 12" of clearance to allow proper maintenance and cleaning on lamps and ballasts.

**Standard Products-Grid Troffers (for projects constructed by Construction Services)**

In general applications being constructed by Construction services, for the sake of expediency, use the following fixtures. Similar fixtures from other manufacturers are acceptable if more readily available. Please note that if the application, or function of the space requires something other than these types, specify the needed fixture:

1. 2’ x 4’ fluorescent lay-in grid troffer shall be Lithonia 2SP8G-332-FW-A12125-***-GEB10 RS GLR
2. 2’ x 2’ fluorescent lay-in grid troffer shall be Lithonia 2SP8G-317-FW-A12125-***-GEB10 RS GLR
3. Patient Room ’3 in 1’ fixtures shall be Kenall MedMasterMPC 24G-1/2/4-40B. Affirm exact number with vendor when voltage level and other variables are known.

*** = voltage as required. Normally 277 volt.

**Exit Lights**

1. Use low power, LED type Exit fixtures with diffuser that disguises LED’s. Fixtures to be wired so failure of one, or more, LED’s does not cause loss of a letter or whole sign.
2. Power packs are not an option with buildings that have generator power available.