The following information shall be included in specifications prepared for use on all University of Cincinnati construction and renovation projects. This information is supplemental and not intended to be a complete specification.

**GENERAL STANDARDS**

**General Criteria**

**Lamp Selection:** It is preferred to minimize the variation of lamps within a space or building.
- **Flourescent:** Use standard lamps when possible which include 4' T8 28 watt, 84,000 hours; 4' T5 35 watt, 40,000 hours; 4' T5HO 54 watt, 60,000 hours; 150 watt Pulse Start Metal Halide 20,000-hour horizontal; 28 watt Ubend, 30,000 hours; 21 watt CFL, 20,000 hour life.
- **LED:** Limit manufacturers to RAB, Lutron or Sylvania.

**Work Surface Illumination (FC)**

- **70** Laboratories, drafting rooms
- **50** Paperwork-intensive offices, shops, kitchens, library study areas, etc.
- **42** Classrooms, lecture rooms, classroom auditoriums, computer-oriented offices, and general-purpose computer workstations/labs. Consider two-level switching (50/17 ft-c) for mixed computers and paperwork.
- **30** Non-classroom auditoriums, conference rooms
- **20** Restrooms, mechanical and electrical rooms, locker rooms, etc.
- **10** Special computer labs: Consider two-level switching (30/10 ft-c) for mixed uses or dimmable ballast.
Minimum Illumination (FC)

15  Corridors, passageways, and stairways adjacent to spaces with more than 50 foot-candles
10  Corridors, passageways, stairways, storerooms, etc.
2.5  Covered parking garages
1  Open parking
1  Roadway (use Illuminating Engineers Society [IES] recommendation to suit security level)
0.5  Walkways (use IES recommendation to suit security level)

Roadway/Walkway Lighting
Streets, parking lots, sidewalks, and pathways will generally be illuminated with pole-mounted, LED luminaires:

- Protect all street and walkway luminaries with waterproof in-line fuse holders located in each pole base.
- All pole lights under 20’ in height shall be hinged at the base such that servicing can be done from ground level.
- All walkway luminaire poles must be provided with a hinged base.
- All outside lighting shall be controlled by a photocell and hand-off-auto switch.
- Each lighting circuit shall be on a separate single pole or two-pole breaker.
- All mounting bolts shall be installed with anti-seize compound.

Lighting Controls
Controls: General - Multiple switching and split circuiting is preferred to single switching of higher light levels. Control all interior lighting with local switching. Do not use standard circuit breakers as light switches.

Special Controls - Lighting control panels and relays for difficult access spaces such as vivariums, biohazard areas, operating rooms, patient rooms, and procedure rooms shall be readily accessible, preferably in a hallway outside the space.

Automatic Controls - When automatic controls are to be used, occupancy sensors are generally preferred to master lighting control systems to avoid maintaining time schedules. Lighting control for common spaces should be controlled by the building BAS via lighting contactors.

- All lighting controls shall switch loads when output voltage is approximately 0.
- Occupancy sensors shall operate in series, with an ON/OFF switch having the look and feel of a typical light switch and mounted in a typical light switch location.
- Occupancy sensors shall fail ON.
- Occupancy sensors shall have time delay adjustments of 10 to 30 minutes before turning lights OFF. Choose delay settings to minimize ON time while limiting the number of starts to less than
12 per day. Provide a statement of occupancy sensor adjustments in the construction documents. When in doubt, use 10 minutes for meeting spaces such as classrooms and 30 minutes for other applications.
- Dual technology sensors should be used for all applications.
- Large common office spaces may use multiple-zoned, dual-technology occupancy sensor control.
- Occupancy sensors may be used to reduce pathway and warehouse light levels but “stumble lighting” and egress lighting should be maintained ON. Coordinate with emergency lighting requirements.

**Dual Switching** – Typical daylight zones shall have independent dual switching.

- One switch controls all lamps nearest windows and some of the lamps in each luminaire further away from the windows. (Consider turning OFF additional lamps nearest the north wall of rooms with east- or west-facing windows by this same switch.)
- A second switch controls all remaining lamps in the daylight zone.

**Outside Lighting Control** - No automatic controllers or time clocks shall be used for exterior lighting. The university DDC control system has a virtual photocell and will be used.

**Additional Requirements** - Lighting control panels and contactors shall be located away from occupied spaces and shall be accessible. All lighting control panels and contactors will have a hand off auto switch. Electrical spaces are acceptable. Latching type relays will be used. Systems utilizing a carrier frequency for control shall not be used, unless existing conditions require their use. Locate photocells in protected, accessible areas.

**Design Evaluation**
The following information is required to evaluate the design:

**Schematic Design Phase** - Zones with foot-candle levels are needed for the lighted spaces; provide information on luminaires’ types to be used, energy code requirements, and the different control designs being considered.

**Design Development Phase** - A description of the luminaires’ layout and the switching schemes to be used in the different lighted spaces. Light-level calculations with the factors used in calculating the levels to evaluate the efficacy of the design.

**Construction Documents Phase** - Description of all of the luminaires to be used (provide with the schedules circuited with the lighting homeruns). Provide control diagrams for the different areas of the lighting design.

**Submittals**
Luminaires, lamps, and ballasts shall be submitted with all lighting control equipment to be used in the design.
PRODUCT STANDARDS

Product Requirements

In-Ground Uplighting - All in-ground uplighting will be installed with ground water drainage systems.

Illuminated EXIT Lights

LED Lighting - Illuminated EXIT luminaires shall use light-emitting diodes (LEDs) as the source of illumination. The housing and faceplate shall be white in color (other colors must be approved). Input power shall be less than 5 watts per face and operate on dual voltage 120/277 VAC. EXIT luminaires shall comply with UL 924 and U.S. Environmental Protection Agency (EPA) EnergyStar Specifications at the end of five years of continual use.

Graphics - Letters shall be red and not less than six inches high, and strokes shall not be less than 0.75 inch wide. Luminance contrast shall be greater than 0.8. At the end of five years of continual use (when measured at 0 degrees and 45-degree viewing angles), average luminance shall be greater than 15 candelas/meter, minimum luminance shall be greater than 8.6 candelas/meter, and maximum-to-minimum luminance ratio shall be less than 20:1. Letter illumination shall appear even when viewed in a typical installation. The manufacturer shall replace all defective parts for five years from the date of purchase.

Additional Stock - All new luminaires and lamps shall be supplied with an additional quantity of 15 percent of installed fixtures and lamps for use by the Owner as attic stock.

Additional Requirements - All lighting applications near the perimeter of buildings (including parking garages) shall be evaluated for daylight harvesting such that the quantity of lighting by luminaires during daylight can be controlled based upon the amount of day lighting available.

--- END OF SECTION ---