1.0 GENERAL

1.1 Related UBC Guidelines

.1 Section 27 05 05 Communication Rooms Design Guidelines – 2.13

1.2 Coordination Requirements

.1 UBC Energy & Water Services
.2 UBC Building Operations Electrical Technical Support
.3 UBC Information Technology.
.4 UBC Learning Space Design Guidelines

2.0 MATERIAL AND DESIGN REQUIREMENTS

2.1 General

.1 All interior building lighting shall be supplied from 120 volt power systems.

.2 Lighting design shall incorporate the principles of sustainability (environmental & financial) and its products and systems shall be energy conserving, long life, have a low cost of ownership and be accessible for service and maintenance.

.3 For interior building lighting solutions, preference shall be given to Light Emitting Diode (LED) light sources. HID lighting shall not be permitted.

.4 Daylight harvesting opportunities shall be implemented in areas where natural daylight is available.

.5 Uniformity and low brightness contrast shall be achieved by judicious use of luminaires and their locations.

.6 All lighting shall be designed to suit the task and task location rather than the general lighting. ASHRAE 90.1, IESNA and WorkSafeBC guidelines shall be taken into consideration and calculations submitted where requested.

.7 As a general rule, the following task lighting levels shall be used:

<table>
<thead>
<tr>
<th>Task</th>
<th>Lighting Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices</td>
<td>500 lux maintained.</td>
</tr>
<tr>
<td>Classrooms and Seminar Rooms</td>
<td>500 lux maintained.</td>
</tr>
<tr>
<td>Corridors</td>
<td>100 lux maintained.</td>
</tr>
<tr>
<td>Washrooms</td>
<td>150 lux maintained.</td>
</tr>
<tr>
<td>Special areas</td>
<td>in accordance with the user's task requirements and IESNA recommendations.</td>
</tr>
</tbody>
</table>

.8 When mounting luminaires in high ceiling spaces, consideration must be given to ensure access for maintenance such as fixture, driver, lamp and ballast replacement. The use of scaffolding is discouraged. Indoor lighting shall be accessible either from ladders on flat surfaces such as floors or stair landings or from powered lifts with a maximum lift of 6.1 m. Building access, floor construction, and elevators shall permit entry and use of existing UBC lift equipment for proper and safe maintenance (Genie GR20 with weight of 1,112 kg (2451 pounds) and able to pass through a standard 3’x7’ door opening.) If special
equipment is required for lighting maintenance, then the consultant shall, prior to tender, prepare and submit a Lighting System Maintainability Plan to UBC for review and approval and it shall contain documentation describing the special equipment and a maintenance schedule and spare parts list. *Existing Building Operations and Work Safe BC Fall Protection procedures shall be minimized by the design.*

.9 The lighting design proposed for all public areas such as corridors and stairways shall ensure the life safety of building occupants at all times and shall also minimize lighting energy required to maintain BCBC minimum levels (i.e. lights off until occupancy has been detected or an emergency has occurred). A portion of the lighting fixtures shall be wired to a Life Safety power panel if an emergency generator or Central Inverter is available. Lighting circuits fed from emergency power panels shall be arranged so that they may be switched or dimmed during normal operation.

.10 Suspended luminaires shall be direct/indirect. Full indirect suspended luminaires are not acceptable.

.11 Non-linear specialty fixtures such as pot lights, cylinders, wall sconces, wall washers and other decorative lighting shall be minimized and shall not exceed 10% of the total quantity of fixtures in the building project.

.12 Metal Halide (MH) lighting solutions are not acceptable. LED solutions, especially for high bay applications, shall be pursued.

.13 Banks of multiple switches shall be labeled to avoid confusion.

.14 All light fixtures provided shall be stock items (no custom made fixtures) readily available from local suppliers. A written commitment from the manufacturer that replacement parts and fixtures will be available for a period of 5 years after project completion is required.

.15 Light fixtures shall not contain batteries.

.16 *All light fixtures shall be attached to building structure using mechanical fasteners. Tape and or adhesive methods shall not be used.*

### 2.2 Lamps

.1 Lamps shall be the longest life available. Preference will be given to LED linear T8 lamps, linear fluorescent T8 lamps shall not be used.

.2 T8 LED lamps shall be rated for at least 50,000 hours operation with 3 hours per start. Acceptable manufacturers are: General Electric, Osram, Sylvania, or Philips.

.3 T8 - 15 watt (maximum) LED lamps with 3500° K color temperature operating from 120 volt instant start ballasts with standard ballast factors shall be the standard.

.4 T8 LED lamps shall not be line-voltage connected.

.5 LED lamps shall be used as substitutes for traditional applications involving CFL, MR-16, PAR 20, PAR 30, PAR 38 lamps. LED lamps shall be Energy Star rated. Acceptable manufacturers are: General Electric, Osram, Sylvania, or Philips.
2.3 Ballasts

.1 All LED and fluorescent lighting ballasts shall operate from 120 volt input voltage and shall be instant start electronic type with standard ballast factor. If fluorescent lighting must be used, the ballasts specified shall be compatible with GE and Philips T8 LED lamps. Ballasts shall have parallel lamp operation. Acceptable manufacturers are: General Electric, Osram, Sylvania, Philips/Advance or Universal.

.2 Ballast output frequency shall be greater than 42 kHz.

.3 Dimming ballasts shall be instant start with 0-10 volt control.

.4 Ballasts shall have lamp end-of-life detection and shutdown circuitry that meets ANSI standards.

2.4 Lighting Controls

.1 All interior lighting shall have controls such that when the lighting is not needed, it will automatically be either turned off or dimmed to a low output condition.

.2 Where low voltage relay controls are provided for new building projects they shall include a BACNET compatible BMS interface device which shall be wired to the local BMS control panel. This will ensure that all scheduling functions related to lighting systems will be under the control of the BMS system. Acceptable manufacturers are General Electric, Douglas, or equivalent approved in writing by UBC Building Operations Electrical Technical Support.

.3 Exterior building mounted lighting and exterior building area lighting that may be powered from the building project electrical system shall be under the control of the BMS scheduling system. Exterior lighting shall not be dimmable.

.4 Occupancy sensors shall be dual technology type with both Passive Infrared (PIR) and acoustic/ultra-sonic sensors, and may be either line voltage or low voltage types. Low voltage occupancy sensors with 1 or 2 poles and local power packs are preferred. Slave power packs are not acceptable. The occupancy sensor time delay settings shall be adjusted to 30 minutes for offices, classrooms or theatres and 20 minutes for washrooms. Acceptable manufacturers are Watt stopper, Sensor Switch, Leviton, Crestron, or Hubbel.

.5 Offices, classrooms, and lecture theatres shall have light control switches at all entrances, exits and vestibules. These interior spaces shall also have occupancy sensors, mounted at a high level in a corner and arranged for semi-automatic operation such that manual operation of the local switches is required to energize the lighting while occupancy sensors and local switches will de-energize the lighting. Large spaces may need more than one sensor.

.6 Corridors, lobbies, atria and similar public spaces shall be controlled by the BMS system and shall also have occupancy sensors, mounted at high levels, and arranged for full automatic operation. The BMS system shall energize lighting in these areas in the early morning and will also disable the occupancy sensors in these areas during the daytime occupied condition. Late at night when the building is un-occupied, the BMS system will energize the occupancy sensors and lighting in these areas will be turned off automatically once the un-occupied sensor time-out period has expired. The occupancy sensor time delay settings shall be adjusted to 20 minutes for corridors and public spaces. Large spaces may need more than one sensor. Programming shall support custodial requirements.

.7 Occupancy sensors, timers are not permitted in interior spaces that may be or may become hazardous, such as laboratories, electrical closets, electrical and mechanical service rooms.
.8 Lighting in audio/video enabled spaces, including theatre (type 1), classroom (type 2), seminar room (type 3), and video-conferencing/AV capture enabled shall be controlled by Crestron lighting control or equivalent. Equivalents will be evaluated by UBC IT Audio Visual. Approval of equivalent equipment will be provided in writing by UBC IT Audio Visual Technical Specialist. Refer to UBC Learning Space Design Guidelines for space type definitions and further lighting requirements.

.9 All classrooms and lecture theatres shall have LV lighting control switches at all entrances and exits to the space. In addition, LV switching controls shall be installed at the instructor’s end of the space. Classroom and lecture theatre lighting control shall include at minimum 4 dimmable zones. Zone 1 comprises the white board area lighting; zone 2 comprises the front of room area lighting; zone 3 comprises the front seating area lighting; and zone 4 comprises the back seating area lighting. The extent of zoning will vary depending upon the size of the teaching space.

.10 For all other audio/video enabled spaces, the lighting zones shall be designed to meet the application of the space and shall take into account audio/video technology being used. The design shall be approved by UBC IT Audio Visual in writing.

.11 Where applicable, all classrooms, lecture theatres, offices, corridors, stairways and other public spaces shall incorporate daylight harvesting via use of interior mounted photocells and arranged to take advantage of free illumination while maintaining acceptable minimum illumination levels within the space.

.12 LED dimmers shall be compatible with the LED lamps used and their drivers.

2.5 Exit Signage

.1 Exit lighting shall be provided in accordance with the BC Building Code and the Canadian Electrical Code as amended by BC Electrical Safety regulations.

.2 All exit signs shall be illuminated by LED light sources.

.3 Exit signs shall be powered at 120 volts from Life Safety power panels or central inverter power panels if available. If not available, Exit Signs shall be AC/DC compatible and be fed from Unit Equipment DC supply.

.4 Approved manufacturers are Ready-Lite Ultima series, or approved equal.

.5 Exit signs shall not incorporate batteries or any other type of stored energy source.

2.6 Emergency Lighting

Emergency lighting shall be installed in accordance with the B.C. Building Code and the latest edition of the Canadian Electrical Code.

.1 Emergency lighting Unit Equipment shall only be installed in buildings less than 2,500 GSM. In no case shall the total pieces of Unit Equipment installed in a single building exceed 12.

.2 Emergency lighting installed as part of renovations or tenant improvements shall be designed to incorporate the existing emergency lighting system in the building.

.3 Individual light fixtures shall not contain batteries.
.4 All Unit Equipment lighting, remote heads and exit lights shall be manufactured by ’Ready-Lite’ or approved equivalent.

.5 The Unit Equipment shall be 360 Watt, 12V DC or approved equivalent. The Unit Equipment shall not be self-testing.

.6 Unit Equipment shall be mounted on a manufacture-supplied shelf specifically design for the purpose.

.7 Generator and Electrical rooms containing Transfer Switches shall be provided with Unit Equipment.

.8 Unit Equipment and remote heads shall be 12V, minimum 5W LED.

.9 Unit Equipment shall be cord-connected to a 120V receptacle mounted adjacent to the unit. Receptacle shall be connected to a local, un-switched 120V lighting circuit. In buildings with existing 347V lighting, 120V receptacle shall be connected to a dedicated circuit from a local panel.

***END OF SECTION***