26 50 00 Lighting

1. **Lamps**
   1.1. The selection and specification of lamps shall result in low operating and maintenance costs for lighting.
   
   1.2. Lamps shall be specified from the PPS Approved Lamp List.

2. **Lighting Fixtures**
   2.1. Fixtures shall be selected for quality, performance, efficiency and economy.
   
   2.2. Fluorescent and LED fixtures are preferred for most interior applications.
   
   2.3. Fixtures shall have hinged, framed lenses or louvers. Lenses shall be acrylic prismatic (K12). Deep parabolic diffusers or direct/indirect lighting may be specified when applications require.
   
   2.4. Custom made fixtures shall be avoided whenever possible. Fixtures and parts should be equal to those manufactured by Lithonia, Visioneering, and Cooper.
   
   2.5. Ballasts shall be high efficiency, high power factor, sound rated A.
   
   2.6. Fluorescent ballasts for T8 lamps shall be electronic, rapid start. Instant start may be specified where approved by PPS.
   
   2.7. Cast metal fixtures shall be specified for exterior applications.
   
   2.8. Documentation shall include manufacturer's catalogue cut indicating fixture specified, fixture designation, quantity specified, options specified.
   
   2.9. Fixtures with remote ballasts/drivers are not acceptable. All fixtures must have integral ballasts/drivers.
   
   2.10. Where T5 fixtures are specified, they are to be HO (High Output) and not standard T5’s due to ballast incompatibility.

3. **Interior Lighting**
   3.1. Lighting systems shall have demonstrated optimum life cost for all components (i.e. lamps, fixtures, ballasts, etc.).
   
   3.2. Lighting shall be designed to provide high quality illumination appropriate for the identified tasks.
1.3. Whenever practical, task lighting shall be considered and energy consumption minimized.


1.5. Unless information is given by the architect to the contrary, lighting design shall be based on the following reflection coefficients:

<table>
<thead>
<tr>
<th>Surface</th>
<th>Reflection Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceilings</td>
<td>80% or higher with a non-glossy surface: acoustically treated ceilings may be somewhat lower.</td>
</tr>
<tr>
<td>Walls</td>
<td>50 – 60%</td>
</tr>
<tr>
<td>Desk Tops</td>
<td>35 – 40%</td>
</tr>
<tr>
<td>Floor Coverings</td>
<td>30% or higher</td>
</tr>
</tbody>
</table>

1.6. Interior areas shall be provided with sources that provide high colour rendering (CRI - 75 or greater). Colour temperature shall be 3500K.

1.7. Ultra Violet (UV) filters are required in art galleries and throughout the space occupied by the art department.

1.8. For 24/7 lighting applications or non-switched fixtures (stairwells, hallways, etc.) consideration should be given to daylight harvesting, and occupancy control with dimming to 20% with functionality to ramp to 100% under emergency power. Illumination level shall be 50 lux minimum (O.B.C. -3.2.7.1. (1)).

1.9. Lighting in washrooms are to be LED with a 20% dimmed unoccupied mode through the use of occupancy sensors.

1.10. All LED fixtures to be controlled by dimmable switching. Dimming switches to be specified wherever possible.
4. **Exit Lights**
   4.1. Code requirements and life cost, including energy and maintenance, dictate the selection of exit fixtures. Fixtures must comply with C860 standard.

   4.2. As stipulated in the latest version of the Ontario Building Code, exit signs shall be the “green running man” sign. When only a portion of a building is being renovated and exit signs are being added to the space, the exit sign shall be the “green running man” and all exit signs that are visible from that new sign shall also change to the “green running man”. The energy requirement shall be 5 watts per face (maximum). Minimum fixture warranty shall be 5 years, expected lamp life 25 years.

   4.3. Fixtures shall be illuminated during both normal and emergency conditions. Emergency power shall be supplied from a generated source. Battery power shall be provided if generated power is not available.

   4.4. Fixtures must use a LED source for illumination.

   4.5. Documentation shall include manufacturer's catalogue cut indicating specific fixture and options, complete lamp data (including emergency lamp when used) fixture designation and quantity specified.

5. **Emergency System Lighting**
   5.1. Emergency lighting shall be powered from the building or area standby generator. When there is no building or area standby generator, emergency lighting shall be fed from a central, battery powered inverter. When there is no inverter, or installing an inverter is not feasible, emergency lighting fixtures shall have battery packs.

   5.2. Unit equipment for emergency lighting shall be selected for optimum life cost, maintenance being of utmost consideration. Automatic controls shall be provided for charging at both high and low rates. Meters/monitors shall be provided to indicate charge rate and condition.

   5.3. Unit equipment output voltage shall normally be rated 24 VDC.

   5.4. Commissioning of emergency lighting shall include recording the illumination levels achieved for all areas where provided.

   5.5. Fixtures (other than unit lamp head type) used for emergency lighting shall be marked with a visible label indicating that it is an emergency lighting fixture.

   5.6. Documentation shall include manufacturer's operation instructions, maintenance instructions, catalogue cut sheets, data sheets, as-built floor plans, unique identification and listing of all emergency fixtures.
6. Exterior Lighting

6.1. Exterior lighting shall conform to the principles outlined in the Campus Master Plan (2014).

6.2. Pedestrian walkway fixtures, poles and lamps shall match the campus standards.

6.3. Illuminance values for applications not included in the plan shall be based on the latest edition of the IES Lighting Handbook. Generally:

<table>
<thead>
<tr>
<th>Minimum Average Levels</th>
<th>Illuminance (Lux)</th>
<th>Illuminance (foot-candles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Areas</td>
<td>2</td>
<td>.2</td>
</tr>
<tr>
<td>Parking Areas</td>
<td>5</td>
<td>.5</td>
</tr>
<tr>
<td>Walkways</td>
<td>2</td>
<td>.2</td>
</tr>
</tbody>
</table>

6.4 Exterior fixtures are assigned unique numbers referred to as grid numbers.

6.5 Underground parking lighting is to be LED, dimmable, and appropriate locations shall be dimmed to 20% through the use of occupancy sensors.

6.6 Documentation shall include manufacturer's catalogue cut indicating specific fixture and options, fixture designation and quantity specified.

7. Lighting for Assistance Phones

7.1. Assistance phones utilize a characteristic blue light to make them stand out clearly at night. The lens interior is painted with translucent blue paint to create the blue colouring.

7.2. Pole mounted fixtures are McGraw-Edison (Cooper Lighting) MQS using a 70 watt metal halide lamp. The pole shall have a fixture mounting height of ten feet, a tenon matching the fixtures socket and a final pole outside diameter of four inches to match the fixture mounting plate. Aluminum or high quality fiberglass poles are acceptable.

7.3. Wall mounted fixtures are Lumark (Cooper Lighting) WP type using a 70W metal halide lamp.