1. GENERAL

1.01 SECTION INCLUDES

.1 Solid state, light emitting diode (LED) source interior luminaires.

.2 New, fully integrated luminaires for indoor applications.

1.02 RELATED REQUIREMENTS

.1 Section 26 09 23 – Lighting Control Devices.

.2 Section 26 52 13.13 – Emergency Lighting.

1.03 REFERENCES

.1 CSA Group:

.1 CSA C22.1:21, Canadian Electrical Code, Part 1 (25th Edition), Safety Standard for Electrical Installations.

.2 Ontario Electrical Safety Code (28th edition/2021).

.3 CSA C22.2 No. 250.0 - Luminaires (Bi-National Standard, with UL 1598).

.2 DesignLights Consortium (DLC):

.1 Solid-State Lighting Technical Requirements v5.1, or latest edition.

.2 Where the specifications do not explicitly call for DLC qualified LED luminaires, the technical criteria provided in the DLC Technical Requirements provide the basis of the requirements for this section of the Specification.

.3 Energy Star:

.1 Program Requirements for Luminaires - Eligibility Criteria, Version 1.2, or latest edition.

.4 Illuminating Engineering Society (IES):

.1 IES HB-10-11 – The Lighting Handbook, 10th Edition.

.2 IES LM-79-08 – Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products.

.3 IES LM-80-08 – IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.

.4 IES TM-21-11 – IES Technical Memorandum on Projecting Long Term Lumen Maintenance of LED Light Sources.

.5 IES TM-30-15 – IES Method for Evaluating Light Source Color Rendition.

.5 IEEE 1789-2015 – IEEE Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers.

.6 National Electrical Manufacturer's Association (NEMA):

.1 SSL-1-10 – Electronic Drivers for LED Devices, Arrays, or Systems.

.2 WD 6 - Wiring Devices - Dimensional Requirements.

1.04 DEFINITIONS

.1 CCT: Correlated colour temperature.

.2 CRI: Colour-rendering index.

.3 LED: Light Emitting Diode.

.4 Lumen: Measured output of lamp and luminaire, or both.

.5 Luminaire: Complete lighting fixture, including ballast housing if provided.

1.05 ACTION SUBMITTALS

.1 Refer to Section 01 33 00.

.2 [Manufacturer reports: Provide a point-by-point photometric analysis of the [pool], in accordance with the procedures laid out in IES recommended practices to demonstrate compliance with OBC illumination requirements as described in 2012 OBC 3.11.10.1.(3)(a)(i).]

.3 [Manufacturer reports: Provide a point-by-point photometric analysis of the [parking garage], in accordance with the procedures laid out in IES recommended practices to demonstrate compliance with OBC and municipal parking garage illumination requirements.]

.4 Product submittals shall be accompanied by product specification sheets or other documentation that includes the designed parameters as detailed in this specification. These parameters include (but not limited to):

.1 Maximum power in Watts.

.1 If a transformer is used in conjunction with a driver (for example on some 347 volt lighting circuits), the maximum power shall include the transformer losses.

.2 L70 in hours, when extrapolated for the worse case operating temperature. TM-21 report shall be submitted to demonstrate this.

.3 Product submittals shall be accompanied by performance data that is derived in accordance with appropriate IESNA testing standards and tested in a laboratory that is NVLAP accredited for Energy Efficient Lighting Products.

1.06 INFORMATIONAL SUBMITTALS

.1 Installation instructions.

1.07 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submittals for project closeout.

.2 Submit manufacturer's operation and maintenance instructions for each product.

.3 Warranty information.

1.08 QUALIFICATIONS

.1 Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

1.09 REGULATORY REQUIREMENTS

.1 Products shall be listed and classified by CSA (Canadian Standards Association), ULC (Underwriter's Laboratories of Canada), or certified by recognized independent testing organizations that test to CSA standards.

.2 Products shall be certified by a recognized testing agency accredited by the Standards Council of Canada and bear a certification mark from that agency.

.3 All luminaires shall be listed and labeled for installation in fireproof or non-fireproof construction, dry, damp, or wet locations as required.

.4 Recessed fixtures mounted in an insulated ceiling shall be listed for use in insulated ceilings.

1.10 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

1.11 EXTRA STOCK MATERIALS

.1 Refer to Section 01 78 00.

.2 Provide the following additional equipment as listed herein.

.1 Provide an additional 2 per cent spare luminaires of each new type to be provided.

.2 Provide 1 per cent of each plastic lens type.

.3 Provide three of each type of any special tools required for system use and maintenance.

1.12 WARRANTY

.1 Refer to Section 01 78 00 and Section 26 05 00.

.2 The manufacturer shall provide a warranty against loss of performance and defects in materials and workmanship for the luminaires for a period of 5 years after acceptance of the luminaires. Warranty shall cover all components comprising the luminaire.

.3 All warranty documentation shall be provided to customer prior to the first shipment.

.4 LED Luminaires shall have a manufacturer's warranty for a period of not less than five years.

.5 LED boards, drivers and associated components shall have a warranty of 5 years on the LEDs, 5 years on the driver, 10 years on the paint finish.

2. PRODUCTS

2.01 MANUFACTURERS

.1 As noted on Lighting Fixture Schedule.

2.02 INDOOR LED LUMINAIRES, GENERAL

.1 Initial delivered lumens – thermal losses should be less than 10 per cent when operated at a steady state at an average ambient operating temperature of 25 degrees C, and optical losses should be less than 15 per cent.

.2 Average Delivered Lumens – Average delivered lumens over 50 000 hours should be minimum of 85 per cent of initial delivered lumens.

.3 All luminaires shall be tested per LM79/80 and published L70 data.

.4 Colour rendition:

.1 Interior luminaires with a CRI greater than or equal to 90, or as indicated on the lighting fixture schedule.

.2 Where minimum 90 CRI is indicated, the following may be considered acceptable in lieu, subject to confirmation with the Consultant by means of a Request for Interpretation during the bid period:

.1 CRI (Ra) ≥ 90.

.2 CRI (Ra) ≥ 80 and R9 (R9) ≥ 50.

.3 IES Rf ≥ 78, IES Rg ≥ 100, -1% ≤ IES Rcs,h1 ≤ 15%.

.5 Correlated colour temperature as indicated on the lighting fixture schedule.

.6 Accessibility and Maintenance:

.1 All LED luminaires shall be field serviceable, with LED arrays, LED modules, drivers, etc. fully serviceable and easily accessible. In the case of recessed ceiling mounted, and in the case of surface mounted ceiling fixtures, these components must be accessible from below. Luminaires in which any of these components are accessible only from above are not acceptable.

.2 Ballasts, drivers, LED arrays, LED modules, and lamps shall be serviceable while the fixture is in its normally installed position. Ballasts or drivers shall not be mounted to removable reflectors or wireway covers unless so specified. In the case of ceiling mounted luminaires, the serviceable components must be accessible from below.

.7 Housings:

.1 Formed to prevent warping and sagging. Housing, trim, and lens frame shall be true, straight (unless intentionally curved), and parallel to each other as designed.

.2 Sheet steel housings to be minimum 20 gauge.

.3 Wireways and fittings: free of burrs and sharp edges, and shall accommodate internal and branch circuit wiring without damage to the wiring.

.4 When installed, any exposed fixture housing surface, trim frame, door frame, and lens frame shall be free of light leaks.

.5 Hinged door frames shall operate smoothly without binding. Latches shall function easily by finger action without the use of tools.

.6 Drivers shall not be mounted to removable reflectors or wireway covers unless so specified.

.8 Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by captive screws, chains, aircraft cable, captive hinges, or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.

.9 Metal Finishes:

.1 Fixture finish and construction to meet ULC listings and CSA certifications related to intended installation.

.2 All metal components of fixtures shall be painted after fabrication to mitigate raw metal edges, and thus prevent premature corrosion.

.3 The manufacturer shall apply standard finish (unless otherwise specified) over a corrosion-resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes shall be finished in a similar corrosion resistant manner to match the adjacent surface(s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking, and shall be applied after fabrication.

.4 Interior light reflecting finishes shall be white with not less than 85 per cent reflectance, except where otherwise shown on the drawing.

.10 Wiring:

.1 Lighting fixtures shall have a specific means for grounding metallic wireways and housings to an equipment grounding conductor.

.2 Supplied complete with a luminaire disconnect plug.

.11 Control of Visual Perceptions of Temporal Light Modulation (flicker):

.1 All electric lights (except decorative lights, emergency lights and other special-purpose lighting) used in regularly occupied spaces meet at least one of the following requirements for flicker:

.1 A minimum frequency of 90 Hz at all 10% intervals from 10% to 100% light output.

.2 LED products with a "low risk" level of flicker (light modulation) of less than 5%, especially below 90 Hz operation as defined by IEEE standard 1789-2015 LED.

2.03 DRIVERS, GENERAL

.1 Electronic LED drivers shall be integral to the luminaire, and be designed to be accessible in the field for replacement and servicing.

.2 Input Voltage:

.1 Driver with a voltage range of (120-277) +/- 10% or (347-480) +/- 10%.

.2 Refer to lighting fixture schedule.

.3 For luminaires connected to a 347 volt circuit and utilizing a natively 120-277 volt driver, provide an appropriately sized step down transformer.

.3 Input frequency 60 Hz.

.4 Load regulation: +/- 1 per cent from no load to full load.

.5 Output ripple less than 10 per cent.

.6 Output should be isolated.

.7 Case temperature: rated for -40 degrees C through +80 degrees C.

.8 Overheat protection, self-limited short circuit protection and overload protected.

.9 Primary fused.

.10 Driver life rating not less than 50 000 hours

.11 Power Factor and Total Harmonic Distortion

.1 Power factor of greater than or equal to 0.9 at full load.

.2 THD of less than or equal to 20 per cent at full load.

.12 Dimming Control:

.1 Coordinate with Section 26 09 23.

.2 0-10 V dimming control typical for all fixtures unless otherwise noted.

.3 Control range: 10 per cent to 100 per cent typical, unless noted otherwise.

.4 Provide a mock-up to demonstrate the luminaire is free of flicker throughout the dimming range when used with the dimming controllers described in related sections.

2.04 INTERIOR WALL-WASH LED LUMINAIRES

.1 Minimum Light Output: 575 lm.

.2 Zonal lumen density:

.1 Minimum 60 per cent between 0 degrees and 90 degrees from nadir.

.2 Minimum 60 per cent of the lumens must be produced in the "forward" hemisphere, towards the wall.

.3 Minimum luminaire efficacy: 45 lumens per watt.

.4 Correlated Colour Temperature (CCT): 3500 K

.5 Colour Rendition Index (CRI): 80 CRI minimum.

.6 Minimum L70 lumen maintenance to occur at 50 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.05 TRACK OR MONO-POINT DIRECTIONAL LED LUMINAIRES

.1 Minimum Light Output: 250 lm.

.2 Zonal lumen density:

.1 Minimum 85 per cent between 0 degrees and 90 degrees from nadir.

.3 Minimum luminaire efficacy: 45 lumens per watt.

.4 Correlated Colour Temperature (CCT): 3500 K

.5 Colour Rendition Index (CRI): 80 CRI minimum.

.6 Minimum L70 lumen maintenance to occur at 50 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.06 DOWNLIGHT LUMINAIRES

.1 Minimum Light Output: 500 lm.

.2 Zonal lumen density: Minimum 75 per cent between 0 degrees and 60 degrees from nadir.

.3 Minimum luminaire efficacy: 45 lumens per watt.

.4 Correlated Colour Temperature (CCT): 3500 K

.5 Colour Rendition Index (CRI): 80 CRI minimum.

.6 Minimum L70 lumen maintenance to occur at 50 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.07 NOMINAL 610 MM BY 610 MM (2 FOOT BY 2 FOOT) LUMINAIRES FOR AMBIENT LIGHTING OF INTERIOR SPACES

.1 Minimum Light Output: 2 000 lm.

.2 Zonal lumen density:

.1 Minimum 75 per cent between 0 degrees and 60 degrees from nadir.

.3 Spacing Criteria:

.1 0 degrees to 180 degrees: 1.0 to 2.0

.2 90 degrees to 270 degrees: 1.0 to 2.0

.4 Minimum luminaire efficacy: 85 lumens per watt.

.5 Correlated Colour Temperature (CCT): 3500 K

.6 Colour Rendition Index (CRI): 80 CRI minimum.

.7 Minimum L70 lumen maintenance to occur at 50 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.08 NOMINAL 305 MM BY 1220 MM (1 FOOT BY 4 FOOT) LUMINAIRES FOR AMBIENT LIGHTING OF INTERIOR SPACES

.1 Minimum Light Output: 1 500 lm.

.2 Zonal lumen density:

.1 Minimum 75 per cent between 0 degrees and 60 degrees from nadir.

.3 Spacing Criteria:

.1 0 degrees to 180 degrees: 1.0 – 2.0

.2 90 degrees to 270 degrees: 1.0 – 2.0

.4 Minimum luminaire efficacy: 85 lumens per watt.

.5 Correlated Colour Temperature (CCT): 3500 K

.6 Colour Rendition Index (CRI): 80 CRI minimum.

.7 Minimum L70 lumen maintenance to occur at 50 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.09 NOMINAL 610 MM BY 1220 MM (2 FOOT BY 4 FOOT) LUMINAIRES FOR AMBIENT LIGHTING OF INTERIOR SPACES

.1 Minimum Light Output: 3 000 lm.

.2 Zonal lumen density:

.1 Minimum 75 per cent between 0 degrees and 60 degrees from nadir.

.3 Spacing Criteria:

.1 0 degrees to 180 degrees: 1.0 – 2.0

.2 90 degrees to 270 degrees: 1.0 – 2.0

.4 Minimum luminaire efficacy: 85 lumens per watt.

.5 Correlated Colour Temperature (CCT): 3500 K

.6 Colour Rendition Index (CRI): 80 CRI minimum.

.7 Minimum L70 lumen maintenance to occur at 50 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.10 LINEAR AMBIENT LUMINAIRES: INDIRECT

.1 Minimum Light Output: 500 lm per foot.

.2 Zonal lumen density:

.1 Minimum 50 per cent between 90 degrees and 150 degrees from nadir.

.3 Minimum luminaire efficacy: 85 lumens per watt.

.4 Correlated Colour Temperature (CCT): 3500 K

.5 Colour Rendition Index (CRI): 80 CRI minimum.

.6 Minimum L70 lumen maintenance to occur at 50 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.11 LINEAR AMBIENT LUMINAIRES: INDIRECT/DIRECT

.1 Minimum Light Output: 500 lm per foot.

.2 Zonal lumen density:

.1 Minimum 25 per cent between 0 degrees and 60 degrees from nadir.

.2 Minimum 50 per cent between 90 degrees and 150 degrees from nadir.

.3 Minimum luminaire efficacy: 85 lumens per watt.

.4 Correlated Colour Temperature (CCT): 3500 K

.5 Colour Rendition Index (CRI): 80 CRI minimum.

.6 Minimum L70 lumen maintenance to occur at 50 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.12 LINEAR AMBIENT LUMINAIRES: DIRECT/INDIRECT

.1 Minimum Light Output: 500 lm per foot.

.2 Zonal lumen density:

.1 Minimum 40 per cent between 0 degrees and 60 degrees from nadir.

.2 Minimum 35 per cent between 90 degrees and 150 degrees from nadir.

.3 Minimum luminaire efficacy: 85 lumens per watt.

.4 Correlated Colour Temperature (CCT): 3500 K

.5 Colour Rendition Index (CRI): 80 CRI minimum.

.6 Minimum L70 lumen maintenance to occur at 50 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.13 LINEAR AMBIENT LUMINAIRES: DIRECT

.1 Minimum Light Output: 375 lm per foot.

.2 Zonal lumen density:

.1 Minimum 40 per cent between 0 degrees and 60 degrees from nadir.

.3 Minimum luminaire efficacy: 85 lumens per watt.

.4 Correlated Colour Temperature (CCT): 3500 K

.5 Colour Rendition Index (CRI): 80 CRI minimum.

.6 Minimum L70 lumen maintenance to occur at 50 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.14 HIGH-BAY LUMINAIRES FOR COMMERCIAL AND INDUSTRIAL BUILDINGS

.1 Minimum Light Output: 10 000 lm.

.2 Zonal lumen density:

.1 Minimum 30 per cent between 20 degrees and 50 degrees from nadir.

.3 Minimum luminaire efficacy: 80 lumens per watt.

.4 Correlated Colour Temperature (CCT): 4000 K

.5 Colour Rendition Index (CRI): 70 CRI minimum.

.6 Minimum L70 lumen maintenance to occur at 35 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.15 LOW-BAY LUMINAIRES FOR COMMERCIAL AND INDUSTRIAL BUILDINGS

.1 Minimum Light Output: 5 000 lm.

.2 Zonal lumen density:

.1 Minimum 30 per cent between 20 degrees and 50 degrees from nadir.

.3 Minimum luminaire efficacy: 80 lumens per watt.

.4 Correlated Colour Temperature (CCT): 4000 K

.5 Colour Rendition Index (CRI): 70 CRI minimum.

.6 Minimum L70 lumen maintenance to occur at 35 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

2.16 HIGH-BAY AISLE LUMINAIRES

.1 Minimum Light Output: 10 000 lm.

.2 Zonal lumen density:

.1 Minimum 30 per cent between 0 degrees and 20 degrees from nadir.

.2 Minimum 50 per cent between 20 degrees and 50 degrees from nadir.

.3 Minimum luminaire efficacy: 80 lumens per watt.

.4 Correlated Colour Temperature (CCT): 4000 K

.5 Colour Rendition Index (CRI): 70 CRI minimum.

.6 Minimum L70 lumen maintenance to occur at 35 000 hours in accordance with LM-80 testing data and TM-21 extrapolation.

3. EXECUTION

3.01 VERIFICATION OF CONDITIONS

.1 Coordinate the lighting system installation with the relevant trades so as to eliminate interferences with hangers, mechanical ducts, sprinklers, piping, steel, etc.

3.02 INSTALLATION

.1 Install lighting equipment, including but not limited to luminaires, controls, auxiliary devices and the integration of same in strict conformance with all manufacturers' recommendations and instructions the securing of which shall be the responsibility of the Contractor.

.2 Integrate luminaires with controls in accordance with respective luminaire manufacturers' and controls manufacturers' recommendations and instructions and to provide a complete, trouble-free operation without compromising safety, code and CSA requirements.

.3 Seal all luminaires for wet locations (i.e. all knock-outs, all pipe and wire entrances, etc.) as is standard industry practice to prevent water from entering luminaires.

.4 Luminaire Alignment:

.1 Locate recessed ceiling luminaires as indicated on reflected ceiling plan. Install recessed luminaires to permit removal from below. Include accessories and materials to meet applicable codes and regulatory requirements.

.2 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.3 Align luminaires mounted individually parallel or perpendicular to building grid lines.

.4 Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

.5 Locate and install luminaires as indicated. Mounting heights and configuration of the luminaires shall be as specified in the Luminaire Schedule portion of the Specification or indicated on the drawings, and where conflicts exist, as approved by the Consultant.

.6 Installed all luminaires plumb and true and level as viewed from all directions unless specifically identified otherwise in the Lighting Fixture Schedule. Luminaires shall remain plumb and true without continual adjustment or visibly obvious means beyond what is shown on luminaire submittal drawings.

.7 For installation in suspended ceilings, ensure that the luminaires are supported such that there is no resultant bowing or deflection of the ceiling system greater than 1/360 of the length of the total span of the ceiling member.

.5 Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

.6 Whenever a luminaire or its hanger canopy is installed directly to a surface mounted junction box, use a finishing ring painted to match the ceiling to conceal the junction box.

.7 Suspended Luminaires:

.1 Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.

.2 Suspended luminaires shall be installed plumb and true and level unless specifically identified otherwise in the Luminaire Schedule portion of this Specification and at a height from finished floor as specified on the drawings, details and Luminaire Schedule. In cases where this is impractical, refer to the Consultant for a decision. All appurtenances shall be consistently organized for a neat, uniform appearance.

.8 Install wall mounted luminaires at height as indicated.

.9 Accessories:

.1 Reflector cones, louvers, baffles, lenses, trims and other decorative elements shall be installed after completion of ceiling tile installation, plastering, painting and general cleanup.

.2 Install accessories provided with each luminaire.

.3 All accessories shall be properly installed and adjusted by Contractor in accordance with specification and installation instructions. Any spare items shall be clearly labeled (indicate type of accessory and associated luminaire types).

3.03 TESTING AND ADJUSTMENT

.1 As required, all adjustable luminaires shall be aimed, focused, locked, etc., by the Contractor under the observation of the Consultant. As aiming and adjusting is completed, locking setscrews and bolts and nuts shall be tightened securely by the Contractor.

.2 For luminaires with field selectable lumen output and/or CCT, ensure the correct setting matches the intended set points.

.3 All ladders, scaffolds, lifts, etc. required for aiming and adjusting luminaires shall be furnished by the Contractor.

.4 Where possible, units shall be focused during the normal working day. However, where daylight interferes with seeing lighting effects, aiming shall be accomplished at night.

3.04 LUMINAIRE SUPPORTS

.1 Provide adequate support to suit ceiling system.

.2 Support luminaires independently of ceiling framing, unless ceiling is certified by the manufacturer to support weight of installed devices. Confirm if T-bar ceilings are metric or imperial and provide luminaires to suit ceiling dimensions.

.3 Provide chain hangers for new and existing luminaires.

.4 Install clips to secure recessed grid-supported luminaires in place.

.5 Fixtures supported by suspended ceiling systems shall be securely fastened to the ceiling framing member by mechanical means, such as bolts, screws, or rivets. Ceiling framing members must be securely attached to each other and to the building structure as required by all applicable codes and standards. Use of integral clips is not acceptable.

3.05 WIRING

.1 Use SPC90 conductors for final connections to luminaires (including 0-10 V dimming conductors for applicable luminaires).

.2 Install luminaire disconnect plugs on all new luminaires not provided as such from the manufacturer.

.3 Connect luminaires to branch circuit outlets provided under Section 26 05 33.13 using flexible conduit.

.4 Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

.5 Bond products and metal accessories to branch circuit equipment grounding conductor.

3.06 FIELD QUALITY CONTROL

.1 Operate each luminaire after installation and connection. Inspect for proper connection and operation.

.2 Make wiring connections to the branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

.3 Occupancy Sensors.

.1 Locate and aim sensors in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas.

.2 Rooms shall have 90 per cent to 100 per cent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room.

.3 Exercise proper judgment in executing the work to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components.

3.07 CLEANING

.1 Thoroughly clean all luminaires and accessories after installation. All fingerprints, dirt, tar, smudges, drywall mud, dust, etc. shall be removed by the Contractor from the luminaire bodies, reflectors, trims, and lens or louvers prior to final acceptance. All reflectors shall be free of paint other than factory-applied, if any. All reflectors, cones and lenses shall be cleaned only according to manufacturers' instructions.

.2 Clean electrical parts to remove conductive and deleterious materials.

.3 Remove dirt and debris from enclosures.

.4 Clean photometric control surfaces as recommended by manufacturer.

.5 Clean finishes and touch up damage.

.6 Luminaire finishes which are disturbed in any way during construction shall be touched up or refinished in a manner satisfactory to the Consultant.

3.08 COMMISSIONING

.1 In accordance with Section 26 08 50.

End of Section