

SECTION 265000**LIGHTING****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Provide all lighting outlets indicated on the Drawings with a fixture of the type designated and appropriate for the location. Outlet symbols on the Drawings without a type designation shall have a fixture the same as those used in similar or like locations.
- B. Provide lamps or LED modules for all fixtures.
- C. Coordinate installation of fixtures with the ceiling installation and all other trades to provide a total system that is neat and of orderly appearance.

1.02 QUALITY ASSURANCE

- A. Fixtures shall conform to the following specifications.
- B. Manufacturers specified are indicative of the general type and performance desired and are not intended to restrict selection to fixtures of any particular manufacturer. Fixtures of similar designs and equivalent light distribution and brightness characteristics, and of equal finish and quality will be acceptable if approved by the Architect prior to the bid. Digital IES files shall be provided as part of Submittal and Substitution Request processes upon request in order to properly evaluate proposed fixtures.
- C. Equality shall be determined by comparisons of performance, construction, installation ease, maintenance, and appearance.
- D. All light fixtures shall be UL listed and labeled.

1.03 SUBMITTAL AND RECORD DOCUMENTATION

- A. Submit product data describing fixtures, lamps, LED modules, ballasts, drivers, and emergency lighting units. Arrange product data for fixtures in order of fixture designation.
- B. Include data on features and accessories and the following information.
 - 1. Outline drawings of fixtures indicating dimensions and principle features.
 - 2. Electrical ratings and photometric data with specified lamps/LED modules and certified results of laboratory tests, including digital IES files.
 - 3. Data on batteries and chargers of emergency lighting units.
- C. Submit shop drawings from manufacturers detailing nonstandard fixtures and indicating dimensions, weights, methods of field assembly, components, features, and accessories.

PART 2 PRODUCTS**2.01 LED FIXTURES**

- A. General:

1. LED lighting fixtures shall be in accordance with IES, NFPA, UL, as shown on the Drawings and as in these Specifications.
2. LED drivers shall include the following features unless otherwise indicated:
 - a. Power factor: > 0.9 nominal
 - b. Input Voltage: 120V – 277V, 60 Hz
 - c. Total Harmonic Distortion: < 20%
 - d. Temperature Rating: 0 deg C – 40 deg C
 - e. Integral short circuit, open circuit, and overload protection.
3. LED modules shall include the following features unless otherwise indicated.
 - a. Comply with IES LM-79 and LM-80 requirements.
 - b. Minimum 80 CRI and color temperature 3500 deg K (interior) and 4000 deg K (exterior) unless otherwise specified in Lighting Fixture Schedule/List.
 - c. Minimum Rated Life: 70,000 hours per IES L70, unless otherwise specified in Lighting Fixture Schedule/List.
 - d. Light output initial lumens as specified in Lighting Fixture Schedule/List.
 - e. LED modules shall be field replaceable and contain quick-disconnects.
4. LED lighting fixtures shall have available digital IES files from a NVLAP accredited testing laboratory in accordance with IESNA LM-79, which specifies the entire luminaire as the source, resulting in an efficiency of 100%. Lighting fixtures that do not have these test results available will not be accepted.

B. Miscellaneous:

1. All surface-mounted lighting fixtures shall have low density label.
2. All recessed lighting installed in fire-rated ceilings shall be provided with fire-rated protective covers per UL standards.
3. All fixtures mounted outdoors or in unheated spaces shall have 0 deg F ballasts/drivers.

2.02 RECESSED FIXTURES

- A. In insulated ceilings, recessed fixtures to be equipped with “IC” rated housing or with a field fabricated fireproof box (metal, sheet rock, etc.), complying fully with all clearance requirements.
- B. Recessed troffers shall be as follows, unless specified otherwise:
 1. Diffusers shall be pattern 12 extruded clear acrylic plastic, 0.125" overall thickness, unless otherwise specified in the fixture schedule by catalog number or remarks. Door shall be securely closed by use of enclosed cams.
 2. Finish shall be white baked enamel, unless otherwise specified with a minimum average reflectance of 85% on all exposed and light reflecting surfaces.
 3. Housing shall be 22-gauge minimum.

2.03 EMERGENCY LIGHTING

A. Wall Packs:

1. Emergency wall packs shall comply with UL 924 and be self-contained units, complete with two adjustable lensed fixtures and LED modules, battery, and battery charger, suitable for 120V or 277V AC power supply as indicated on the Drawings.
2. Battery shall be sealed, maintenance-free, lead-calcium recombination type, 10-year life expectancy. Battery shall have 1-1/2 hour minimum capacity at rated wattage to 87-1/2% of rated DC voltage from a fully charged state. Shall carry a five-year pro-rata warranty.
3. Battery charger shall be solid-state, voltage regulated. Charge circuit shall react to the condition of the battery and alter the rate of charge in order to maintain peak battery capacity and maximum battery life.

4. A solid-state overload monitoring device in the DC circuit shall disconnect the lamp load from the battery should excessive wattage demands be made, and automatically reset when the overload or short circuit is removed.
 5. A brownout circuit shall monitor the flow of AC current to the unit and activate the emergency lighting system when a predetermined reduction of AC power occurs.
 6. The unit shall incorporate a solid-state switching system, not relays. The switching circuit shall detect a loss of AC voltage and automatically energize the DC lamps. Upon restoration of the AC power, the emergency lamps shall switch off and the charger shall automatically recharge the battery.
 7. When the battery's terminal voltage falls below 80% of the rated voltage, the low voltage circuitry shall disconnect the lighting load. The disconnect shall remain in effect until normal utility power is restored, preventing deep battery discharge.
- B. LED Emergency Battery Backup: Emergency battery backup for LED fixtures shall be internal to the fixtures, and shall provide at least 20% of full fixtures lumen output in the emergency mode for a minimum of 90 minutes.
- C. Emergency Bypass Relay:
1. 20 amp relay, 120-277 volt operation, UL924 listed, no minimum load requirement, five-year warranty.
 2. Shall connect to the line side of the lighting control device to sense the presence of "normal" power. It shall also connect to the load side of the lighting control device to provide an ON/OFF signal for control of the emergency lights along with the general lighting.
 3. When the normal power is lost, control is suspended and the normally closed relay provides emergency power to the emergency fixtures.
 4. Provide one relay per lighting control switch leg which has emergency fixtures.
 5. Relay shall be located in accessible ceiling space (or flush mount box in hard ceiling) above the lighting controls associated with the relay.

2.04 OUTDOOR FIXTURES

- A. Outdoor fixtures shall be weatherproof, heavy duty types designed for efficient light utilization, adequate dissipation of lamp and ballast/driver heat and safe cleaning and relamping. Ballasts/drivers shall be incorporated within the luminaire housings unless otherwise noted. Luminaires shall be sealed unless charcoal filters are provided. Lenses shall be heat and impact resistant, tempered glass. Lens gasket shall be heat and weather resistant. Materials shall be rustproof. Latches and fittings shall be nonferrous metal or stainless steel.

2.05 POLES AND STANDARDS

- A. Lighting standards, assemblies, and pole bases shall be designed and constructed to withstand a steady wind velocity of 100 miles per hour without permanent distortion or displacement. Where unusual soil or base installation conditions occur, the Contractor shall provide adequate reinforcement under the guidance of the Architect to assure the specified strength for 100-mile-per-hour wind. Generally poles/bases shall be suitable for installation in earth having an allowable bearing of 1800 pounds per square foot.

2.06 FIXTURES

- A. See Drawings for Lighting Fixture List/Schedule.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Lamps of the proper type, wattage, and voltage rating shall be delivered to the project in the original cartons and installed in the fixtures just prior to the completion of the project. Provide lamp type as recommended by the fixture manufacturer.
- B. Fixtures shall be left clean at the time of acceptance of the work with every lamp or LED module in operation. If fixtures are deemed dirty by the Architect at completion of the project, the Contractor shall clean them.
- C. Fixtures shall be carefully aligned, leveled in straight lines, and located as shown on the Architectural reflected ceiling plan. The final decision as to adequacy of support and alignment shall be made by the Architect. The fixtures shall be supported and fastened to the ceiling system. The lighting plans are to be used for fixture types and connection information only, not exact locations.
- D. Verify all ceiling conditions and provide all lighting fixtures complete with factory furnished stems, balls, aligners, and canopies as required for a complete installation.
- E. Recessed troffers installed in suspended T-bar ceiling shall be independently supported on two opposite corners by #12 gauge steel wire attached to structure, per UBC Standard #47-18.
- F. Surface mounted light fixtures shall be securely fastened to the building surface via factory-created holes in the fixtures. Attachment of fixture merely to recessed outlet box is not sufficient.
- G. Where two switches are shown dedicated to an office, room, or area, provide two-level lighting.
- H. Lighting fixtures in any single enclosed room shall be connected using a common (one) circuit, except in cases where the loading requires a second circuit.
- I. Accessories such as straps, mounting plates, nipples, or brackets shall be provided for proper installation.
- J. Standards shall be plumb with arms aligned and square. Arms shall be perpendicular to the parking axis unless specifically shown otherwise.
- K. Standards shall be in line such that sighting along straight lines of standards will show no standard out of line with the others. The Contractor is cautioned that some curbs or roadway edges may not be straight and, therefore, should not be used for alignment.
- L. The Contractor shall erect the luminaires and pole assemblies complete on locations called out on the Drawings.
- M. The poles shall be installed with leveling nuts (galvanized). The space between the bottom of the pole base flange and the top of the footing shall be grouted to present a finished appearance with a 1/2" drain hole.

END OF SECTION