SECTION 26 50 00 - LIGHTING

PART 1 - GENERAL

1.01 REFERENCE

A. Refer to Section 26 00 00 for other requirements of this Section.
B. All work to conform to the National Electrical Code.
C. Refer to standards of the Illuminating Engineering Society.
D. All exit and emergency lighting shall comply with NFPA Life Safety Code 101, ADA, and other local codes as may apply.

1.02 SCOPE

A. Furnish and install a complete and operating lighting system, including all luminaires, wiring, lamps, and 0-10V dimmable LED drivers.
B. All lighting outlets shall have a fixture. If a fixture designation is missing, furnish and install a fixture in similar use in the project.
C. All luminaires shall have a home run. If these are omitted on the drawings the contractor shall allow for a home run to the nearest appropriate panel.
D. All rooms are to be provided with lighting controls. Provide manual switch and code required control devices as appropriate. If controls are not indicated within a space, controls are to be provided for the space in a similar manner as adjacent or similar spaces.
E. Provide exit and emergency lighting as required by Code in all spaces to meet requirements of the AHJ. Allow for ten additional luminaires to be installed where directed by the AHJ.

1.03 MOUNTING

A. The contractor shall be responsible for selecting mounting arrangements of luminaires to suit the construction or ceiling types. Contractor or his agent shall review architectural drawings to establish ceiling types prior to preparing shop drawings for submission. It is NOT to be understood that the fixture schedule accounts for the mounting types. Frequently ceiling types are changed after the fixture schedule has been completed.
B. Luminaires shall be mounted on structurally secure supports. The contractor shall provide miscellaneous steel supports to span between structural elements to provide a base of support for the luminaires at the locations shown on the drawings. Refer to architectural and structural drawings for locations of beams, joists, purlins, etc.
C. Exterior luminaires shall be mounted with anchor bolts of suitable size secured into concrete bases. The mounting arrangement shall be capable of withstanding a continuous wind of 100 mph with gales to 130 mph. EPA of fixture shall be rated with pole to provide required performance.

1.04 APPROVALS

A. Furnish shop drawings and catalog cuts of all luminaires for review by the engineer prior to ordering.
B. Provide samples of any particular fixture or luminaires when requested by the owner, architect, or engineer.
C. Provide a point by point lighting level calculation for parking areas, areas when requested by the engineer, and for high profile areas (i.e., main lobbies, atriums, pools, gymnasiums, etc.), when an alternate manufacturer or fixture is being presented for approval. Calculation shall be provided by

the manufacturer or the local manufacturer's representative. Footcandle levels are to be indicated at a maximum of 10'-0" intervals (exterior) or 5'-0" intervals (interior). A drawing is to be provided at the same scale as the contract documents.

PART 2 - PRODUCTS

2.01 LUMINAIRE REQUIREMENTS

A. Luminaires shall be complete with wiring, lamp holders, lamps, reflectors, glassware, canopies, shades, bases, pendants, etc.
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
C. Luminaires shall be wired with type AF fixture wire.
D. Plastic lenses shall not be used. Provide either virgin acrylic, high impact polycarbonate or tempered glass or as specified in the fixture schedule. Lens thickness shall be a minimum of 1/8".
E. Any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks either between fixture components or between fixture and adjacent surface.
F. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.
G. Hinged door closure frames shall operate smoothly and easily without binding when installed and latches shall function easily by finger action without the use of tools.
H. Recessed luminaires installed in an insulated ceiling shall be listed for use in insulated ceilings.
I. Luminaires in damp areas shall be gasketed, vapor tight, and fabricated with aluminum instead of steel. These luminaires shall have pressure clamping devices in lieu of latches.
J. Luminaires located in other harsh environments are to be of suitable construction and finish for the intended environment in addition to the requirements listed in the Lighting Fixture Schedule.
K. All fixture lenses shall, from the manufacturer, be shipped within a protective covering, i.e. plastic bag, paper wrapped, to prevent dust, dirt, smudges prior to final acceptance.
L. Drivers shall be easily serviceable when installed and shall not be mounted to removable reflectors or wire way covers.
M. Luminaires shall have a minimum CRI of 80 and a CCT of 3500 K.
N. Luminaires shall have a rated lamp life of 50,000 hours to L70.
O. Luminaires shall be dimmable from 100% to 10% of maximum output.

2.02 LED DRIVERS

A. Shall be internal.
B. Shall be designed for 10-year operational life.
C. Shall be designed to withstand electrostatic discharges according to IEC 61000-4-2.
D. Shall be furnished with poke-in wire trap connectors, color coded to ANSI standard C82.11.
E. Shall operate from a line voltage range of 108 - 305 volts, 50/60 Hz.
F. Input current shall have Total Harmonic Distortion (THD) of less than 20% with a power factor of >.90% to comply with ANSI standard C82.11
G. Shall meet UL 8750, UL 1012, and UL 1310 as applicable in NFPA compliant installations.
H. Shall have no visible output change at ±10% line voltage input.
I. Shall have a Class A sound rating (inaudible at 27dBA ambient noise level).
J. Shall have a universal input voltage (120-277V/ 50-60Hz).
K. Shall be Underwriters Laboratories (UL) Listed (Class P) and CSA Certified where applicable and

rated for use in air handling spaces.

L. Shall carry a five year warranty from the date of manufacture for operation at a case temperature of 75°C or less. When operated at a case temperature between 75°C and 85°C, the warranty shall be three years from the date of manufacture.

2.03 LED EQUIVILANT LAMPS

A. LED: ENERGY STAR Certified, NRTL compliant, FM Global compliant. Recessed luminaires shall comply with NEMA LE4, CRI: 80, CCT: 3500 K. Lamps dimmable from 100 percent to 10 of maximum light output, 50,000 hour lamp rated life, internal driver must be UL Listed, dimmable with any standard dimmer switch, smooth, flicker-free dimming.

B. Manufacturers; Philips, Feit, Sylvania, GE, Archipelago.

C. Contractor is to coordinate lamp color for all luminaires. Lamp color is to be similar in all spaces.

2.04 EMERGENCY LIGHTING UNITS

A. General requirements: Self-contained units, thermoplastic enclosure, comply with UL 924. Units include the following features:
   1. Battery: Sealed, maintenance-free, lead-acid type with minimum 10 year nominal life and special warranty, 12 volt, remote capacity as required.
   2. Charger: Fully automatic, solid-state type with sealed transfer relay.
   3. Operation: Relay automatically turns lamp on when supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps, and battery is automatically recharged and floated on charger.
   4. Wire Guard: Where indicated, heavy-chrome-plated wire guard arranged to protect lamp heads or luminaires.
   5. Integral Time Delay Relay: Arranged to hold unit on for fixed interval after restoring power after an outage. Provides adequate time delay to permit high-intensity-discharge lamps to restrike and develop adequate output.
   6. Test switch and LED pilot light
   7. Self-diagnostic circuitry.

B. Manufacturers: Emergi-Lite, Dual-Lite, Chloride or Edge-Lit.

2.05 EMERGENCY LED POWER SUPPLY UNIT

A. Integral Type: Self-contained, modular, battery-inverter unit factory mounted within fixture body. Comply with UL 924.
   1. Test Switch and Light-Emitting Diode Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
   2. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum 10-year nominal life.
   3. Charger: Fully automatic, solid-state, constant-current type.
   4. Operation: Relay automatically energizes lamp from unit when normal supply circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamp and battery is automatically recharged and floated on charger.
   5. Light output:
      a. Minimum 1400 lumens for LED luminaires.

2.06 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction. Refer to Lighting Fixture Schedule on

drawings.

B. Internally lighted Signs:
   1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
   2. Self-Powered Exit Signs (Battery Type) Integral automatic charger in a self-contained power pack.
      a. Battery: Sealed, maintenance-free, nickel-cadmium type.
      b. Charger: Fully automatic, solid-state type with sealed transfer relay.
      c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
      d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
      e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
      f. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

PART 3 - EXECUTION

3.01 FIXTURES

A. All recessed LED troffers (2' x 2', 2' x 4', and 1’ x 4') and recessed luminaires weighing up to 20 lbs. are to be installed in grids with mounting clips and with grid secured at diagonal corners of fixture to the building structure. (4' x 4') luminaires to be secured at 4 corners.

B. Recessed luminaires between 20 and 50 pounds are to have, in addition to above, 12 gauge steel safety chains at opposite corners hung slack from the building structure. Luminaires above 50 pounds to be independently supported directly from the structure with approved hangers and angular sway bracing according to manufacturer’s installation guidelines.

C. Surface mounted and pendant luminaires under 15 pounds can be supported directly from the outlet box when all of the following apply: screws pass through round holes and not key slots in the fixture body, the outlet box is attached to a main ceiling runner, and the outlet box is supported vertically from the building structure.

D. Surface luminaires between 15 and 50 pounds shall be bolted to the ceiling independent of the outlet box. Luminaires over 50 pounds shall be secured to the building structure using a manufacturer’s approved mounting method.

E. Luminaires to be set plumb.

F. Provide 6’-0” flexible leads on recessed luminaires to allow for easy removal.

G. Recessed luminaires shall be set with mounting frames.

H. Coordinate final location of all luminaires with other disciplines to avoid interferences and potential obstructions as the work progresses.

I. Luminaires used for temporary lighting during construction shall be removed, cleaned, and re-installed prior to acceptance of the lighting system.

J. Luminaires shall be cleaned and free of all dirt, dust, smudges, and surface imperfections just prior to final acceptance.

K. Luminaires which are recessed in a fire rated ceiling shall be provided with an enclosure around the fixture which shall maintain the fire rating integrity of the ceiling system. The installation of the enclosure shall meet the requirements of the authority having jurisdiction. The fixture shall be

insulation rated for higher temperature operation.

L. All recessed or surface mounted luminaires on or in sloped ceilings shall have sloped ceiling adapters to allow for vertical light distribution.

3.02 SWITCHING

A. Provide lighting control switch legs to wall switches for all fixtures except for those operated by integral switches.
B. Provide 3-way or 4-way control where indicated and for rooms with more than one entrance.
C. Provide a single time clock, contactors and relays as indicated on the drawings and as necessary for site lighting and parking lot lighting control.
D. Provide interior lighting controls to meet IBC 2015/IECC 2015/ ASHRAE 90.1. Refer to Specification Section 26 09 00 for additional requirements.

END OF SECTION