INTERIOR BUILDING LIGHTING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. Extent of interior lighting fixture work is indicated by drawings and schedules.

B. Types of luminaires and controls in this section include the following:
   
   High-intensity-discharge (HID).
   Fluorescent.
   Incandescent.
   Dimming Controls

C. Applications of interior lighting fixtures required for project include the following:
   
   General lighting.
   Supplementary lighting.
   Emergency lighting.

D. UL Compliance: Provide interior lighting fixtures which have been UL-listed and labeled.

E. CBM Labels: Provide fluorescent-lamp ballasts which comply with Certified Ballast Manufacturers Association standards and carry the CBM label.

F. Provide ballast meeting applicable energy codes with a temperature rating suitable for the application.

G. Provide barriers to isolate fixtures from insulation installations.
2.01 ACCEPTABLE MANUFACTURERS:

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, manufacturers specified below and as shown on the drawings within the lighting fixture schedule.

2.02 INTERIOR LUMINAIRES:

A. Luminaires shall consist of complete units including the lighting fixture, ballast, lamps, and associated components required for a complete and operating unit with the options, finishes and photometry specified.

B. Recessed/Indirect Luminaire: A recessed/indirect luminaire shall consist of a steel enclosure with a curved reflector and center mounted light shield. The curved reflectors shall have a power coat finish of high reflectance white, and shall provide symmetric light distribution. The center lamp shield shall be a perforated with a white finish, and shall have a white acrylic diffuser behind. The shield shall swing down to allow access to the lamps. The ballast compartment shall be center mounted and shall enclose the ballast and wiring in an all-steel enclosure, and shall have tool-less entry. A top-mounted wiring access cover shall allow the luminaire to be wired without need to access the ballast compartment from below.

1. Recessed/Indirect luminaires in 2'x4' size shall use 32-watt T8 lamps, unless indicated otherwise. Fixture shall be capable of installing up to three (3) lamps behind the shield, but shall be provided sockets and ballasts for the quantity of lamps indicated on the plans. Luminaire efficiency factor (LEF) shall be 67% minimum.

2. Recessed/Indirect luminaires in 2'x2' size shall use 40-watt long compact fluorescent lamps. Fixture shall be capable of installing up to three (3) lamps behind the shield, but shall be provided sockets and ballasts for the quantity of lamps indicated on the plans.

C. Parabolic Troffer: shall consist of a steel enclosure with 8"x8" parabolic louvered cells. Louver finish shall be low iridescent diffuse silver.

1. 2'x4' size shall have 18 cells and be provided with three 4' T8 lamps, unless indicated otherwise. Luminaire efficiency factor (LEF) shall be a 64% minimum.
2. 2'x2' size shall be the same style of construction as the 2'x4' luminaires, and shall have 9 cells. Provide with two 31-watt T8 U-lamps.

2.03 LAMPS

A. General: Provide lamps to match the requirements of the luminaire and ballast in which they are installed. Subject to compliance with these specifications, provide fluorescent lamp from one of the following manufacturers:

General Electric
Phillips
Sylvania

B. Standard T8 fluorescent lamps shall be medium bi-pin lamps suitable for instant start or rapid start ballasts. Lamps shall be in lengths as required for the fixture installation and shall be 3500 degree Kelvin color temperature, 86 color rendering index minimum, 20,000 hour rated average life. Mean rating for a 4-foot, standard output lamp shall be 2800 lumens. All T8 style fluorescent lamps shall be low Mercury and Toxicity Characteristic Leaching Procedure (TCLP) compliant, and shall have green endcaps to demonstrate compliance.

C. Compact fluorescent shall be suitable for the luminaire in which they are installed and shall be 82 CRI minimum. Four-pin lamps shall be used except below 13-watts, and in luminaires that require two-pin lamps.

2.04 BALLASTS

A. Non-dimming fluorescent ballasts shall be high frequency electronic integrated circuit providing normal light output from the lamps. Lamp operational frequency shall be greater than 42 kHz. Total harmonic distortion (THD) shall be less than 10%. Power factor shall be no less than 98%. Crest factor shall be less than 1.7. Audible noise rating shall be better than Class A. Lamps shall be operated in an instant start, parallel configuration. Ballasts shall meet all applicable ANSI and IEEE standards, including ANSI/IEEE C62.41, CAT. A. Ballasts shall carry a five year warranty. Ballasts shall be capable of operating 2', 3' or 4' lamps. Ballast shall contain auto restart circuitry in order to restart lamps without resetting power. Ballast shall provide independent lamp operation for instant start ballasts allowing remaining lamps to maintain full light output when one or more lamps fail. Ballast shall be Advance Centium T8, no substitutions.
B. Compact fluorescent ballasts shall be high frequency electronic integrated circuit providing normal light output from the lamps. Lamp operational frequency shall be greater than 42 kHz. Total harmonic distortion shall be less than 20%. Power factor shall be greater than 98%. Crest factor shall be less than 1.7. Audible noise rate shall be Class A or better. Ballasts shall meet all applicable ANSI and IEEE standards, including ANSI/IEEE C62.41, CAT A. Ballasts shall carry a five year warrantee.

C. Incandescent lamps shall be size, style wattage and type suitable for the application and as indicted.

D. Fluorescent Emergency Ballast shall consist of a high-temperature, maintenance-free nickel cadmium battery, charger and electronic circuitry contained in one metal case. A solid-state charging indicator light to monitor the charger and battery, a double-pole test switch, and installation hardware shall be provided. The emergency ballast shall be capable of operating two fluorescent lamps at 1350 lumens initial light output in the emergency mode for a minimum of 90 minutes. The emergency ballast shall have 4 Watts of input power, a 24 Watt-hour battery capacity, and exceed emergency standards set forth by the current NEC. The emergency ballast shall be UL Listed for installation inside, on top of, or remote from the fixture and warranted for a full five years from date of purchase. Bodine # B50 or approved equal.

E. Compact Fluorescent Emergency Ballast shall consist of a high-temperature, maintenance-free nickel cadmium battery, charger and electronic circuitry contained in one metal case. A solid-state charging indicator light to monitor the charger and battery, a double-pole test switch, and installation hardware shall be provided. The emergency ballast shall be capable of operating one compact fluorescent lamp at 1000 lumens initial light output in the emergency mode for a minimum of 90 minutes. The emergency ballast shall have 3.5 Watts of input power, a 19.2 Watt-hour battery capacity, and exceed emergency standards set forth by the current NEC. The emergency ballast shall be UL Listed for installation inside, on top of, or remote from the fixture and warranted for a full five years from date of purchase. Bodine # B84C or approved equal.

F. Dimmable Fluorescent Ballast, non-addressable: Ballasts for dimming fluorescent lamps for presentation areas shall dim the lamps from 100% to 1% relative light output without flicker. THD shall be less than 10%, power factor greater than 0.95, ballast factor greater than .85, and have inrush current limited to 7 amps for 120-volt systems. Lutron Hi-lume series.

2.05 ADDRESSABLE BALLAST SYSTEM
A. Addressable Fluorescent Ballast: Addressable ballasts shall communicate digitally with other ballasts to form a dedicated network for lighting control and monitoring. The ballast shall be dimmable from 100% to 10% relative light output. Each ballast shall be capable of integrating a daylight sensor, occupancy sensor, or infrared controller into the control network. Lutron EcoSystem series.

B. Digital Bus Supply: A digital bus supply shall be installed for each addressable zone. The bus shall provide power to the communications bus and shall be capable of being integrated with other digital bus supplies to form larger networks.

C. Occupancy sensors: Dual technology occupancy sensors shall be installed where indicated. Sensor shall be selected to provide coverage over the entire area. Provide ceiling mounted sensor unless shown otherwise. Lutron LOS series.

D. Daylight sensor: Where indicated, provide daylight sensors for light harvesting control. Through programming, the sensor shall dim selected fixtures based on the available daylight. Sensor shall also contain an infrared receiver for EcoSystem programming. Lutron #C-SR-M1-WH.

E. Infrared Receiver: used for wireless control of the system. Provide ceiling mounted units where indicated and required for programming. Lutron C-R-M1-WH.

F. A control module shall be supplied where an addressable fluorescent ballast is not available due to voltage, lamping, dimming requirements, or other issues. The module shall provide an addressable control point and shall control a 3-wire ballast, 10% eco-system unless indicated otherwise. Lutron C5-BMF-2A or equal.

G. Control wiring shall be provided between all components per the manufacturers written instructions and recommendations. Control wiring shall be installed in a dedicated conduit system separate from the power wiring.

H. The system shall be programmed to provide correct operation of ballasts with inputs for hand-operated control and automatic sensors. Programming shall be complete at the time of substantial completion.
3.01 INSTALLATION OF INTERIOR LIGHTING FIXTURES:

A. Install interior lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.

B. Coordinate with other electrical work as appropriate to properly interface installation of interior lighting fixtures with other work.

C. Fasten fixtures securely to indicated structural support; and check to ensure that solid pendant fixtures are plumb.

D. Coordinate lighting fixture installation with the mechanical, plumbing and sprinkler installation work. Develop a reflected ceiling arrangement plan in cooperation with the installers of the mechanical, plumbing, and sprinkler work. Adjust lighting fixture locations to solve conflict problems with other installation work. Notify the designer of pending conflict problems and recommend adjustments prior to installing the lighting fixtures.

E. The lighting fixture vendor shall be responsible for coordinating all fixture types with mounting requirements and ceiling types. Provide for adjustments, exchanges and accessories required to match fixture to ceiling type.

3.02 ADJUST AND CLEAN:

A. Clean interior lighting fixtures of dirt and debris upon completion of installation.

B. Protect installed fixtures from damage during remainder of construction period.

C. Maintain a protective seal over lighting fixture diffusers during the remaining construction period.
3.03 FIELD QUALITY CONTROL:

A. Upon completion of installation of interior lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

B. Replace defective and burned out lamps at the time of Substantial Completion.

3.04 GROUNDING:

A. Provide tight equipment grounding connections for each interior lighting fixture installation.

END OF SECTION 26 51 00