SECTION 265100 - LUMINAIRES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior luminaires and accessories.
2. Exterior luminaires, poles, and accessories.
3. Lamps and ballasts.
4. Emergency lighting units and exit signs.
5. Luminaire supports.

B. Related Sections:

1. Section 262726 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, digitally addressable lighting control systems, and multi-pole lighting relays and contactors.

1.2 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color-rendering index.

C. LED: Light Emitting Diode

D. LER: Luminaire efficacy rating.

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

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

G. Pole: Luminaire support structure, including tower used for large area illumination.

1.3 SUBMITTALS

A. For each type of luminaire, arranged in order of luminaire designation. Include complete product model number and product data sheets on features, accessories, finishes, and the following:

1. Physical description of luminaire including dimensions, as well as effective projected area for exterior luminaires.
2. Details of attaching luminaires and accessories.
3. Emergency lighting units including battery and charger.
4. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
5. LED photometric report per latest IESNA LM-79-08 testing guidelines, including luminaire model number, manufacturer of LED chip array/board and driver, input wattage, and independent testing laboratory name, report number, and date tested.

6. Dimmer device data for all LED luminaires specified as dimming. Must be from approved manufacturer per luminaire manufacturer requirements, furnished and installed by contractor. Contractor responsible for dimmer control and luminaire compatibility.
7. Pole information including: Materials, dimensions, finishes, means of attaching luminaire to support, anchor bolts and templates, structural analysis and manufactured pole foundations.

B. Custom Luminaires: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

1.4 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products, or by an independent agency complying with the IESNA Lighting Measurements Testing & Calculation Guides.

B. Comply with IEEE C2, “National Electrical Safety Code” and NFPA 70.

1.5 COORDINATION

A. Coordinate layout and installation of luminaires and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver luminaire and components to site. Store such that luminaires, finishes, lenses, and trims are protected. Install with protective films on and remove only after construction clean-up is complete.

B. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation. Prevent breakage and damage to finish.

1.7 WARRANTY

A. Warranty Period for LED chips/arrays and drivers: 5 years from date of substantial completion.

B. Warranty Period for Emergency Lighting Unit Batteries: 5 years from date of substation completion.

C. Warranty Period for Luminaires: 5 years LED fixtures and 2 years for others from date of substantial completion.

D. Warranty Period for Poles: 3 years from date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Refer to Luminaire Schedule on the drawings.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES AND COMPONENTS

A. All luminaires shall carry a UL listing, unless otherwise noted on the Luminaire Schedule. Exterior luminaires shall carry a UL wet location listing as well as designated IP rating, unless otherwise noted on the Luminaire Schedule.

B. Recessed Luminaires: Housing shall be constructed of aluminum (UON), free of burrs and sharp corners and edges, free of light leakage and accessible without use of tools. Components shall be formed and supported to prevent warping and sagging. Lamp and ballast compartments shall be accessible from below the ceiling.

1. Where fire-rated ceilings are specified, luminaires should be provided with listed enclosures meeting requirements to maintain fire-rated system rating.

C. Suspended Luminaires: Canopies, power feeds, and mounting accessories shall be coordinated with architectural-designated ceiling type. Luminaires shall be installed plumb and level at luminaire height designated on Luminaire Schedule.

D. Exterior Luminaires: Housings shall be rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Doors shall be removable for cleaning or replacing lenses, designed to disconnect ballast when door opens.

1. Diffusers and Globes: Acrylic Lighting Diffusers shall be 100 percent virgin acrylic plastic, minimum 0.125 inch thickness. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation. Glass globes shall be annealed crystal glass unless otherwise indicated.
2. In-grade luminaires shall have separate compartments for wire entry and lamp chamber, separation shall prevent surface temperature of exceeding 115°F.

2.3 LIGHT EMITTING DIODE (LED) LUMINAIRE SYSTEMS

A. Light emitting diodes shall have a minimum color rendering index (CRI) of 80 for interior applications and 70 for exterior applications. Refer to Luminaire Schedule for color temperature of the luminaires.

B. Color changing LED chip arrays shall have chip colors as noted on the Luminaire Schedule.

C. LED chips shall be wired so that operation of chip array is not prohibited by failure of one chip.

D. LED Driver:

1. Solid state driver with integral heat sink. Driver shall have overheat, short-circuit and overload protection, power factor 0.90 or above and maximum total harmonic distortion of 20%. Surge suppression device for all exterior luminaires minimum 9kV.

2. Drivers shall have dimming capabilities as outlined in the luminaire schedule for each luminaire type.
3. Driver shall have a minimum of 50,000 hours rated life.

2.4 LUMINAIRE SUPPORT COMPONENTS

A. Comply with Section 26 0529 "Hangers and Supports" for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single luminaire. Finish same as luminaire.

D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.

E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.

F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

G. Hook Hangers: Integrated assembly matched to luminaire and line voltage and equipped with threaded attachment, cord, and locking-type plug.

2.5 ACCEPTABLE MANUFACTURERS – POLES

A. Manufacturer of Luminaire.

B. Valmont Poles.

C. Shakespeare Composite Structures.

D. United Lighting Standards Inc.

E. Gardco Poles.

F. Ameron Poles.

2.6 LIGHTING POLES

A. Poles: Refer to lighting schedule.

B. Structural Characteristics: Comply with AASHTO LTS-4-M.

1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed 100mph with a gust factor of 1.3 with luminaires, brackets, and banners mounted.

C. Handhole: 2 inches x 4 inches with weatherproof cover secured by stainless-steel captive screws. Provide gasket with matching finish.

D. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

E. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug, complying with requirements in Section 26 0526 "Grounding and Bonding," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.

F. Duplex Receptacle: 120 V, 20 A in a weatherproof assembly complying with Section 26 2726 "Wiring Devices" for ground-fault circuit-interrupter type.

1. Nonmetallic polycarbonate plastic or reinforced fiberglass, weatherproof in use, cover, < that when mounted results in NEMA 250, Type 4x enclosure with cord opening.
2. With lockable hasp and latch that complies with OSHA lockout and tag-out requirements.

G. Anchor Bolts: As recommended by pole manufacturer, installed per manufacturer's template with washers and hex nuts. Grout between anchor plate and concrete base with non-shrink grout after pole is plumbed.

H. Vibration Damper: As recommended by pole manufacturer, internal to pole. Provide additional pole top damper for first mode vibration on single-head poles where recommended by manufacturer.

I. Concrete as indicated on plans, provide reinforcing as indicated on plans. Poles exposed to concrete bases taller than 6" AFG, contractor shall provide a rubbed finish on the exposed surfaces. Apply a water proof agent after concrete has cured and after rubbed finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Luminaires:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
2. Install lamps in each luminaire.

B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.

C. Remote Mounting of Ballasts: Distance between the ballast and luminaire shall not exceed that recommended by ballast manufacturer. Verify, with ballast manufacturers, maximum distance between ballast and luminaire.

D. Lay-in Ceiling Luminaire Supports: Use grid as a support element.

1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each luminaire. Locate not more than 6 inches from luminaire corners.
2. Support Clips: Fasten to luminaires and to ceiling grid members at or near each luminaire corner with clips that are UL listed for the application.

3. Luminaires of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support luminaires independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
4. Install at least one independent support rod or wire from structure to a tab on luminaire. Wire or rod shall have breaking strength of the weight of luminaire at a safety factor of 3.

E. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

F. When installing luminaires, the contractor shall use the luminaire manufacturer's mounting hardware and follow all manufacturer's installation direction.

G. All recessed downlights must be installed so that the bottom of the throat is even with the finished ceiling plane. The overlapping flange must then fit flush to the ceiling plane/throat. No light leak must be visible. All miscellaneous hardware above the ceiling plane to accomplish the above shall be included in the base bid.

H. All recessed downlights shall have self-flanged reflectors unless otherwise noted.

I. When installing compact fluorescent lamp luminaires, consistent lamp orientation shall be maintained in a given area.

J. When luminaires are installed in continuous rows of 2 or more, luminaires shall be approved for use as wireway.

K. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

L. Embedded Poles: Set poles to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height, installed plumb with double nuts for adjustment. Grout around pole anchor base.

M. Raise and set poles using web fabric slings (not chain or cable), or non-chafing ropes.

N. Bollards and Ground-Mount Luminaires: Align units for optimum directional alignment of light distribution. Install on concrete base with top 4 inches above finished grade or surface at bollard location. Cast conduit into base, shape base to match shape of bollard base. Finish by troweling and rubbing smooth.

O. Bond luminaires and metal accessories to branch circuit equipment grounding conductor.

P. Ground metal and non-metallic poles and support structures according to Section 26 0526 "Grounding and Bonding."

3.2 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Verify that self-luminous exit signs are installed according to their listing and the requirements in NFPA 101.

C. Illumination Observations: Verify normal operation of luminaires after installing luminaires and energizing circuits with normal power source.

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.4 STARTUP SERVICE

A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

3.5 ADJUSTING AND CLEANING

A. Aim and adjust luminaires to provide illumination levels and distribution as directed. This work will be completed at night after hours. Contractor shall provide all labor to aim fixtures as directed by the architect/engineer.

B. Align luminaires and clean lenses and diffusers at completion of work. Clean paint splatters, dirt, and debris from installed luminaires. Touch up luminaire and pole finishes as necessary.

C. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

END OF SECTION 265100