

SECTION 265600 EXTERIOR POLE MOUNTED LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior luminaires with lamps and ballasts.
2. Luminaire-mounted photoelectric relays.
3. Poles and accessories.

B. Performance:

1. Basic Function
 - a. Provide exterior artificial lighting for safe passage of students and staff to deter theft and vandalism that is adequate in quantity, quality and distribution for the performance of tasks typical for the type of outdoor space and the characteristics of the intended user population.
 - b. Exterior Area Lighting Requirements
 - 1.) In addition to building mounted lighting and lighting to comply with Best Practices, lighting to the specified lighting levels is required for the following:
 - a.) All parking areas and adjacent sidewalks.
 - b.) All drop off and queuing areas, service and turn around areas.
 - c. Where exterior area lighting is integral with elements defined within another element group, meet requirements of both groups.
 - d. Provide components that are IDA approved as dark Sky Friendly products for exterior light fixtures.
 - e. Brand Names: Where brand names are listed, they represent the Basis of Design unless those items are identified as approved proprietary items in project requirements.

1.2 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

- A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in the latest edition of AASHTO LTS-4.
- B. Live Load: Single load of 500 lbf, distributed as stated in the latest edition of AASHTO LTS-4.
- C. Ice Load: Load of 3 lbf/sq. ft., applied as stated in the latest edition of AASHTO LTS-4 Ice Load Map.
- D. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in the latest edition of AASHTO LTS-4.
 1. Basic wind speed for calculating wind load for poles 50 feet high or less is 100 mph

1.3 ACTION SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, and finishes.
- B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

1.4 QUALITY ASSURANCE

- A. 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.
- B. Comply with IEEE C2, "National Electrical Safety Code."
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
- B. Luminaires to be utilized as approved by the owner:
- C. Light Levels: Maintained Lighting Levels
 - 1. Light Levels: Provide maintained average illuminance values for exterior spaces that are based on the primary visual tasks to be accommodated and are not less than the following, when measured at grade:
 - a. Parking Lots, Medium Activity: 0.6 fc, maximum uniformity ratio (average to minimum) of 4:1.
 - b. Building Entrance Areas 5.0 fc, maximum uniformity ratio (average to minimum) of 4:1
 - c. Building Perimeter (20ft depth from building) 1.0fc, maximum uniformity ratio (average to minimum) of 4:1.
 - d. Pedestrian Areas:
 - (1) Sidewalks: 1.0 fc, maximum uniformity ratio (average to minimum) of 4:1.
 - (2) Stairways: 1.0 fc, maximum uniformity ratio (average to minimum) of 10:1

D. Light Quality

- a. Glare Minimization: Provide exterior area lighting that minimizes the incidence of discomfort glare and avoids disability glare under all normal conditions of use, in accordance with IESNA recommendations.
- b. Color: Provide light sources throughout project with Color Rendering Index of not less than 80.
- c. Color Temperature: Provide light sources with correlated color temperature (CCT) of 3000K.

E. Appearance

- a. Provide exterior area lighting that is compatible with overall project appearance and coordinated with site layout and building organization.

(1) Luminaire Mounting

- (a) Installation on poles or wall mounting brackets with full cut off optics.:
- (b) Maximum height of 25 ft.
- (c) Style compatible with building design.
- (d) Material and finish compatible with exterior building elements.

(2) Luminaire Design

- (a) Light distribution by direct methods.
- (b) Optical control by reflectors or refractors.
- (c) Material and finish of housing compatible with mounting.

F. Lighting Cutoff

- a. Configure exterior area lighting to avoid spill light on adjacent property and streets.

G. Structure

1. Provide poles for parking lot area lighting that are located to avoid damage by automobiles or mounted to bases that are structurally capable of withstanding moderate impact.
2. Provide mounting system for exterior area lighting that is capable of withstanding 3-second wind gusts in excess of 100 mph.

H. Durability

Expected Service Life Span: Provide a system which will last a minimum of 25 years in service without major repairs.

2. Vandal Resistance:

- a. Parts not easily removed without the use of special tools.

- b. Luminaires mounted at minimum height of 12 ft above grade.
 - c. Lenses of tempered glass or high impact acrylic.
 - d. Metal gratings for protection of optical assemblies.
- I. Operation and Maintenance
- 1. Minimum Outdoor Operating Temperature: Provide lighting systems that operate at temperatures as low as -10 degrees F.
 - 2. Power Consumption and Efficiency: Comply with requirements of Section D5040.00 Artificial Lighting.
 - a. Lighting Controls: Provide programmable timing in accordance with ASHRAE 90.1-2016.
 - 3. Maintenance Efficiency: Provide luminaires that do not collect dirt rapidly and are readily cleanable.
 - a. Luminaire Categories: Provide luminaires of IESNA Category I, for minimum dirt accumulation and LDD factors.
 - b. Ease of Relamping: Provide luminaires designed for easy relamping with special tools only.
- J. Metal Parts: Free of burrs and sharp corners and edges.
- K. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
- L. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- M. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.
- N. Exposed Hardware Material: Stainless steel.
- O. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- P. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- Q. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
- 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- R. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

- S. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
 - a. Color: As selected by Architect from manufacturer's full range.
- T. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp and ballast characteristics:
 - a. "USES ONLY" and include specific lamp type.
 - b. Lamp tube configuration (twin, quad, triple), base type, and nominal wattage for compact fluorescent luminaires.
 - c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
 - d. Start type (preheat, rapid start, instant start) compact fluorescent luminaires.
 - e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
 - f. CCT and CRI for all luminaires.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

- A. Install lamps in each luminaire.
- B. Fasten luminaire to indicated structural supports.
 - 1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Adjust luminaires that require field adjustment or aiming.

3.2 POLE INSTALLATION

- A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.
- B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:
 - 1. Fire Hydrants and Storm Drainage Piping: 48 inches.
 - 2. Water, Gas, Electric, Communication, and Sewer Lines: 10 feet
 - 3. Trees: 15 feet from tree trunk.

- C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 033000 "Cast-in-Place Concrete."
- D. Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.
 - 1. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
 - 2. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.
 - 3. Install base covers unless otherwise indicated.
 - 4. Use a short piece of 1/2-inch diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
- E. Embedded Poles with Tamped Earth Backfill: Set poles to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.
 - 1. Dig holes large enough to permit use of tampers in the full depth of hole.
 - 2. Backfill in 6-inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.
- F. Embedded Poles with Concrete Backfill: Set poles in augered holes to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.
 - 1. Make holes 6 inches in diameter larger than pole diameter.
 - 2. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of 3000 psi at 28 days, and finish in a dome above finished grade.
 - 3. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through concrete dome. Arrange to drain condensation from interior of pole.
 - 4. Cure concrete a minimum of 72 hours before performing work on pole.
- G. Poles and Pole Foundations Set in Concrete Paved Areas: Install poles with minimum of 6-inch-wide, unpaved gap between the pole or pole foundation and the edge of adjacent concrete slab. Fill unpaved ring with pea gravel to a level 1 inch below top of concrete slab.
- H. Raise and set poles using web fabric slings (not chain or cable).

3.3 BOLLARD LUMINAIRE INSTALLATION

- A. Align units for optimum directional alignment of light distribution.
- B. Install on concrete base with top 1 inch above finished grade or surface at bollard location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.4 INSTALLATION OF INDIVIDUAL GROUND-MOUNTING LUMINAIRES

- A. Install on concrete base with top 1 inch above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.5 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.6 GROUNDING

- A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."
 - 1. Install grounding electrode for each pole unless otherwise indicated.
 - 2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.
- B. Ground nonmetallic poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."
 - 1. Install grounding electrode for each pole.
 - 2. Install grounding conductor and conductor protector.
 - 3. Ground metallic components of pole accessories and foundations.

END OF SECTION 265600