

## **SECTION 265600 - EXTERIOR LIGHTING**

Latest Update 11-09-2017 See underlined text of Edits.

(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all "underlines".)

### **PART 1 - GENERAL**

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and all other sections of Division 26.

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Exterior luminaires with lamps/modules, and drivers.
- 2. Luminaire-mounted photoelectric relays.
- 3. Poles and accessories.

#### 1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color-rendering index.
- C. LER: Luminaire efficacy rating.
- D. Luminaire: Complete lighting fixture, including ballast housing if provided.
- E. Pole: Luminaire support structure, including tower used for large area illumination.
- F. Standard: Same definition as "Pole" above.

#### 1.4 SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:

1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
  2. Details of attaching luminaires and accessories.
  3. Details of installation and construction.
  4. Luminaire materials.
  5. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.
  6. Voltage drop calculations.
    - a. Manufacturer Certified Data: Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
  7. Photoelectric relays.
  8. Lamps, including life, output, CCT, CRI, lumens, and energy-efficiency data.
  9. Materials, dimensions, and finishes of poles.
  10. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
  11. Anchor bolts for poles.
  12. Pole foundations.
  13. LED lamps/modules and drivers.
- B. Shop Drawings: 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. Anchor-bolt templates keyed to specific poles and certified by manufacturer.
  3. Design calculations, certified by a qualified professional engineer, indicating strength of foundations and soil conditions on which they are based.
  4. Wiring Diagrams: For power, signal, and control wiring.
- C. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.
- D. Field quality-control reports.
- E. Operation and Maintenance Data: For [luminaires] [and poles] to include in emergency, operation, and maintenance manuals. Provide data in electronic and hard-copy formats.  
<Engineer to Edit for Project Requirements>
- F. Warranty: Sample of special warranty specified in this section

- G. Coordination Drawings: Provide coordination drawings by coordination with Civil and other trades.

## 1.5 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratory that is accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency acceptable to the authority having jurisdiction, and marked for intended location and application.
- C. Comply with IEEE C2, "National Electrical Safety Code."
- D. Comply with NFPA 70.
- E. LED fixtures shall comply with the following:
  - 1. UL Standard 8750 "Light Emitting Diode Equipment for Use in Lighting Products".
  - 2. IES Standard LM-79 "Electrical and Photometric Measurements of Solid-State Lighting Products".
  - 3. IES Standard LM-80 "Measuring Lumen Maintenance of LED Light Sources".
  - 4. IES Standard TM-21 "Projecting Long term Lumen Maintenance of LED Light Sources".
  - 5. ANSI C78.377 "Specifications for the Chromaticity of Solid State Lighting Products" with LEDs binned within a maximum three-step MacAdam Ellipse to ensure color consistency amongst luminaires of the same type.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Package aluminum poles for shipping according to ASTM B 660.
- B. Store poles on decay-resistant-treated skids at least twelve (12) inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- C. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

## 1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Glass and Plastic Lenses, Covers, and Other Optical Parts: [One (1) for every one hundred (100)] of each type and rating installed. Furnish at least one (1) of each type. <Engineer to Edit for Project Requirements>
  2. Globes and Guards: [One (1) for every twenty (20)] of each type and rating installed. Furnish at least one (1) of each type. <Engineer to Edit for Project Requirements>
  3. LED Lamps/Modules: [One (1) for every one hundred (100)] <Insert quantity> of each type and rating installed. Furnish at least one (1) of each type.
  4. LED Drivers: [One (1) for every one hundred (100)] <Insert quantity> of each type and rating installed. Furnish at least one (1) of each type.

## 1.8 WARRANTY/GUARANTEE

- A. See Division 26 Specification Section “Basic Electrical Requirements” for warranty and guarantee requirements.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.
1. Warranty Period for Luminaires: Five (5) years from date of Substantial Completion.
  2. Warranty Period for Metal Corrosion: [Five (5)] <Insert number> years from date of Substantial Completion.
  3. Warranty Period for Color Retention: [Five (5)] <Insert number> years from date of Substantial Completion.
  4. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than [three (3)] <Insert number> years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one (1) of the products indicated on Drawings.

## 2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

- 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. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- F. 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.
- G. Exposed Hardware Material: Stainless steel.
- H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
  - 1. White Surfaces: 85%.
  - 2. Specular Surfaces: 83%.
  - 3. Diffusing Specular Surfaces: 75%.
- K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- L. Luminaire Finish: Coordinate color with architect to match UMB standards factory-assembled and -tested luminaire before shipping. Where indicated, match the finish process and color of pole or support materials.

- M. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
  2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
    - a. Color: As selected by UMB from manufacturer's full range.
- N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
  2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
  3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
  4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
    - a. Color (other than Polson fixtures): [Light bronze] [Medium bronze] [Dark bronze] [Black]. <Engineer to Edit for Project Requirements>
- O. 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/Module code configuration and nominal wattage for luminaires.
    - c. Driver type (dim, non-dim) for luminaires.
    - d. CCT and CRI for all luminaires.

2.3 LED Lighting Products:

A. Acceptable Manufacturers:

1. Luminaires:

a. Refer to the Luminaires Schedule on the drawings.

2. Drivers:

a. Cree.

b. EldoLED.

c. Philips/Advance.

d. Thomas Research Products.

e. Or as supplied by the luminaire manufacturer, in compliance with these Specifications.

3. Dimmable Drivers:

a. Cree.

b. EldoLED.

c. Philips/Advance.

d. Thomas Research Products.

e. Or as supplied by the luminaire manufacturer, in compliance with these Specifications.

B. Luminaires:

<Engineer to coordinate exterior lighting fixture requirements with UMB Design Standards>.

1. Refer to Luminaire Schedule for specified parameters such as correlated color temperature (CCT) value(s), lumen output, efficiency, etc.

2. Products shall be fabricated to be Reduction of Hazardous Substances (RoHS) - compliant.

3. Must maintain their warranted life while operating within the manufacturers' specified environmental parameters.

4. The lumen value specification listed in the Luminaire Schedule is a delivered lumen value specification. Products supplied shall deliver not less than the lumen value specified.

5. The lumen maintenance specification of any assembled LED based chip, array, module, driver, and luminaire combination shall be a minimum of L70, at 50,000 hours, as tested and measured in compliance with IES documents LM-79 and LM-80.

6. Except as otherwise stated in the Luminaire Schedule, the light source shall provide a minimum CRI of >85.

7. Operating temperature rating shall be between -40°C (-40°F) and 50°C (120°F).

C. Drivers: Listed and so labeled per UL 8750 and UL 1310, and shall meet or exceed the following general specification criteria:

1. Designed and tested to be compatible with the luminaire light source operating current, voltage, and output power requirements.
2. Inaudible above 27 dBA ambient sound level.
3. Designed, fabricated, and tested to operate at an input voltage of 120 – 480VAC,  $\pm 10\%$ , at 60 Hz, with no perceptible change in light source output.
4. Contribute less than 20% total harmonic distortion, operating at full rated load, and shall not exceed the maximum allowable THD requirements allowed per standard ANSI C82.11.
5. Provided with integral short circuit, open circuit, and overload protection.
6. Have an operating power factor  $\geq 0.9$ .
7. Limit conducted and radiated interference in compliance with FCC 47 CFR Part 18.
8. Housed in a UL compliant and listed enclosure, suitable for remote installation where required, as defined in NFPA 70 – the National Electrical Code.
9. Starting temperature  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ).
10. Power supplies Class I or II output.
11. Surge Protection: The system must survive 250 repetitive strikes of “C Low” wave forms at 1-minute intervals with less than 10% degradation in clamping voltage. “C Low” waveforms are as defined in IEEE/ANSI C62.41.2-2002, Scenario 1 Location Category C.

D. Dimmable Drivers - In addition to the general specification criteria specified above:

1. Have an operating power factor of  $\geq 0.9$  at full load, and not less than 0.8 at dimmed level.
2. Provide smooth, flicker-free, dimmable light output from 100% to less than 1%.
3. 0-10VDC "sinking" type dimming control protocol per enforced version of IEC Standard 60929, unless otherwise noted or required.

## 2.4 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

A. Comply with UL 773 or UL 773A.

B. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at one and one half (1.5) fc to three (3) fc and off at four and one half (4.5) fc to ten (10) fc with fifteen (15) second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.

1. Relay with locking-type receptacle shall comply with ANSI C136.10.
2. Adjustable window slide for adjusting on-off set points.



## 2.5 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

- A. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.
- B. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
  - 1. Materials: Shall not cause galvanic action at contact points.
  - 2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
  - 3. Anchor-Bolt Template: Plywood or steel.
- C. Hand hole: Oval-shaped, with minimum clear opening of two and one half (2-1/2) inches by five (5) inches, with cover secured by stainless-steel captive screws.
- D. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete."
- E. Breakaway Supports: Frangible breakaway supports, tested by an independent testing agency acceptable to authorities having jurisdiction, according to AASHTO LTS-4-M.

## 2.6 STEEL POLES

- A. Poles: Comply with ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psig; one-piece construction up to 40 feet in height with access handhole in pole wall.
  - 1. Shape: Round, straight
  - 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- B. Brackets for Luminaires: Detachable, cantilever, without underbrace.
  - 1. Adapter fitting welded to pole, allowing the bracket to be bolted to the pole mounted adapter, then bolted together with stainless steel bolts.
  - 2. Cross Section: Tapered oval, with straight tubular end section to accommodate luminaire.
  - 3. Match pole material and finish.
- C. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

- D. Steps: Fixed steel, with nonslip treads, positioned for fifteen (15) inch vertical spacing, alternating on opposite sides of pole; first step at elevation ten (10) feet above finished grade.
- E. Grounding and Bonding Lugs: Welded one half (1/2) inch threaded lug, complying with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
- F. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable and rated for a minimum load equal to weight of supported cable times a five (5.0) safety factor.
- G. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.
- H. Galvanized Finish: After fabrication, hot-dip galvanize complying with ASTM A 123/A 123M.
- I. Factory-Painted Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."
  - 2. Interior Surfaces of Pole: One coat of bituminous paint, or otherwise treat for equal corrosion protection.
  - 3. Exterior Surfaces: Manufacturer's standard finish consisting of one (1) or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
    - a. Color: As selected by Architect from manufacturer's full range.

## 2.7 ALUMINUM POLES

- A. Poles: ASTM B 209, 5052-H34 marine sheet alloy with access handhole in pole wall.
  - 1. Shape: [Dual Round, straight]. <Engineer to Edit for Project Requirements>
  - 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- B. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

- C. Grounding and Bonding Lugs: Welded one half (1/2) inch threaded lug, complying with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
- D. Brackets for Luminaires: Detachable, with pole and adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, than bolted together with stainless-steel bolts.
  - 1. Tapered oval cross section, with straight tubular end section to accommodate luminaire.
  - 2. Finish: Same as luminaire.
- E. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.
- F. Aluminum Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
  - 2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
  - 3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
  - 4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
  - 5. <Insert finish>.
    - a. Color: As selected by Architect from manufacturer's full range].

## 2.8 POLE ACCESSORIES

- A. Base Covers: Manufacturers' standard metal units, arranged to cover pole's mounting bolts and nuts. Finish same as pole.
- B. Decorative accessories, supplied by decorative pole manufacturer, include the following:
  - 1. Banner Arms: <Insert material>.
  - 2. Flag Holders: <Insert material>.
  - 3. Ladder Rests: <Insert material>.

## PART 3 - EXECUTION

### 3.1 LUMINAIRE INSTALLATION

- A. Install lamps in each luminaire.
- B. Fasten luminaire to indicated structural supports.
- C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

### 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: [Sixty (60) inches] <Insert dimension>.
  2. Water, Gas, Electric, Communication, and Sewer Lines: [Ten (10) feet] <Insert dimension>.
  3. Trees: [Fifteen (15) feet] <Insert dimension> from tree trunk.
  4. <Insert features and clearance dimensions>.
- 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 Division 03 Section "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. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.
  2. Install base covers unless otherwise indicated.
  3. Use a short piece of one half (1/2) inch diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
  4. Orient hinged side of pole base facing the street.
- E. 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 [four (4) inches] <Insert dimension> 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 Division 03 Section "Cast-in-Place Concrete."

### 3.4 INSTALLATION OF INDIVIDUAL GROUND-MOUNTING LUMINAIRES

- A. Install on concrete base with top [four (4) inches] <Insert dimension> 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 Division 03 Section "Cast-in-Place Concrete."

### 3.5 CORROSION PREVENTION

- A. Steel Conduits: Comply with Division 26 Section "Raceway and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 % overlap. Aluminum shall not be used.

### 3.6 GROUNDING

- A. Ground metal poles and support structures according to Division 26 Section "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.

### 3.7 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.
  - 1. Verify operation of photoelectric controls.
- C. Illumination Tests:
  - 1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):

- a. IESNA LM-5, "Photometric Measurements of Area and Sports Lighting Installations."
- b. IESNA LM-50, "Photometric Measurements of Roadway Lighting Installations."
- c. IESNA LM-52, "Photometric Measurements of Roadway Sign Installations."
- d. IESNA LM-64, "Photometric Measurements of Parking Areas."
- e. IESNA LM-72, "Directional Positioning of Photometric Data."

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.

### 3.8 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaire lowering devices.

END OF SECTION 265600