

## University of Houston Master Specification

<Insert Project Name>

<Insert U of H Proj #>

<Insert Issue Name>

<Insert Issue Date>

### SECTION 26 5619 - LED EXTERIOR LIGHTING

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information.

Edit and finalize this Section, where prompted by Editor's notes or indicated by **bold** text, to suit Project specific requirements. Make selections for the Project at text identified in **bold**.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

#### 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.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
  - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
  - 2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction*.

##### 1.2 SUMMARY

- A. Section includes:
  - 1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
  - 2. Luminaire supports.
  - 3. Light poles.
  - 4. Base covers and other accessories.
  - 5. **[Luminaire-mounted photoelectric relays.] [Note to editor: use of fixture-mounted photo cells requires written approval by Owner, including Owner's Facilities Planning Department and Electrical Shop.]**
- B. Work included:

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**

**UH Master: 07.2024**

26 5619 - 1

## University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

1. Furnish and install luminaire fixtures of the types indicated by letter at each location shown on the Drawings.
2. Provide materials, accessories and any other equipment necessary for the complete and proper installation of luminaire fixtures included in this Contract.
3. Conformance: Luminaire fixture shall be manufactured in strict accordance with the Drawings and Specifications.
4. Specifications and Drawings are intended to convey the salient features, function and character of the fixtures only and do not undertake to illustrate or set forth every item or detail necessary for the Work.
5. Minor details, not usually indicated on the Drawings nor specified, but that are necessary for the proper execution and completion of the fixtures, shall be included the same as if they were herein specified or indicated on the Drawings.
6. Omissions: The Owner shall not be held responsible for the omission or absence of any detail, construction feature, etc. that may be required in production of the fixtures. The responsibility of accurately fabricating the fixtures to the fulfillment of this specification rests with Contractor.

### 1.3 DEFINITIONS

- A. CCT: Correlated color temperature (Kelvin temperature).
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

### 1.4 ACTION SUBMITTALS

- A. Product Data. Include the following for each type of luminaire. Arrange in order of luminaire designation.
  1. Data on features, accessories, and finishes.
  2. Physical description and dimensions of luminaire.
  3. Lamps, including life, output (lumens, CCT and CRI) and energy-efficiency data.
  4. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project per IES LM-79 and IES LM-80.
    - a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**  
**UH Master: 07.2024**

26 5619 - 2

## University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

5. Wiring diagrams for power, control, and signal wiring.
6. **[Photoelectric relays.]**
7. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.
8. Finishes for light poles and luminaire supporting devices.

B. Shop Drawings. Include the following:

1. Plans, elevations, sections, and mounting and attachment details.
2. Details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Diagrams for power, signal and control wiring.
4. Pole foundation design, anchor bolt and base cover details.

C. Coordination Drawings. Include the following:

1. Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - a. Luminaires.
  - b. Structural members, including poles and footings, to which equipment and luminaires will be attached.
  - c. New and existing underground utilities and structures.
  - d. New and existing above-grade utilities and structures.
  - e. Landscape elements, such as trees, benches and sidewalks.
  - f. Building features.
  - g. Traffic and other signage.
  - h. Vertical and horizontal information.

D. Samples: For each luminaire and pole and for each color and texture indicated with factory-applied finish.

E. Product Schedule: For luminaires and lamps. Use same luminaire designations indicated on Drawings.

### 1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing laboratory providing photometric data for luminaires.

B. Product Certificates: For each type of the following:

1. Luminaire.
2. **[Photoelectric relay.]**

C. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Source quality-control reports.

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**

**UH Master: 07.2024**

26 5619 - 3

## University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

E. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

F. Sample warranties.

### 1.6 QUALITY ASSURANCE

A. Provide luminaires from a single manufacturer for each luminaire type.

B. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

C. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

### 1.8 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by Architect and Owner prior to the start of concrete footing and luminaire installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide product indicated and scheduled on Drawings and related contract documents. Only fixtures listed in the schedule may be used.

1. Substitutions for listed fixtures are NOT allowed.

B. The first luminaire fixture listed for each type in the luminaire fixture schedule is the basis of design (BOD) fixture and has been used in calculating lighting levels and energy code compliance.

1. Perform studies and demonstrate compliance with lighting requirements upon selection of a luminaire listed in the fixture schedule that is different from the BOD fixture.

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**

**UH Master: 07.2024**

26 5619 - 4

## University of Houston Master Specification

<Insert Project Name>

<Insert U of H Proj #>

<Insert Issue Name>

<Insert Issue Date>

### 2.2 PERFORMANCE REQUIREMENTS

- A. Ambient Temperature: -20° F to 104° F.
  - 1. Relative Humidity: Zero to 100 percent.
- B. Altitude: Minimum 1000 feet.

### 2.3 LUMINAIRE REQUIREMENTS

- 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. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. UL Compliance: Comply with UL 1598 and listed for wet location.
- D. L70 lamp life of 50,000 hours.
- E. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- F. Internal driver.
- G. Nominal Operating Voltage: Multi-volt.
- H. In-line Fusing: Separate in-line fuse for each luminaire.
- I. Lamp Rating: Lamp marked for outdoor use.
- J. Color Temperature: 4000K.
- K. CRI: 90 or better.
- L. Source Limitations: Obtain luminaires from single source from a single manufacturer with resources to provide products of consistent quality in appearance and physical properties.

### 2.4 LIGHT POLES

- A. Pole Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Valmont.
  - 2. Or same manufacturer as pole-mounted luminaire.
- B. Pole Heights: As indicated on the Drawings. Refer to the Luminaire Schedule.

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**  
**UH Master: 07.2024**

26 5619 - 5

## University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

- C. Concrete Base: Refer to the Drawings.
- D. Structural Characteristics: Comply with AASHTO LTS-6-M.
  - 1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in Part 1 "Structural Analysis Criteria for Pole Selection" Article.
  - 2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.
  - 3. The minimum EPA capacity of each pole shall exceed 200% of the total fixture head EPA value attached to each pole at 90 mph. This provides a safety factor, as well as countering long-term fatigue and/or accommodating an additional fixture head in the future.
- E. Aluminum Poles
  - 1. Pedestrian Poles: Seamless, extruded structural tube complying with ASTM B221, Alloy 6061-T6, with access handhole in pole wall.
    - a. Shape: Round, tapered.
    - b. Mounting Provisions: Butt flange, hinged, for bolted mounting on foundation or breakaway support.
- F. Steel Poles
  - 1. Street and Parking Lot Poles: Comply with ASTM A500/A500M, Grade B carbon steel with a minimum yield of 46,000 psig (317 MPa); one-piece construction up to 30 feet in height with access handhole in pole wall.
    - a. Shape: Round, tapered.
    - b. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- G. Pole Accessories
  - 1. Handhole: Oval shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws.
  - 2. Pole Cap: Provide removable, watertight cap at top of pole.
  - 3. Base Cover: Provide University standard vandal resistant base cover, finished to match pole and arranged to cover pole's mounting bolts and nuts and rest directly on the concrete base.
  - 4. **[Decorative accessories, supplied by pole manufacturer, include the following:**
    - a. **Banner Arms: 1-inch diameter cast aluminum with black finish.]**

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**

**UH Master: 07.2024**

26 5619 - 6

## University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

5. **[Duplex Receptacle: Ground-fault circuit interrupter type, 120 V ac, 20 A in a recessed, weatherproof assembly. Comply with requirements in Section 26 2726 "Wiring Devices."**
  - a. **Locate receptacle 36 inches above base of pole.]**

### 2.5 [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 1.5 to 3 fc and off at 4.5 to 10 fc with 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.]**

### 2.6 MATERIALS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Sheet Metal Components: Epoxy-coated steel. Form and support to prevent warping and sagging.
- C. Doors, Frames and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit re-lamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during re-lamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- D. Diffusers and Globes:
  1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  2. Glass: Annealed crystal glass unless otherwise indicated.
  3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- F. 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.

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**

**UH Master: 07.2024**

26 5619 - 7

## University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

### G. Housings:

1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
2. Provide filter/breather for enclosed luminaires.

### H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels 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 characteristics:
  - a. "USE ONLY" and include specific lamp type.
  - b. Lamp diameter, shape, size, wattage and coating.
  - c. Light distribution (R-type) for all luminaires.
  - d. CCT and CRI for all luminaires.

## 2.7 FINISHES

- A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. 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.
- C. 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, 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 or SSPC-SP 8.
  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: Black.

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**

**UH Master: 07.2024**

26 5619 - 8



## University of Houston Master Specification

<Insert Project Name>

<Insert U of H Proj #>

<Insert Issue Name>

<Insert Issue Date>

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.
- C. Examine foundations, exterior walls, roofs, canopy ceilings and overhang ceilings for suitable conditions where luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

#### 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with NECA 1.
- B. Install lamps in each luminaire.
- C. Fasten luminaire to structural support.
- D. Supports and mounting devices:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position after cleaning and re-lamping.
  - 3. Able to support luminaires without causing deflection of finished surface.
  - 4. Capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Wall-Mounted Luminaire Support:
  - 1. Attached to a minimum 1/8-inch backing plate attached to wall structural members.
- F. Wiring Method: Install cables in raceways. Conceal raceways and cables.
  - 1. Exposed conduit is NOT allowed.

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**  
**UH Master: 07.2024**

26 5619 - 9

## University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

- G. Install luminaires level, plumb, and square with finished grade unless otherwise indicated. Install luminaires at height and aiming angle as indicated on Drawings.
- H. Coordinate layout and installation of luminaires with other construction.
- I. 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.]**
- J. Comply with requirements in Division 26 Sections, including "Low-Voltage Electrical Power Conductors and Cables," Section 26 0533 "Electrical Raceways" and Section 26 0534 "Electrical Boxes" for wiring connections and wiring methods.

### 3.4 INSTALLATION OF PEDESTRIAN POLE AND STREET POLE-MOUNTED LUMINAIRES

- A. Align units for optimum directional alignment of light distribution.
- B. Install pedestrian and street light poles on concrete base with top of concrete to be 4 inches above finished grade when located in landscape; or with top of concrete to be flush with surrounding surface when located in a plaza or other paved area.
- C. Cast conduit into base and finish by troweling and rubbing smooth.
- D. Concrete materials, installation and finishing are specified in Section 03 3000 "Cast-in-Place Concrete."
- E. Use of pedestrian light poles and street light poles for installation of security cameras, traffic signs or other regulatory signs is NOT permitted.

### 3.5 INSTALLATION OF PARKING LOT POLE-MOUNTED LUMINAIRES

- A. Align units for optimum directional alignment of light distribution.
- B. Install parking lot pole on concrete base with top of concrete to be 2-foot 6-inches above surrounding parking lot grade.
- C. Cast conduit into base and finish by troweling and rubbing smooth.
- D. Concrete materials, installation and finishing are specified in Section 03 3000 "Cast-in-Place Concrete."

### 3.6 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES

- A. Aim as indicated on Drawings.

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**

**UH Master: 07.2024**

26 5619 - 10

## University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

- B. Install on concrete base with top of concrete to be 4 inches above finished grade when located in landscape; or flush with paving surface at luminaire location.
- C. Cast conduit into base and finish by troweling and rubbing smooth.
- D. Concrete materials, installation and finishing are specified in Section 03 3000 "Cast-in-Place Concrete."

### 3.7 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 26 0533 "Electrical Raceways." In concrete foundations, wrap conduit with 0.010-inch thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

### 3.8 IDENTIFICATION

- A. Identify system components, wiring, cabling and terminals. Comply with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."

### 3.9 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. **[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 IES testing guide(s):
    - a. IES LM-64.
  - 2. Operational Test: After installing luminaires, switches and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- D. Luminaire will be considered defective if it does not pass tests and inspections.

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**

**UH Master: 07.2024**

26 5619 - 11

## University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

- E. 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.

### 3.10 PROJECT CLOSEOUT

- A. Submit an as-built foot-candle (*fc*) analysis of the exterior lighting system.
  - 1. Demonstrate compliance with the Owner's *fc* metrics as outlined in Section 12, Exterior Lighting, of the Owner's Design Guidelines
- B. Submit manufacturers' warranties for luminaires, poles and accessories. Complete the Owner's warranty transmittal log.
- C. Comply with requirements of Section 01 7700 "Closeout Procedures."

### 3.11 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate and maintain luminaires **[and photocell relays]**.

### 3.12 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
  - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
  - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION 26 5619

<Insert A/E Name>

AE Project #: <Insert Project #>

**LED Exterior Lighting**

**UH Master: 07.2024**

26 5619 - 12