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USACE / NAVFAC / AFCESA / NASA **UFGS-26 56 19.00 40 (November 2008)**

Preparing Activity: NASA **Superseding UFGS-26 56 19.00 40 (April 2007)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2009
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DIVISION 26 - ELECTRICAL

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ROADWAY LIGHTING

11/08

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SECTION 26 56 19.00 40

ROADWAY LIGHTING

11/08

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NOTE: This specification covers the requirements for highway and roadway lighting luminaires.

Drawings should show details of each street lighting fixture with letter designation keyed to the drawings and electrical symbols describing the type, style, class, kind, and size of fixture as follows:

Roadway lighting fixtures including luminaires for IES as listed in IES RP-8, "Lighting Distribution Patterns."

Coordinate this section with UFGS Section 26 09 23.00 40 LIGHTING CONTROL DEVICES and UFGS Section 26 56 13.00 40 LIGHTING POLES AND STANDARDS.

Roadway-lighting standards and fixture details on drawings should describe, in plan and elevation, the type and kind of pole, bracket, luminaire, base, and foundation required for installation at the location indicated. Elevation details should indicate height of pole, bracket-spread length, luminaire, depth of foundation, anchor bolts, underground conduit connections, ground rods, and ground connections. Plan views should indicate foundation configuration, conduit stub-ups, base dimensions, and bolt circles. Foundation detail drawings should accurately describe the nature and properties of soil surrounding foundations for the support of lighting standards.

Foundations for installation of area, flood lighting, roadway lighting, and security lighting standards and fixtures in filled locations may require modification to resist horizontal movement without permanent set under stipulated wind loads.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or

insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

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NOTE: TO DOWNLOAD UFGS GRAPHICS

Go to http://www.wbdg.org/ccb/NAVGRAPH/graphtoc.pdf.

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NOTE: This section contains the following sketches (Graphics) and are available in metric (SI) and U.S. Customary (IP) system dimensions. Sketch titles and style numbers are unchanged for both types. The metric values indicated are a conversion of U.S. Customary (IP) system dimensions.

Do not include list of sketches, or sketches themselves, in project specifications. Use luminaire sketches as details on drawings whenever possible. If special features are required, do not modify sketches, but indicate these changes as notes in fixture schedule. The "XL" style numbers and dates should remain on the drawing details.

Sketch No.	Title
XL-1	Roadway and Area Light
XL-4	Roadway and Area Light
XL-6	Area and Street Lighting Cutoff Luminaire
XL-13 thru 19	Reserved for Future Exterior Luminaires

NOTE: Do not include this index in project specification.

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NOTE: Show the following information on the drawings or specify in the project specifications:

a. Luminaire schedule and indicate pertinent information; i.e., mounting, lamps, ballasts, and voltage.

1. Type of luminaire;

2. Voltage, wattage, and frequency rating required;

3. Accessories required, such as photocell, time switches, and auxiliary lamps;

4. Location of poles or standards;

5. Referenced sketch; and

6. Extent and location of the work to be accomplished and wiring and equipment necessary for a complete installation.

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NOTE: Demolition work that involves disposal of fluorescent and HID lamps and ballasts will require the use of Section 02 84 16 HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)

IESNA RP-8	(2000; Errata 2004; R 2005) Roadway Lighting

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ANSLG C78.42	(2007) Standard for High-Pressure Sodium Lamps

NEMA C136.11	(2006) Roadway Lighting Equipment Series Sockets and Series Sockets Receptacles
NEMA C136.15	(2009) Roadway Lighting Equipment - High-Intensity-Discharge and Low-Pressure Sodium Lamps in Luminaires - Field Identification
NEMA C136.2	(2004) American National Standard for Roadway Lighting Equipment: Luminaires Voltage Classification
NEMA C136.3	(2005) Roadway and Area Lighting Equipment Luminaire Attachments
NEMA C136.6	(2004) American National Standard for Roadway Lighting Equipment - Metal Heads and Reflector Assemblies - Mechanical and Optical Interchangeability
NEMA C136.9	(2003) Roadway Lighting Equipment - Socket Support Assemblies for Metal Heads - Mechanical Interchangeability
NEMA C82.4	(2002) Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)
NEMA C82.5	(1990; R 1995) High-Intensity Discharge and Low-Pressure Sodium Lamps, Reference Ballasts
NEMA C82.9	(1996) American National Standard for High-Intensity Discharge and Low-Pressure Sodium Lamps, Ballasts and Transformers - Definitions

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

21 CFR 1040	Performance Standards for Light-Emittng Products

1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Keep submittals to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Material, Equipment, and Fixture Lists.

SD-02 Shop Drawings

Submit fabrication drawings for the following items consisting of fabrication and assembly details to be performed in the factory:

Street-Lighting Fixtures
Street-Lighting Luminaires
Installation Drawings

SD-03 Product Data

Equipment and Performance Data

Submit manufacturer's catalog data for the following items:

Street-Lighting Fixtures
Street-Lighting Luminaires

SD-06 Test Reports

Operational Tests

SD-07 Certificates

Lighting-distribution Certificates

1.3 GENERAL REQUIREMENTS

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NOTE: If Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS is not included in the project specification, applicable requirements there from should be inserted and the following paragraph deleted.

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Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS applies to work specified in this section.

Submit Material, Equipment, and Fixture Lists for highway and roadway lighting fixtures including manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site information.

Submit Equipment and Performance Data for highway and roadway lighting systems consisting of life test, system functional flows, safety features, mechanical automated details, automatic interlocks, and such features as electrical system protective device ratings.

Submit Lighting-distribution Certificates showing compliance with the following requirements:

Submit lighting-distribution curves for each type of fixture prepared utilizing the fixture manufacturer's own facilities or those of an independent nationally recognized laboratory, in accordance with the standard procedure developed by the Illuminating Engineering Society.

PART 2 PRODUCTS

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NOTE: Revise as necessary to meet project requirements.

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2.1 STREET-LIGHTING FIXTURES

Provide street-lighting fixtures, equipped with lamps, furnished complete with wiring and mounting devices ready for installation at the locations indicated.

2.2 STREET-LIGHTING LUMINAIRES

Provide enclosed and gasketed vaportight street-lighting luminaires in accordance with IESNA RP-8 for Types I, II, III, IV, and V lighting-distribution patterns.

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NOTE: Select street-lighting luminaires, ballasts, and lamps from the following parts to suit project requirements.

Factors which will affect the selection of luminaire types include the following:

Fixture efficiency is the percent of available lumens from the light source that will be emitted from the fixture. The most efficient fixture should be selected commensurate with the other design

requirements.

The spacing to mounting height ratio (S/MH) indicates how far apart the fixtures can be placed in relation to their mounting height. This ratio should be available in the fixture manufacturer's literature. A medium-to-wide distribution of light from the fixture should be selected. Fewer fixtures will be required using the larger, more efficient light sources, and overlapping light patterns will provide greater uniformity of illumination and increase light on vertical surfaces.

High power factor ballasts should be selected.
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2.2.1 Roadway Luminaire Components

Provide roadway luminaire components conforming to the following:

a. Attachments, NEMA C136.3
b. Voltage classification, NEMA C136.2
c. Field identification marking, NEMA C136.15
d. Interchangeability, NEMA C136.6 and NEMA C136.9
e. Sockets, NEMA C136.11

2.2.2 End-Mounted High-Intensity-Discharge (HID) Luminaires

End-mounted HID luminaires with horizontal lamp-burning position include a hinged two- or three-piece housing, reflector, refractor, refractor holding ring, lampholder, fuses, fuseholders, terminal block, ballast, and lamp in a completely sealed optical system for end-mounting to street-lighting standards. Conceal wiring in street-lighting standards and luminaires.

Provide with cast aluminum upper housing with fixture-leveling pad, integral slip fitter, pipe stop, and clamps with provision for vertical adjustments of plus or minus 3 degrees for leveling purposes.

Mount porcelain lampholder on an adjustable supporting bracket that will permit vertical and horizontal positioning of the lamp. Provide with reflector formed from anodized sheet aluminum with a specular finish. Provide molded prismatic heat-resistant borosilicate glass refractor designed to provide the lighting-distribution pattern indicated, with refractor cover allowing for expansion and contraction of the refractor with ambient temperature changes from minus 18 to 41 degrees C 0 to 105 degrees F.

Provide cast aluminum refractor holding ring and ballast cover which forms the lower housing. Equip lower housing with corrosion-resistant steel hinge and hinge pin, spring-loaded safety catch, and refractor latching mechanism. Upper housing is to overlap the lower housing with a heat-resistant gasket that will provide a seal against moisture, dirt, and insects.

2.2.3 Side-Mounted (HID) Luminaires

Provide side-mounted (HID) luminaires with base-up vertical lamp-burning position, including a universal head with built-in ballast, lamp, porcelain lampholder, and reflector assembly in a completely sealed optical system

for bracket mounting to street-lighting standards. Conceal wiring in street-lighting standards and luminaires.

Provide cast aluminum universal head with integral side-mounting slip fitter, pipe stop, and clamps with provisions for vertical adjustments of plus or minus 3 degrees for leveling purposes.

Include in reflector assembly a reflector, refractor, and clamping band. Form reflector from anodized sheet aluminum and with a specular finish. Include molded prismatic heat-resistant borosilicate glass refractor designed to provide the lighting-distribution pattern indicated. Provide clamping band formed from sheet aluminum or corrosion-resistant steel which completely seals the joint between reflector and refractor against moisture, dirt, and insects.

Provide complete assembly which latches reflector directly to the universal head with aluminum or corrosion-resistant steel latches, including a seating flange to provide a seal against moisture, dirt, and insects.

2.2.4 Lamp Ballasts

2.2.4.1 Multiple-Circuit Ballasts

Multiple-circuit ballasts include a two-winding core-and-coil assembly with a saturated-iron regulating element and capacitors impregnated with an insulating material in accordance with NEMA C82.4, NEMA C82.5, and NEMA C82.9.

Provide ballasts which maintain correct lamp operation over a voltage-input range of plus or minus 13 percent of rated voltage. Include capacitors providing a power factor lamp load of not less than 95 percent.

Provide ballasts with a voltage rated for operation on 120- or 277-volt, single-phase, 60-hertz lighting-distribution systems as indicated.

Design ballasts for a minimum lamp starting temperature of minus 29 degrees C 20 degrees F and a maximum ambient temperature of 41 degrees C 105 degrees F.

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NOTE: Select solid-state ballasts, if available and most efficient.
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2.2.4.2 Series Circuit Transformers

Provide series transformers with a two-winding core-and-coil assembly designed for connection to constant-current supply circuits in accordance with NEMA C82.5 and NEMA C82.9.

Design primary winding of the transformer for connection to 6.6-or 20-ampere constant-current street-lighting circuits, and to provide the proper starting voltage and operating current for the lamp indicated.

Design transformers for a maximum ambient temperature of 41 degrees C 105 degrees F.

2.2.5 Lamps

Provide lamps, if used in a populated area, certified to be automatically self-extinguishing, conforming to 21 CFR 1040, Section 30.

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NOTE: Select one of the following two paragraphs.
Add watt requirements on the drawings.
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2.2.5.1 (HID) Lamps and Ballasts

Provide compatible (HID) lamps and ballasts, furnished as specified on drawings. Provide high pressure sodium lamps in compliance with the following industry standards:

1,000 watts	NEMA ANSLG C78.42
400 watts	NEMA ANSLG C78.42
150 watts	NEMA ANSLG C78.42
70 watts	NEMA ANSLG C78.42

2.2.5.2 Low Pressure Sodium

Provide lamps certified by manufacturer as meeting the requirements defined by the contract drawings.

2.2.6 Side-Mounted Incandescent Luminaires

Provide side-mounted incandescent-lamp luminaires with base-up vertical lamp-burning position including a universal head with lamp and porcelain lampholders and reflector assembly in a completely sealed optical system suitable for bracket mounting to street-lighting standards. Conceal wiring in street-lighting standards and luminaires.

Provide cast aluminum universal head with integral side-mounting slip fitter, pipe stop, and clamps with provision for vertical adjustments of plus or minus 3 degrees for leveling purposes.

Include in reflector assembly a reflector, refractor, and clamping band. Form reflector from anodized sheet aluminum with a specular finish. Provide a molded prismatic heat-resistant borosilicate glass refractor designed to provide the type of lighting-distribution pattern indicated. Form clamping band from sheet aluminum or corrosion-resistant steel to completely seal the joint between reflector and refractor against moisture, dirt, and insects.

Provide reflector assembly which latches directly to the universal bead with aluminum or corrosion-resistant steel latches, with latches and seating flange to provide a seal against moisture, dirt, and insects.

2.2.7 Incandescent Lamps

Provide the following incandescent lamps:

a. General-purpose incandescent lamps - clear or inside frosted.

b. Lamps with wattage ratings up to and including 300 watts- medium brass screw bases.

c. Lamps with wattage ratings in excess of 300 watts- mogul brass screw bases.

Provide special-purpose lamps, including PAR and R lamps as follows:

PAR lamps - clear molded heat-resistant hard-glass bulbs with parabolic aluminized inner-bulb wall reflectors for spotlighting or floodlighting applications.

R lamps - clear soft blown-glass bulbs with silver-deposited, inner-bulb wall reflector for spotlighting or floodlighting applications.

Provide lamps designed for operation on 120-volt, 60-hertz circuits unless otherwise specified.

PART 3 EXECUTION

3.1 INSTALLATION

Install a street-lighting fixture at each location indicated, with lamps of the proper type, voltage, and wattage in each fixture.

Install new lamps immediately prior to completion of the project. Install lamps with the light center at the focal point of the reflector and in the proper burning position.

Submit Installation Drawings for the highway and roadway lighting systems. Indicate on drawings overall physical features, dimensions, ratings, service requirements, and weights of equipment.

Perform Operational Tests in accordance with referenced standards within this section[, in the presence of the Contracting Officer].

3.1.1 Final Field Testing

Perform demonstration to verify street lighting operates satisfactorily in the presence of the Contracting Officer, after sunset.

-- End of Section --