

EXTERIOR LIGHTING STANDARD

Date August 22, 2012

Rev. No. 2

Introduction:

This standard is intended to provide direction for architects, engineers, planners, contractors and service personnel with regard to a consistent and comprehensive exterior lighting standard. This standard is applicable to all projects. As a primary goal this standard seeks to meet the requirements set forth for light trespass and night sky access for all projects.

Purpose:

This document addresses standards for exterior lighting used for walkways, roadways, parking lots and other outdoor lighting applications. The intent of this standard is to ensure proper lighting levels, lighting quality, fixture appearance, and overall lighting standardization. Reduction of light trespass from campus, reduction of sky-glow to increase night sky access, improved nighttime visibility through glare reduction and reduced development impact from lighting on nocturnal environments is also addressed as required for LEED compliance and as practical by this standard.

Standard Poles and Fixtures:

Walkways

Typically the University's Campus Standard light pole and fixture will be as currently supplied by Sternberg Vintage Lighting consisting of a 12' cast aluminum pole with

MS805ALED / 7312TO / 4ARC45T5 / CTA (63 watt LED, 4500K) / Silver Fixture and Dark Bronze Duranodic pole finishes / Clear Textured Acrylic (CTA) lens /solid top fixture

Existing installations likely consist of similar poles and fixtures;

MS805A6GT / 7312TO / with either 150PSMHMT or 175PSMHMT (150 watt or 175 watt multi-tap ballast) RE5G / Medium Base Lamp / Silver Fixture and Dark Bronze Duranodic pole finishes / Frosted Glass Lens/ open top

In general lamps operate at 208 VAC single phase and are spaced nominally 80' on center.

Roadways

The current University standard is a Kim CCS21 fixture(s) on a 5" or 6" round aluminum pole, dark bronze (height from 25-30') depending on application, 140 watt LED, and typically at 100' spacing.

Prior to 2011 the roadway standard was a Gardco CA-22 fixture on a 5” round pole of 25’-30’ height. These are full cutoff fixtures with 250 watt metal halide lamps.

In certain applications the Campus Standard described in the Walkway section is also used for roadways.

In general fixtures operate at 208 VAC single phase and are spaced 80-100’ on center.

Parking Lots

The current University standard is a Kim CCS21 fixture(s) on a 5” or 6” round aluminum pole, dark bronze (height from 25-30’) depending on application, 140 watt LED, and typically at 100’ spacing.

Prior to 2011 the parking lot standard was a Gardco CA-22 fixture on a 5” round pole with 20-30’ heights. These are full cutoff fixtures with either 250 watt or 400 watt metal halide lamps.

In general fixtures operate at 208 VAC single phase and are spaced based on lighting design criteria.

Other

Building mounted lighting are discouraged unless absolutely necessary. LED type fixtures are preferred. Decorative entry identification fixtures are acceptable. Wall packs are prohibited.

There is not specific standard fixture, but a variety of Herwig lighting fixtures that have been used including:

128	129	193	218
231	901	902	
A-150	A-227	B-227	B-241
B-543	BG-243		
C-129	C-230	G-166	G-251
G-491	G-492	G-493	G-508
#14 Decco 540			

Systems and Controls

1. Site Lighting systems shall typically be designed based on a three phase lighting circuit with individual fixtures connected uniformly (single phase loads) on each of the three phases of the lighting circuit.
2. 208 V three phase circuits are typical such that a common source also supporting any 120V convenience loads can be provided, while reducing currents and minimizing voltage drop on lighting circuits.
3. Typically 30A circuits are used providing appropriate lighting control configurations.

4. Conduit systems consisting of either 1" or 2" Schedule 40 PVC shall be used based on the largest size practical to enter and exit a given pole base. Typically the Campus Standards are 2" and the other smaller poles are 1".
5. All circuits shall include a ground and a neutral conductor. All empty conduits shall include a pull string.
6. Pole locations that provide a potential for future extension shall include at a minimum at least one spare conduit stubbed for future use.
7. Conduits from pole to pole shall be routed where possible under sidewalks and on the backs of curbs to allow for maximum planting areas for landscape materials.
8. Three-phase electrically held lighting contactors using either time clocks, photocells or both shall be employed to control the hours of operation of lighting.
9. Elapsed time meters are to be provided to track hours of operation on each circuit.
10. Light pole bases shall be per UND standard details available from the Utilities Department and shall include proper grounding and reinforcement.
11. Sports lighting applications shall use electrically operated, mechanically latching contactors.
12. Photocell controls shall be provided as single units mounted near the lighting controls and will be multiplexed to operate multiple contactors. Individual circuit or fixture mounted photocells are not permitted.
13. Outdoor lighting controls shall be installed in low profile cabinets and shall include additional convenience power.
14. Outdoor control panels shall include cabinet heat sources to ensure the integrity of the installed components by preventing condensation. Heaters or lights used for heating shall be rated at least twice the circuit voltage (240V heaters connected to 120V or two lamps in series on a 120V circuit) to ensure long life.
15. All underground conduits entering either a low profile outdoor control cabinet or an indoor control cabinet shall be sealed to prevent the entrance of either water or humid air into the cabinets.
16. Additional spare conduits shall be run in consideration of future expansion or changes to an outdoor lighting system.
17. Handholes, pre-cast type such as manufactured by Quazite or an approved equal shall be provided for periodically to support cable pulling, future expansion, or transitioning to multiple loads. Typically, handhole covers are stamped "ELECTRIC"..
18. Exterior lighting systems commonly include periodic pole mounted (interior) convenience outlets, power to security phones, traffic gates and traffic signals. Any telecommunications wiring associated with these devices may also be run in common trenches, but shall be in their own raceway system including appropriate handholes.

19. Poles shall be labeled using the Utilities Department standard numbering system which denotes a pole and fixtures location, source of power and circuiting. Contact the Utilities Department for further details.

LEED Compliance

Environmental Zone Designation:

Upon determination of a project boundary the designer shall determine and designate the environmental zone as defined by IESNA RP-33.

LZ1:	Dark (Park and Rural Settings)
LZ2:	Low (Residential Areas)
LZ3:	Medium (Commercial/Industrial, High Density Residential)
LZ4:	High (Major City Centers, Entertainment Districts)

Establish applicable site boundaries

Once the environmental zone designation has been established, the applicable site boundaries shall be determined as follows per the established environmental zone:

LZ1:	The inner boundary shall coincide with the real campus boundary. The outer boundary shall extend 10' beyond the inner boundary.
LZ2:	The inner boundary shall coincide with the real campus boundary except where the campus abuts a public right of way in which case the inner boundary shall extend to the curb line. The outer boundary shall extend 10' beyond the inner boundary.
LZ3 & LZ4:	The inner boundary shall coincide with the real campus boundary except where the campus abuts a public right of way in which case the inner boundary shall extend to the curb line. The outer boundary shall extend 15' beyond the inner boundary.

For All Zones: Where a single luminaire illuminates the intersection of a campus driveway and a public roadway, the inner boundary shall be extended to the centerline of the public roadway for a length of 2 times the driveway width centered at the centerline of the driveway. The outer boundary shall be extended 10' (15' for LZ3 or LZ4) beyond the inner boundary.

Light Pollution – Sky Glow

A site lumen calculation shall be conducted to verify that the maximum sky glow threshold, based on the environmental zone designation. The sky glow thresholds by zone are summarized as follows.

LZ1:	0%
LZ2:	2%
LZ3:	5%
LZ4:	10%

Light Pollution – Light Trespass

Once the preliminary exterior lighting design has been completed and if required to demonstrate LEED compliance a photometric analysis shall be prepared to confirm that the horizontal and vertical illuminance thresholds at the inner and outer boundaries, relative to the established environmental zone designation are not exceeded. This analysis should exclude lighting for athletic play areas. Illuminance thresholds by zone designation are as follows:

LZ1: Inner boundary: 0.01 horizontal and vertical footcandles

LZ2: Inner boundary: 0.10 horizontal and vertical footcandles
Outer boundary: 0.01 horizontal footcandles

LZ3: Inner boundary: 0.20 horizontal and vertical footcandles
Outer boundary: 0.01 horizontal footcandles

LZ4: Inner boundary: 0.60 horizontal and vertical footcandles
Outer boundary: 0.01 horizontal footcandles

For projects with athletic play area lighting, conduct a separate photometric analysis which includes such lighting to confirm that the horizontal and vertical illuminance thresholds at the inner and outer boundaries, relative to the established environmental zone as summarized below, are not exceeded.

LZ1: Inner boundary: 0.10 horizontal and vertical footcandles
Outer boundary: 0.01 horizontal footcandles

LZ2: Inner boundary: 0.30 horizontal and vertical footcandles
Outer boundary: 0.01 horizontal footcandles

LZ3: Inner boundary: 0.80 horizontal and vertical footcandles
Outer boundary: 0.01 horizontal footcandles

LZ4: Inner boundary: 1.50 horizontal and vertical footcandles
Outer boundary: 0.01 horizontal footcandles

All sports lighting that is publicly controlled shall include automatic features prohibiting operation during daylight hours and to provide for a specific shutdown time. Specific shutdown times shall be dependent of the application and use. User initiation during periods when lighting is permitted to be used shall require manual initiation and will provide a fixed duration of lighting without reinitiating the control system to avoid extended illumination without use. Typically 90 minutes of service per initiation will be provided with shutdown of systems typically occurring at 12 AM. For facilities used for events or under the exclusive control of authorized personnel either the controls will include override features to avoid event disruptions or they will have no automatic shutdown controls.

Lighting Power Density

Once the preliminary exterior lighting design has been completed, a lighting power density analysis shall be performed in accordance with ASHRAE 90.1-2007 Section 9 to confirm that the tradable and non-tradable lighting power densities are compliant with the maximum levels established by table 9.4.5 within the standard.

Compliance

Once the preliminary exterior lighting design has been completed, the design may be finalized only if compliance with the Light Pollution (sky glow and light trespass) and the Lighting Power Density requirements is met.

MS805A / MS805B LED MAIN STREET

SPECIFICATIONS

LUMINAIRE DESIGN

- The luminaire shall be a modern replica of a popularly styled octagonal fixture, available with (A) or without (B) decorative spikes.
- The luminaire shall be 16" (17 1/2" on the diagonal) and 38" tall.
- The luminaire shall be appointed with a cast aluminum 6 1/2" decorative spiked finial.
- The luminaire shall have LED light sources with roof mounted, down-lighting optics.
- The luminaire shall be ETL or UL Listed and comply with UL 1598 wet location standards as well as UL 8750.

POST FITTER

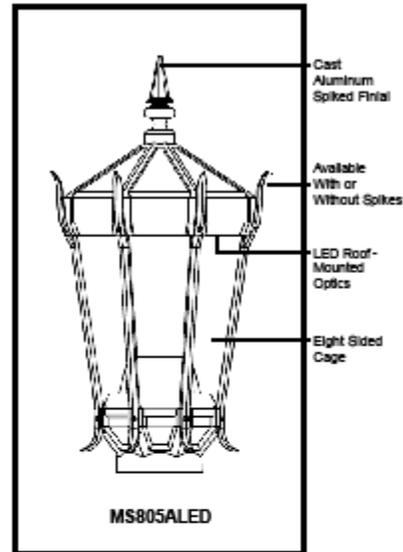
- The fitter shall be heavy wall cast aluminum for high tensile strength.
- The fitter shall have an inside diameter opening to attach to a 3", 4", 5", 6" or 7" pole or tenon.
- When ordered with a Sternberg pole, the fitter shall be attached by set-screw to the pole top or tenon.

DRIVER

- The LED driver shall be securely mounted inside the fitter, for optimized performance and longevity.
- The LED driver shall be supplied with a quick-disconnect electrical connector on the power supply, providing easy power connections and fixture installation.

LIGHT SOURCES

- The luminaire shall use high output, high brightness LEDs.
- The LEDs shall be mounted in arrays, on printed circuit boards designed to maximize heat transfer to the heat sink surface.
- The LED arrays shall be roof mounted to minimize up-light.
- The LEDs shall be attached to the printed circuit board with not less than 90% pure silver to insure optimal electrical and thermal conductivity.
- The LEDs and printed circuit boards shall be protected from moisture and corrosion by a conformal coating of 1 to 3 mils.
- The LEDs and printed circuit board construction shall be environmentally friendly and 100% recyclable. They shall not contain lead, mercury or any other hazardous substances and shall be RoHS compliant.
- The LED life rating shall be determined in accordance with LM-80-08.



LIST NO.
MS805A /
MS805B LED
MAIN STREET
SERIES

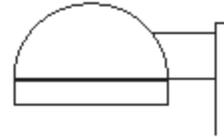
Notes:

Job:

Type:

FORM 10 ROUND

CA/MA ARM MOUNT



GENERAL DESCRIPTION: The Gardco Round arm mounted Form 10 products are cylindrical (CA) or semi-spherical (MA) sharp cutoff luminaires using high intensity discharge lamps up to 1000 watts (400w in the MA). Housings are one-piece seamless spun aluminum and finished with either Architectural Class 1 anodizing or electrostatically applied polyurethane. Luminaires can accept one of eight (8) interchangeable and rotatable precision segmented optical systems.

ORDERING

PREFIX	CONFIGURATION	DISTRIBUTION	WATTAGE	VOLTAGE	FINISH	OPTIONS

Enter the order code into the appropriate box above. Note: Gardco reserves the right to refuse a configuration. Not all combinations and configurations are valid. Refer to notes below for exclusions and limitations. For questions or concerns, please consult the factory.

PREFIX

CA17	17" Diameter Cylindrical Luminaire
MA17	17" Diameter Semi-Spherical Luminaire
CA22	22" Diameter Cylindrical Luminaire
MA22	22" Diameter Semi-Spherical Luminaire

CONFIGURATION

1	Single Assembly	3	Triple at 90°
2	Twin Assembly	3@120	Triple at 120°
2@90	Twin Assembly at 90°	4	Quad Assembly

DISTRIBUTION

Horizontal Lamp	
1	Type I
3	Type III
4X	Type IV (22" luminaires only)
FM	Type IV
Q	Type V

Vertical Lamp

VS Type V

Supplied with acrylic sag lens. Medium base only on 17" luminaires only.

FC3V* Type III, Full cutoff

FCVS* Type V, Full cutoff

*22" 320PSMH only. Supplied with MS32BUVED28LLOPS lamp

WATTAGE

CA17	MA17	CA22	MA22
50MH*	50MH*	250MH	250MH
70MH*	70MH*	400MH	400MH
100MH*	100MH*	1000MH**	250PSMH*
150MH*	150MH*		320PSMH*
175MH	175MH		350PSMH
200MH	175PSMH**		400PSMH
250MH*			450PSMH**
175PSMH**	70HPS		450PSMH*
	100HPS		750PSMH*
	150HPS*		1000PSMH**
70HPS		250HPS	
100HPS		400HPS	
150HPS*		750HPS*	

MY Metal Halide
PSMH Pulse Start Metal Halide
HPS High Pressure Sodium

VOLTAGE

120	240	347	QUAD
208	277	480	120/240/277, Factory tied to 277V.

FINISH

BRP	Bronze Paint	BLA	Black Anodized
BLP	Black Paint	BRA	Bronze Anodized
WP	White Paint	NA	Natural Anodized
NP	Natural Aluminum Paint		
OC	Optional Color Paint		
	Specify RAL designation as shown on CC-RAL704		
SC	Special Color Paint. Specify. Most supply color chip		

- Medium base lamp
- Available with vertical lamp optics only.
- Available with horizontal lamps only.
- Operates 55V lamp.
- Uses 8737 lamps only.
- Furnished standard with Sag Glass Lens.
- Available with 4X and VS optics only.
- MA17 only. Horizontal optics require MS75SPSBUHCR8737 Lamp
- MI32 or MI54
- MI52 or MI54
- MI55 or MI55
- MI57 or MI52
- Horizontal optics only.

14. For 1000w CA22 with 4X optics:

For 1000 Metal Halide, use:

Brand	Product Code	Catalog Number
Venture	53702	MS1000W/HOR/ST/370K
C.E.	18205	MVR1000W/ST/37
Venture	15392	MH 000 WPU/ST/37

For 1000 Pulse Start, use:

Brand	Product Code	Catalog Number
C.E.	10380	MVR1000W/ST/37/PS
Venture	49111	MS1000W/HOR/ST/PS

WARNING: Use of other lamps voids warranty

OPTIONS

HS	Internal House Side Shield Supplied standard w/PM optics	PCR	Photocontrol Receptacle only NA with NA units	PTF2	Pole Top Fitter - 2-3/8" Dia. Tenon
F	Fusing In Head NA above 400w	POLY	Polycarbonate Sag Lens In lieu of flat glass. NA w/4X optics, 750 or 1000w	PTF3	Pole Top Fitter - 3-3/8" Dia. Tenon
LF	In-Line/In-Pole Fusing	QS	Quartz Standby NA above 400w	PTF4	Pole Top Fitter - 3.5-4" Dia. Tenon
MF	Mount Arm Fitter	SG	Sag Glass Lens In lieu of flat glass Supplied standard w/4X optics and 750/1000w		
PC	Photocontrol and Receptacle NA with NA units or 400w.				

Gardco Lighting reserves the right to change materials or modify the design of its product without notification as part of the company's continuing product improvement program.

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A Genlyte Company

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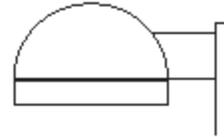
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175MH	175MH		350PSMH
200MH	175PSMH**		400PSMH
250MH*	70HPS		450PSMH**
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	150HPS*		400HPS
70HPS		250HPS	
100HPS		400HPS	
150HPS*		750PSMH*	
		1000PSMH**	
		400HPS	MH
		750HPS*	PSMH
			HPS
			Metal Halide
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PC	Photocontrol and Receptacle <i>NA with NA units or 400w.</i>				

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