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26 56 00_EXTERIOR LIGHTING

PART 1 - DESIGN REQUIREMENTS

1.1 ILLUMINATION LEVELS:

A. Design illumination levels for different activities and spaces shall correspond to those listed below, "LIGHTING LEVEL REQUIREMENTS." These levels are based on the Illuminance Standards found in the 10th Edition of the IESNA Lighting Handbook and IESNA G-1-03 Guideline for Security Lighting for People, Property, and Public Spaces. The designer shall confirm the levels given in the edition of the IESNA Lighting Handbook relevant to the project; any subsequent criteria shall supersede the levels indicated below. For activities not covered by the University standards below, refer to IES recommendations.

SECURITY LIGHTING LEVEL REQUIREMENTS From IESNA G-1-03 *Guideline for Security Lighting for People, Property, and Public Spaces*			
LOCATION	***AVG. MAINTAINED HORIZONTAL ILLUMINANCE (fc), AT GRADE***	***AVG. MAINTAINED VERTICAL ILLUMINANCE (fc), 5 FT ABOVE GRADE***	***HORIZONTAL AVG-TO-MIN UNIFORMITY RATIO***
Building Façade	-	0.5-2	≤ 6:1
University Sidewalk	2	0.25	≤ 4:1
Facial ID	-	0.5-0.8	≤ 4:1
Open Parking Lot	5	1.0	≤ 4:1
Parking Garage	10	1.0-1.5	≤ 4:1
Gathering Point in Parking Garage (Stairs, Elevators, etc.)	10*	--	≤ 4:1

**Measured within a 30 ft radius from the center of the gathering point.*

LIGHTING LEVEL REQUIREMENTS From IESNA *Lighting Handbook Ninth Edition*			
LOCATION	***AVG. MAINTAINED HORIZONTAL ILLUMINANCE (fc), AT GRADE***	***AVG. MAINTAINED VERTICAL ILLUMINANCE (fc), 5 FT ABOVE GRADE***	***HORIZONTAL AVG-TO-MIN UNIFORMITY RATIO***
Building Entrance (Active)	5	3	≤ 6:1
Building Entrance (Inactive)	3	3	≤ 4:1
Loading Dock	10	3	≤ 4:1
Exterior Egress Path	2-3	1	≤ 4:1

Note: While The IESNA Lighting Handbook addresses a variety of issues in determining recommended illuminance values, in G-1-03 it addresses security as the only issue and deals with areas primarily away from buildings. Therefore, values taken from G-1-03 shall be treated as minimum values. Values taken from the Lighting Handbook shall be treated as recommended values and closely targeted.

1.2 LIGHT POLLUTION REQUIREMENTS:

A. Design illumination levels shall not exceed the maximum initial illuminances for the different locations that correspond to those listed below, "SITE LIGHTING TRESPASS LEVEL REQUIREMENTS." The designer shall confirm the levels given in the edition of the IESNA Lighting Handbook relevant to the project; any subsequent criteria shall supersede the levels indicated below. For activities not covered by the University standards below, refer to IES recommendations.

SITE LIGHTING TRESPASS LEVEL REQUIREMENTS TO ADJACENT NON-UNIVERSITY PROPER		
LOCATION	***MAX INITIAL HORIZONTAL ILLUMINANCE (fc), AT GRADE***	***MAX INITIAL VERTICAL ILLUMINANCE (fc), FROM GRADE TO HEIGHT OF HIGHEST POLE***
Site Boundary	≤ 0.10	≤ 0.10
15 ft beyond site boundary	≤ 0.01	-

Note 1: For site boundaries that abut public right-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

Note 2: Illuminance generated from a single luminaire placed at the intersection of a private vehicular driveway and public roadway accessing the site is allowed to use the centerline of the public roadway as the site boundary for a length of 2 times the driveway width centered at the centerline of the driveway.

B. The design must show that no more than five percent (5%) of the total initial designed fixture lumens (sum of all fixtures on site) are emitted upward, at an angle of 90 degrees or higher from nadir. The design must also show that for interior lighting, the input power of all nonemergency interior luminaires with a direct line of sight to any openings in the envelope (translucent or transparent) be reduced (by automatic device) by at least fifty percent (50%) between 11 P.M. and 5 A.M. After-hours overrides may be provided by a manual or occupant-sensing device provided the override lasts no more than 30 minutes.

C. "SECURITY LIGHTING LEVEL REQUIREMENTS" take precedence over all other lighting requirements presented in this section.

1.3 LIGHTING POWER DENSITIES:

A. Adjusted power densities for lighting as calculated in ASHRAE 90.1 compliance procedures shall not exceed the ranges outlined below for the different building spaces, in the space-by-space method. These levels indicated below are based on the 2007 edition of ASHRAE 90.1. The designer shall confirm the levels given in the edition of ASHRAE 90.1 that are relevant to the project; any subsequent criteria shall supersede the levels below. For spaces not indicated below refer to the edition of ASHRAE 90.1 that is relevant to the project.

LIGHTING POWER DENSITY From *ASHRAE 90.1 2007*		
	Applications	**Lighting Power Density**
Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas may be traded.)	***Uncovered Parking Areas***	
	-Parking Lots and drives	0.15 W/ft^2
	Building Grounds	
	-Walkways less than 10 ft wide	1.0 W/linear foot
	-Walkways 10 ft wide or greater -Plaza areas -Special feature areas	0.2 W/ft^2
	-Stairways	1.0 W/ft^2

	Building Entrances and Exits	
	-Main entries	30 W/linear foot
	-Other doors	20 W/linear foot
	Canopies and Overhangs	
	-Canopies (Free standing and attached and overhangs)	1.25 W/ft^2
Non- Tradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.)	-Building façades	0.2 W/ft^2 for each illuminated wall or surface or 5.0W/linear foot for each illuminated wall or surface
	-Automated teller machines	270 W per location plus 90 W per additional ATM per location

1.4 LIGHTING FIXTURES:

A. Site lighting fixtures shall be full-cutoff (recommended) or semi-cutoff luminaires, as defined by IESNA. Overall site lighting design shall produce less than 5% upplight, as defined in "LIGHT POLLUTION REQUIREMENTS" above. Fixtures shall be easy to clean, revamp, replace ballast(s) and shall have a low dirt accumulation rate.

B. Site lighting shall use LED light sources with multi-tap fused ballast and vandal resistant hardware. Decorative building façade lighting shall also be LED sources. Where building mounted fixtures are intended to be used for emergency egress lighting, LED fixtures are acceptable.

C. Ground accessible exterior lighting shall be completely vandal-proof in construction. Use vandal resistant hardware at less than 10' above finished grade. There shall be no in-ground, subterranean, or recessed in wall or step lighting installed. Bollard type lights are not to be used. Any deviations from these exclusions shall be brought to the attention of the University for their review and approval early on during the design phase of a project.

D. Use University Proprietary, Hapco, post fixtures only for projects located on the Green, unless otherwise approved.

E. DO NOT leave existing lighting circuits inoperable overnight.

F. DO NOT Install exterior lighting where it will impede snow removal efforts.

1.5 SECURITY BLUE LIGHT FIXTURES:

A. "Blue Lights" for emergency phones (No Deviations), reference LED Section 265100 for additional information on the blue lights and emergency phones.
   1. Killark VSL-16 fixture body
   2. Killark VBG-100 globe – blue
   3. Killark VAG-100 fixture guard
   4. Killark V series boxes and adaptor plates as needed for mounting

1.6 CONTROLS:

A. All exterior lighting fixtures shall be controlled automatically by photocell and astronomical time clock or connected to local building wide lighting control system.

B. Exterior time-clocked controlled lighting shall be controlled by NSI Tork Series DZS (maintained Circuits) or Series DZM (latching circuits).

1.7 LIGHT SOURCE:

A. LED
   1. Design all exterior lighting with LED light source.
   2. Design with 4000K color temperature.
   3. Design with 80 CRI.
   4. Design with bi-level control or dual level switching.

1.8 UNIVERSITY APPROVED MANUFACTURERS:

A. LED
   1. Philips
   2. GE
   3. Cree
   4. RAB

B. POLES
   1. Hapco

PART 2 END OF SECTION