SUNY State University Construction Fund	**Directive: 26-2 Lighting** **Responsible Office: Design & Construction** **Last Revised Date: December 2021**

SUMMARY

This Directive provides the consultants with the requirements of the State University Construction Fund for SUNY projects. The requirements detailed within are to be implemented into the project's specifications and/or drawings. The intent is not for the specifications or drawings to reference back to this document for compliance nor is it intended to override or amend the local or state codes where either is more stringent.

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Section 1 – DEFINITIONS

A. Localized controls system – Single device or group of components controlling the lighting within a single space. Communication is limited solely amongst devices within the space.

B. Networked controls system - A networked lighting control system consists of individually addressable luminaires, or addressable room control modules, allowing for multiple control strategies, programmability, building level control, zoning and rezoning using software and measurement and monitoring.

Section 2 - REFERENCE INFORMATION

A. RELATED FUND DIRECTIVES

1. Refer to Directives of section 1A, Design Phase Guides
2. Refer to Directive 1B-1, Building Codes

B. CODES, STANDARDS, REGULATIONS and GUIDELINES

1. Illuminating Engineering Society (IES): Lighting Library of Standards

Section 3 – INTERIOR LIGHTING

A. GENERAL

1. Design interior lighting to provide flexibility and ease of use. Design shall provide adequate lighting for the intended space use/program while being energy efficient.
2. Design lighting to meet Campus program needs and preferences. See *Directive 1C-10 - Coordination with Individual Campus Standards.*

B. LIGHT FIXTURES (GENERAL)

1. Fixtures shall be of a standard commercial design, without the use of custom fixtures.
2. The number of lamp types used should be minimized to simplify maintenance.
3. Fixtures shall be selected to minimize the need for multiple spare parts.
4. Fixtures shall be easy to maintain, with optical systems that suit the lighting environment.
5. All light sources shall be standard commercial LED type.
6. Access of fixtures for maintenance and servicing shall be addressed and coordinated with the Campus during the design phase. Select and locate fixtures to provide proper Campus access by use of their preferred means and methods.
7. Fixture color temperatures shall be specified and coordinated with Campus standards.

C. EMERGENCY LIGHTING

1. Emergency egress lighting shall be provided by powering select general lighting fixtures via emergency (life-safety) branch circuit, when available.
2. Emergency egress lighting not powered by an emergency generator shall be provided by individual emergency lighting units (on-board battery), integral battery backup on select general lighting fixtures, or powering fixtures via central lighting inverter, selected in coordination with the Campus.
3. Provide emergency lighting in mechanical and electrical rooms and in other spaces where required by the intended space/use program.

D. LIGHTING CONTROLS

1. Per ASHRAE 90.1 with NYStretch Energy Code 2020 provide local manual lighting controls for each space in the building and implement all mandatory control functions.
2. Where ASHRAE 90.1 with NYStretch Energy Code 2020 requires additional control measures, select the function most appropriate to the space.
   a. Corridor lighting (normal and emergency) shall utilize the additional Automatic Full OFF control measure, and occupancy sensing controls.
3. Network-based control systems shall be considered for public areas, lobbies, atriums, etc.
4. Coordinate with Campus during design to establish the type of lighting control systems (Localized vs. Networked) to be used for each space and to determine occupancy schedules. Select the level of complexity of operating controls, access levels and other user interfaces required by the intended space/use program.
5. Where spaces have more than one access point, select and locate switches and controls to provide the level of control preferred by the Campus at each access point.

E. LIGHTING LEVELS AND LIGHTING POWER DENSITY

1. Illumination level for Emergency Egress Lighting
   a. Arranged to provide not less than an average of 1 footcandle, and a minimum at any point of 0.1 footcandles, along the path of egress at the floor level
   b. Lighting Power Density (LPD) shall be in accordance with the ASHRAE 90.1 with NYStretch Energy Code 2020 compliance path used for the project.
   c. Provide lighting levels that support the intended space use/program

F. SUBMISSION REQUIREMENTS

1. Plan Drawings shall indicate fixture layout, switching arrangements, and branch circuiting. Primary and secondary daylight zones shall be shown on the documents.
2. Fixture Schedule: Provide a complete fixture schedule for the project:
   a. Fixture Tag/Name, description, installation method (grid, suspended, etc.), lamp/LED data, input wattage, specific features, or options, manufacturer, and model number.
   b. Three (3) manufacturers must be specified for each fixture selection. See Directive 1C-2 Specification of Materials.
3. Control System Details
   a. Provide wiring/interconnection diagrams for typical control solutions used throughout the project. Diagram shall highlight the wiring interconnections between controllers, occupant sensors, daylight sensors, power packs, and fixtures.
   b. Provide riser diagrams for network-based control systems.
   c. Sequence of operations for each control method used.
4. Code Compliance Documentation
   a. Document the compliance path used for the lighting system, targeted LPD values, and resulting calculated LPD values.
   b. Photometric plans shall be provided to verify that targeted lighting levels have been reached.
5. Specifications
   a. Specifications shall be tailored to suit the project and the chosen system methodology.
   b. Consider the need to require the services of the manufacturer's technical expert(s) and other quality assurance requirements in Directive 1C-2 Specification of Materials.

c. Include requirements for functional testing and demonstration (prior to beneficial occupancy) of maintenance activities, potential lighting scenes, and other operating features that the Campus should be aware of.
d. Coordinate with Campus staff during the design phase to outline training needs prior to beneficial occupancy, and the need for refresher training after beneficial occupancy.

Section 4 – EXTERIOR LIGHTING

A. GENERAL

1. Design outdoor lighting and building façade lighting to provide for the safety, security and comfort of those persons who will be using campus roadways, walkways, and parking areas. Designs should provide adequate lighting while being energy efficient.
2. Coordination: Lighting designs shall be coordinated with the Campus.
   a. Determine if the Campus has standard lighting fixture styles or pole styles that shall be matched to provide a similar aesthetic.
   b. Discuss the need for pole mounted 120V receptacles.
   c. Determine any areas where safety and security are a concern, where increased light levels shall be used.
   d. Coordinate connections to existing control systems with the Campus.
   e. Determine if the Campus has a preference for placement of poles to facilitate exterior maintenance, snow removal or aesthetic pole arrangement.
3. Light Source: All site lighting shall be LED type.
4. Photometric Plans: Submit photometric plans for review with the Design Manual Submission. Photometrics shall be calculated using computer-based software. Plans shall be drawn to scale and contain the following information:
   a. Point by Point lighting values (in footcandles).
   b. Statistics Table: Listing the target design values (Average, Minimum, Maximum, Uniformity Ratios), and the actual values achieved.
   c. Fixture Schedule: List each fixture type, mounting height, fixture wattage, output lumens, IES distribution pattern, and light loss factor.

B. CAMPUS ROADWAY LIGHTING

1. General guidelines in accordance with *IES RP-8-18, Chapter 11.*
2. Illumination Levels: Light levels given are for horizontal footcandles (fc).
   a. Average = 0.9 fc
   b. Average Uniformity Ratio (Average: Minimum) = 3.5:1
   c. Maximum Uniformity Ratio (Maximum: Minimum) = 6:1
3. Roadway Lighting Control: Provide fixtures with photocell control.

C. WALKWAYS

1. General guidelines in accordance with *IES RP-8-18, Chapter 16.*
2. Illumination Levels: Light levels given are for horizontal footcandles (fc).
   a. Average = 1.0 fc
   b. Average Uniformity Ratio (Average: Minimum) = 4:1
3. Walkway Lighting Control: Provide fixtures with photocell control.

D. PARKING AREAS

1. General guidelines in accordance with *IES RP-8-18, Chapter 17.* The design requirements listed below pertain to open parking facilities.
2. Illumination Levels: Light levels given are for horizontal footcandles (fc).
   a. Minimum = 0.2 fc
   b. Maximum Uniformity Ratio (Maximum: Minimum) = 20:1
3. Parking Area Lighting Control: Provide fixtures with photocell control. Where fixtures serving outdoor parking areas have a rated input wattage of greater than 78 W and a mounting height of 24 feet or less; provide additional power reductions controls per ASHRAE 90.1 with NYStretch Energy Code 2020.

E. BUILDING MOUNTED FIXTURES AND FAÇADE LIGHTING, ATHLETIC PLAYING FIELDS:

1. Building façade lighting shall be shielded to the greatest extent possible.
2. Athletic playing field lighting shall be shielded to prevent up light and direct view of the lamps to the greatest extent possible.

F. LIGHTING CONTROLS

1. With Campus and SUCF concurrence, other advanced lighting control methods can be considered where energy consumption is reduced and/or system functionality is increased.

G. MATERIALS AND SPECIFICATIONS

1. Equipment specified shall be of a type available from three (3) manufacturers with replacement parts normally stocked and readily available. Specifications shall list manufacturer's catalog number.
2. Provide fuses mounted in the base of the pole to protect individual fixtures.

H. INSTALLATION

1. Install wiring in minimum 1" non-metallic conduits with 30" minimum cover.
2. Provide reinforced concrete structural bases for poles. Design of structural bases shall be included in the project design.
   a. Where structural bases are subject to physical damage, base shall extend 30" above grade (min.) and shall extend below the frostline.
   b. Where structural bases are in a grass or landscaped area base shall extend 6" above grade.
   c. Poles adjacent to campus roadways shall be breakaway type or protected by a barrier.
   d. The pole attachment surface of the structural base shall be larger than the pole base by at least 1 inch.
3. Pull boxes and manholes located in pave areas shall be designed to accommodate H-20 vehicular loadings.
4. 277V or 480V branch circuits are preferred.
5. Prepare voltage drop calculations for site lighting circuits, limited to 5% maximum drop.
6. Specify underground utility marking tape, buried directly above conduits.
7. If pole mounted 120V receptacles are required, provide GFCI duplex receptacles with weatherproof while-in-use cover, connected to a separate 120V branch circuit.