PART 1: GENERAL

1.01 SUMMARY

A. This Section provides the University guidelines for the installation of Emergency Lighting Systems.

B. This standard was developed primarily to address the design and installation of emergency lighting equipment to support emergency egress from within a facility out to the public way. The intent is to meet compliance requirements for lighting the path of egress and to minimize the effort required in maintenance and testing of lighting equipment.


D. Any proposed deviations from this standard must be submitted in writing to Cornell University Facilities Engineering (CU FE) for review and approval.

1.02 OBJECTIVE OF STANDARD

A. The objective of this standard is to provide guidelines for designing an emergency lighting system that will allow safe egress from the building in the event of loss of power. This shall be accomplished using the following DESIGN considerations:

1. Provide system incorporating features that minimize maintenance and testing requirements. Testing will be performed as required by the latest adopted version of the Fire Code of New York State (FCNYS); design will be performed in accordance with the latest adopted version of the Building Code of New York State (BCNYS).

   a. Buildings with generators – Reduce or eliminate the use of battery backup devices in buildings utilizing generators; connect all exit and emergency lighting to the building generator.

   b. Buildings without generators – Exit signs and emergency lights with batteries are acceptable if in compliance with this standard.

2. Consider centralized systems for supplying power to emergency lighting in buildings where possible (connected to an Emergency Power Supply System (EPSS) or via central battery unit).
3. Provide exterior egress and emergency lighting to the public way as defined by the BCNYS and as identified by the Authority Having Jurisdiction (AHJ).
4. Be energy efficient, utilizing minimum lighting levels for 'always on' night lights.
5. Provide emergency lighting that activates upon a loss of branch circuit power within the space in which the fixture is installed.
6. Provide 'NORMALLY OFF' emergency lighting in lecture/classrooms above 49 occupants.

1.03 SYSTEM DESIGN PLANNING

A. It is the Consultant’s responsibility to prepare a code-compliant emergency lighting design and submit it to the Project Manager and CU FE for review before completion of the Contract Documents. Coordinate the following system design elements with the Project Manager and representatives from CU FE in a basis of design document:

1. List applicable Codes and Standards with Editions used in the system design, including applicable versions of the Building Code of New York State (BCNYS), Fire Code of New York State (FCNYS), and NFPA 101 Life Safety Code. Identify building occupancy type.
2. The Consultant shall verify that all applicable portions of these standards are incorporated into the project's design drawings, specifications and final construction.
3. Requests for variances from these Standards shall be submitted in writing to the Project Manager for review and written direction from CU FE.

1.04 DESIGN DOCUMENTATION

A. The Consultant shall provide anticipated emergency lighting illumination levels to CU FE for review prior to completion of design documents.

1. This data shall be provided in electronic format using lighting software such as AGi32 Lighting Analysts or equal.
2. Data shall depict compliance with the performance requirements identified in this standard, including:
   a. Means of egress paths
   b. Illumination levels:
      i. Average
      ii. Minimum
      iii. Max:min ratio

B. Determine and identify the system connection type.
C. At the completion of the project, provide small scale plan(s) identifying any emergency lighting equipment battery units and their type(s) for record and testing purposes.

1.05 SYSTEM CONNECTION

A. In new buildings with generators:
   1. Battery back-up units shall not be installed on generator powered circuits unless required by the BCNYS. If installed, battery back-up units must be installed in a manner that will allow the units to be accessible for maintenance and testing; remote testing capability shall be provided where units cannot be made readily accessible as defined by the NEC.

B. In existing buildings with generators:
   1. For renovation projects or one-for-one retrofit/replacements where exit and emergency lighting is minor in scope, every attempt shall be made to eliminate battery back-up units and replace with non-testable units circuited to emergency power.

C. In new buildings without generators:
   1. For small buildings or facilities (those with minimal emergency loads), provide replacement units with battery backup as required by this standard. For larger buildings or facilities, a life cycle cost analysis (including maintenance costs) should be performed to determine if battery pack sources or central inverters would be the most cost effective source for emergency systems.

D. In existing buildings without generators:
   1. Provide replacement units with battery backup as required per this standard.

1.06 SYSTEM PERFORMANCE

A. General: Illumination values described herein shall be foot-candles measured at the floor level in accordance with the latest adopted version of BCNYS.

B. Emergency Egress lighting shall exceed the following minimum illumination levels prescribed by BCNYS measured along the path of egress:
   1. Initial average of 1 foot-candle (fc).
   2. Minimum of 0.1fc at any point.
   3. 40 to 1 maximum-to-minimum illumination ratio.
4. Illumination levels shall be permitted to decline to 0.6 foot-candle average and a minimum at any point of 0.06 foot-candle at the end of the emergency lighting time duration of 90 minutes.

C. At the conclusion of the project, egress and emergency lighting levels shall be verified during commissioning and testing. Systems MUST meet minimum lighting levels after 90 minutes. Documentation of measurements and testing shall be provided to Project Manager via electronic media.

1.07 DESIGN CRITERIA

A. The Designer shall use the following criteria as guidelines in evaluating and selecting a system with the appropriate functional performance for the specific project circumstances. Consideration shall be given to replacing existing fluorescent emergency lighting fixtures with LED fixtures with battery ballasts. System types by order of preference:

B. ALWAYS ON (NIGHT LIGHT) SYSTEM - Emergency and egress lighting utilizing the general lighting system connected directly to the emergency power source through an emergency power automatic transfer switch (ATS).

Note that facility exit signs, fire alarm, egress elevators, fire pumps and all life safety associated equipment may be connected to the same ATS. Any other loads shall be on their own transfer switch per the National Electrical Code (NEC). Circuits will be verified by CU FE.

1. Classrooms and Lecture rooms (defined Assembly spaces): Utilize normally off emergency lighting with smart, self-diagnostic battery packs or room lighting on relay control devices connected to the local unswitched/undimmed leg of the lighting circuits. Fixtures must be labeled where they are connected to relay control devices.

2. Egress lighting in normally off areas: Provide minimum lighting at egress paths within rooms or areas in Assembly occupancies of over 49 where normally-off emergency lighting is used. Wall LED floor wash lighting or strip/rope lighting is recommended to be circuited to the emergency lighting circuit.

3. Relay controlled lighting for normally off areas must be labeled at each room. These devices require 30 day and annual testing. Provide signage as described in this standard.

4. Exterior Emergency Lighting: Provide at all required building exits and to the public way. Consult with the AHJ in advance of design for specific requirements. Luminaires shall be connected to emergency power, switched off during the day with photo cell or other automatic control.

5. Stairwells: Recommend two circuits feed alternate luminaires if the emergency lighting is served by an on-site generator.
6. Theatrical Dimmed Lighting systems require egress lighting per code. Emergency lighting shall be connected to a UL 924 labeled system relay integrated into the system. Provide test information and label fixtures connected to relay. All auditorium lights must come up to full brightness upon activation of the Fire Alarm System.

C. NORMALLY-OFF EMERGENCY LIGHTING: Self-contained individual or tandem smart self-diagnostic battery packs connected to local lighting circuit. This system requires exhaustive testing every 30 days and is not to be used without permission from CU FE.

1. Concealed 'pop out' luminaires are not to be used.
2. Integrated emergency ballast type fixtures are not to be used.
3. Classrooms and Lecture rooms shall use smart, self-diagnostic battery packs.
4. Aisle lighting in assembly occupancies - Wall LED, floor wash lighting or strip/rope on normal power not switched.
5. Egress lighting (night lights) - Provide non-switched lighting throughout exit path including stairwells, restrooms and exterior paths.
6. Exterior Emergency Lighting - Remote heads that are fed from indoor smart, self-diagnostic combo exit units with battery packs.
7. Stairwells - Provide smart, self-diagnostic battery packs.

D. EXISTING LIGHTING SYSTEM RETROFIT INSTALLATION FOR ALWAYS-ON (NIGHT LIGHT) SYSTEM

1. This system would re-circuit existing lights to a separate, (always-on) circuit connected to an emergency generator. In this system, it is imperative that the lighting levels be at the minimum design criteria since they will be on 24 hours a day. This is generally the most economical system since existing lighting circuits are not easily re-grouped for control purposes.
2. Classrooms and Lecture rooms with over 49 occupants shall have self-testing/self-diagnostic battery packs. Review with CU FE on a normally off shunt relay option.
3. Exterior Emergency Lighting: Provide at all required exits up to 30 feet away from building or to the public way. Lighting circuits serving exterior luminaires should be connected to emergency power, switched off during the day with photocell or other automatic control.
4. Stairwells: Provide minimal lighting to meet code, recommend two level lighting or alternate fixture two circuit wiring. Try to capture the existing lighting circuit and change light fixtures as needed. Remove switches to existing circuits. Egress and emergency lighting shall not be switched.
5. Theatrical Dimmed Lighting Systems require egress lighting per code, and emergency lighting connected to a UL labeled system relay integrated into the system. Provide test information and label fixtures connected to relay.

1.08 FIXTURE LOCATION

A. As new or replaced exit signs or battery packs are located for illumination along the path of egress, consider ease of testing when selecting mounting heights. Testing shall be by visual confirmation of self-testing, self-diagnostic (ST/SD) LED indicators and always within code requirements. Order of preference is as follows:

1. Locate unit where it can be tested by a (average height) person standing on the floor.
2. Locate unit where it can be tested with the aid of a 6-ft ladder.
3. If the unit cannot be located within “easy access,” provide for remote testing. Instruct contractor to provide tester for new systems.

PART 2: PRODUCTS

2.01 GENERAL

A. The University has standardized on Simkar exit and emergency lighting products for durability, to reduce the number of different manufacturers/models, and to simplify the testing requirements of campus emergency lighting equipment. This includes exit signage, wallpacks and combination exit/wallpack units. Other units may be considered by CU FE based upon their ability to perform equally to the units specified herein.

B. Where emergency lighting equipment is equipped with battery backup, the ST/SD option must also be included. This will allow for a visual inspection of the equipment rather than a manual test of equipment during monthly code required tests.

C. All emergency luminaires connected to a standby power source (without battery backup) shall be labeled with a 1” diameter permanent red DOT.

2.02 EXIT AND EMERGENCY LIGHTS

Exit and Emergency Lights shall be provided by Simkar or Cornell Approved Lithonia Equal. Simkar model numbers shown below for each Exit and EM lighting type for reference.
A. Exit, AC only, non-testable: Simkar SLEDARW (white housing, red lettering, LED, 5 year warranty).

B. Exit with battery back-up, testable, self-diagnostic: Simkar SLEDWRW-SD

C. Emergency (wallpack) light Simkar DLMW-SD

D. Emergency (wallpack) light self-diagnostic, remote head capable: Simkar DLMW-SD-RC

E. Remote head (to be fed from remote head capable self-diagnostic wallpacks): DLHR1W-SD-WP

F. Combination exit/emergency self-diagnostic: Simkar SCLD2RW-SD

G. Combination exit/emergency self-diagnostic, remote head capable: Simkar SCLD2RW-RC-SD

H. Remote Head (to be fed from remote head capable self-diagnostic combination units): DLHC1WSDT-WP

I. Simkar catalog number description:
   - SD is self-testing, self-diagnosing type
   - RC is remote head capable
   - WP is for weather proof - omit for indoor use
   - 1 – single head, 2 – double heads
   - The remote heads need to be specified for a unit that is self-diagnostic and remote head capable.

J. Exit discharge (exterior): New exit discharge lights shall be LED type. Connect to emergency power where available. In non-generator buildings without an inverter system, consider connecting luminaire to battery source inside to facilitate maintenance and reliability. No HID will be permitted due to restrike limitations.

2.03 CENTRAL BATTERY UNIT

A. Equipment shall provide capacity for 90 minute run time at full load and shall be capable of supplying any existing H.I.D, fluorescent, and incandescent loads.

B. Final equipment size shall allow for 20% future load growth.

C. Consideration during design shall include internal maintenance bypass switch, system monitoring terminal, and remote system status/monitoring tools.

D. Unit shall be supplied by:
   1. Dual-Lite
   2. Myers Power Products
   3. Crucial Power Products
   4. Approved equal.
2.04 BATTERY BALLAST

A. Battery ballasts are generally not preferred due to their limited lumen output in a power outage condition. LED EM lights with battery ballasts may be acceptable, however. Consultant shall provide emergency lighting levels from any selected battery ballast luminaire for review by CU FE.

B. Any luminaires supplied with battery ballasts shall be mounted such that test switches are remotely located and/or visible from the ground level looking up to the luminaire.

C. Manufacturer: Bodine.

2.05 RELAY CONTROL DEVICES

A. Relay transfer devices are intended to automatically switch between the normal utility source and the standby source (typically a generator) on a power outage. They allow for the independent control of luminaires/circuitry, eliminating conventional, unswitched “night light” luminaire installations.

B. Relay transfer devices are installed only where there is a need for independent control of the luminaire by a lighting control system in assembly areas as a result of a power outage which would require a full “on” luminaire to provide egress illumination.

C. Consideration must be given to locating any of these relay control devices for ease of access and inspection. Co-locate multiple devices in electrical closets to permit any code required testing.

D. Provide a sign identifying the location of each relay control device. The sign shall be gray with red letters, 4 1/2 inches wide (the width of double gang wall switch) and 2 inches high; text 1/4" high minimum, located in coordination with the Project Manager. Sign shall state the following:

   EMERGENCY LIGHTING PROVIDED
   TO TEST (REQUIRED MONTHLY)
   TRIP CIRCUIT _____ AT PANEL _____
   PANEL LOCATED IN ROOM_______

E. Provide information on the selection of this equipment to CU Facilities Engineering as soon as possible in order to facilitate the design and location of equipment and signage.

F. Bodine.
PART 3: EXECUTION

3.01 TESTING AND COMMISSIONING

The University has implemented a campus-wide emergency lighting testing program. The routine exercising and operation of the equipment is administered through the campus asset management system, or directly through Campus Life Facilities, and consists of a custom plan for each facility directing personnel where to test and log each piece of equipment. The testing and commissioning of the emergency lighting system following installation is an integral part of the overall testing program. The consultant shall ensure that the following items are provided as part of the testing and commissioning of the installed emergency lighting system components:

A. Test all new units for proper operation and to verify that illumination levels are met at the end of a 90-minute duration. Document test date and results.

B. Verify that battery charging occurs on battery powered units.

C. Label every unit with source power panel name and circuit number.

D. Consultant shall ensure that the contractor provides them with a complete list of EML assets installed. This list shall be provided to Cornell in Excel format. The consultant shall provide Cornell with As-Built/Record Drawings reflecting the information on the list, as follows:

1. Panel names, location, and panel circuit numbers for each emergency lighting unit (EML) including but not limited to Inverters, Central Battery Units, Wallpacks, Exit Signs, Combo Units, Remote Heads, and shunt trip relays.

2. For Generator Buildings where EML’s are served by the generator, provide the following items to the Project Manager:
   a. As-built drawings indicating the source emergency circuit panel name, panel location and circuit number[s] serving EML’s.
   b. Electronic list, in spreadsheet format, of EML locations, model numbers, date purchased, date installed, room location, source panel name, and source circuit.
   c. In the field, designate EML lights that are on generator power by installing a red dot on each unit.

3. For Non-Generator Building, provide the following items to the Project Manager:
   a. As-built drawings indicating the source emergency circuit panel name, panel location and circuit number[s] serving EML’s.
   b. Electronic list, in spreadsheet format, of EML locations, model numbers, date purchased, date installed, location, source panel name, and source circuit.
c. If unit is a remote head, the location and name of the remote source battery supply or combo unit.

4. Remote Test Equipment locations.