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 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, per code.
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) 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 SECTION CONNECTION

A. In buildings with generators - New Construction:
   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.
   2. For additional information on generator requirements see Cornell Standard 16620 Emergency Power Systems.

B. In buildings with generators - Existing Facilities:
   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 buildings without generators - New Construction:
   1. For small buildings or facilities (those with minimal emergency loads), a life cycle cost analysis (including maintenance costs) should be performed to determine if battery pack sources, central inverter or a generator set source would be the most cost effective source for emergency systems.

D. In buildings without generators - Existing Facilities:
   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-candies 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. University’s experience from previous projects with building luminaires connected to the facility generator as emergency egress lighting is that the range shall be an average of between 2 and 3 foot-candles, with a minimum level of 0.5 foot-candles and a maximum level of 15 foot-candles. A level of 15 foot-candles directly below a
fixture would allow for a 1 foot-candle minimum between fixtures, which stays within the max-to-min ratio as required by code.

D. 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.

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. Systems utilizing emergency ballast type fixtures shall only be allowed with special permission from CU FE. System types by order of preference:

B. ALW AY S O N (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 over 49 where normally off emergency lighting is used. Wall LED floor wash lighting or strip/rope lighting is recommended circuited to the emergency lighting circuit.

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

4. Exterior Emergency Lighting: provide at all required exits up to 30 feet away from building or to the public way, whichever is furthest from the building. 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, and emergency lighting connected to a UL labeled system relay integrated into the system. Provide test information and label fixtures connected to relay.
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. Egress 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 - Smart, self-diagnostic 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 over 49 occupants shall have self-testing/self-diagnostic battery packs. Review with CU FE on a normally off 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 may be manual pushbutton or visual
confirmation of LED indicators, in order of preference and always within code requirements:

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, wall packs and combination exit/wall pack units. Other units may be considered by CU FE based upon their ability to perform equally to the units specified herein.

B. It is important that where emergency lighting equipment is equipped with battery backup, the self-testing/self-diagnostic (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

A. Exit, AC only, non-testable: Simkar SLEDARW (white housing, red lettering, LED, 5-year warranty).

B. Exit with battery back-up, testable: Simkar SLEDBRW-SD.

C. Emergency (wall pack) light: Simkar SEMW/SD.

D. Combination exit/emergency: Simkar SCLI2RW-SD.

E. Exit discharge (exterior): an LED type product is preferred. 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 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. 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. Preference is given to ST/SD type which automatically tests for 30 seconds each month and 90 minutes annually, and illuminate an LED and provide an audible alarm in the event of issues.

D. Manufacturer: Bodine RediTest, or approved equal.

2.05 RELAY CONTROL DEVICES

A. Recent installations on projects have included the installation of relay transfer devices, which 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. Generally, this equipment would be installed only where there is a need for independent control of the luminaire by a lighting control system in assembly areas, and 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:

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EMERGENCY LIGHTING PROVIDED
TO TEST (REQUIRED MONTHLY)
TRIP CIRCUIT _____ AT PANEL _____
PANEL LOCATED IN ROOM_______
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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 GTD, or approved equal.

PART 3: EXECUTION

3.01 COMMISSIONING

A. Test all new units for proper operation and to verify that illumination levels are met at the end of a 90-minute duration. Where appropriate, verify that battery charging occurs.

B. Label every unit with power panel and circuit identification.

3.02 ROUTINE EMERGENCY LIGHTING TESTING PROGRAM

A. The University has implemented a campus-wide emergency lighting testing program in the Ithaca campus facilities.

B. 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.

C. Consultant shall be responsible to provide the final location of all emergency lighting equipment, types installed, and the method for testing equipment to the Project Manager.