SCA Lighting Upgrade Options Assessment

Public Report

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THE NEW YORK CITY
SCHOOL CONSTRUCTION AUTHORITY
Long Island City, NY

Report Prepared by

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1 Executive Summary

OLA Consulting Engineers (OLA) was requested by the New York City School Construction Authority (NYC SCA) to investigate the existing lighting at an example public school in Queens, NY (referred to as School A) and a public school in Bronx, NY (referred to as School B). School A, which is 120,000 square feet, and School B, which is 35,000 square feet, are schools for students from grade Pre-K through 8th grade. OLA investigated the existing lighting configuration throughout the schools to determine the potential cost and energy savings available from both retrofit and new fixture upgrades as well as lighting controls upgrades.

The objective of this lighting assessment is to provide potential options for LED lighting upgrades through retrofit replacements and through new fixture replacements rather than through a full lighting redesign. SCA is interested in analyzing the savings from both a lighting retrofit and a new fixture lighting upgrade to determine the optimal approach for these and potentially other schools.

In comparing the retrofit versus new fixture options for the two schools, it was found that even though the material cost for the retrofit lighting replacement option was less than the new fixtures, that this difference was not great enough to offset the increased estimated labor cost associated with retrofit replacement kits as compared to installing new fixtures. The new fixture replacement option also provides additional energy and carbon savings over the retrofit upgrade option. Both options were found to produce lighting levels well above those required by SCA design standards, resulting in overlit spaces, even at the lowest wattage LED retrofit and new fixture replacement options available. The new fixture replacement path can also potentially provide further energy savings and lighting level reductions by reducing the number of fixtures in the classroom lay-in ceilings, providing lighting levels in the classrooms that more closely meet SCA design standard requirements. It is therefore recommended that new lighting fixture replacements be considered over that of retrofit lighting replacements for existing schools such as School A and School B.

2 Building Conditions/Existing Conditions

2.1 Existing Building Conditions

School A is located in Queens, New York. The total building area is approximately 120,000 sq. ft. and consists of 3 floors plus a cellar floor and a mechanical penthouse. The original lighting systems throughout the building were installed in 2002. The lighting design floor plan drawings for School A are included in Appendix A. The count and type of existing fixtures installed in each room throughout School A were surveyed and tabulated. This tabular information with the existing fixtures in School A is included in Appendix B.

School B is located in Bronx, New York. The total building area is approximately 35,000 sq. ft. and consists of 3 floors plus a cellar floor and a mechanical penthouse. The original lighting systems throughout the building were installed in 1997. The lighting design floor plan drawings for School B are included in Appendix A. The count and type of existing fixtures installed in each room throughout School B were surveyed and tabulated. This tabular information with the existing fixtures in School B is included in Appendix B.

2.2 Existing Lighting Configurations

2.2.1 Classroom and Hallways Lighting

Each classroom throughout School A has a similar lighting fixture configuration. The fixtures in the classrooms typically consist of 2'x4' fixtures with 3 (32 W) T8 fluorescent bulbs as well as 2'x2' fixtures with 2 (28 W) T8 U6 fluorescent bulbs. Each classroom contains a range of 9 to 18 lighting fixtures, depending on the size of the classroom, with the most typical number of fixtures per classroom being 12 (3x4 arrangement). Figures 1 and 2 show the original/existing lighting design floor plans for typical classrooms. These fixtures are controlled by 2 light switches that split the classroom zones into a perimeter zone and an interior zone. The average lighting power density (LPD) in the School A's classrooms is 1.31 W/ft^2. A typical classroom lighting fixture layout is shown in Photo 1. A lighting level of about 56 footcandles (FC) was recorded in the classroom shown in Photo 1.

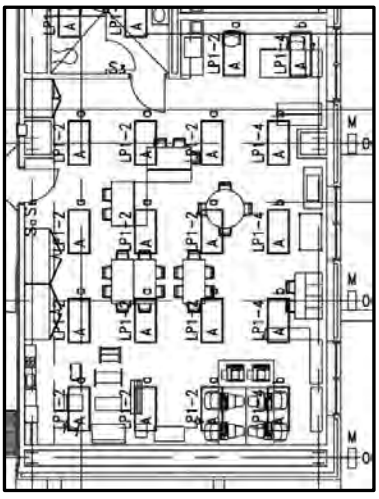

Figure 1: School A Original Lighting Design Floor Plan for 101 Kindergarten

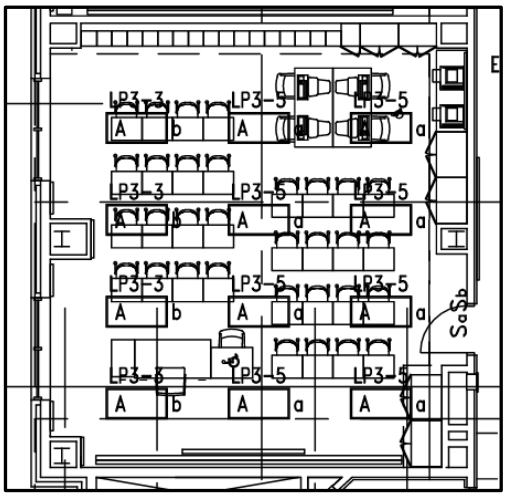

Figure 2: School A Original Lighting Design Floor Plan for 102 Pre-Kindergarten

As shown in Photo 2 below, the hallways at School A consist of 2'x 4' fixtures with 3 (32 W) T8 lamps, which are similar throughout each floor of the building. The average LPD in the School A hallways is about 0.92 W/ft^2. The hallways at School A were measured to have a lighting level of about 55 FC.

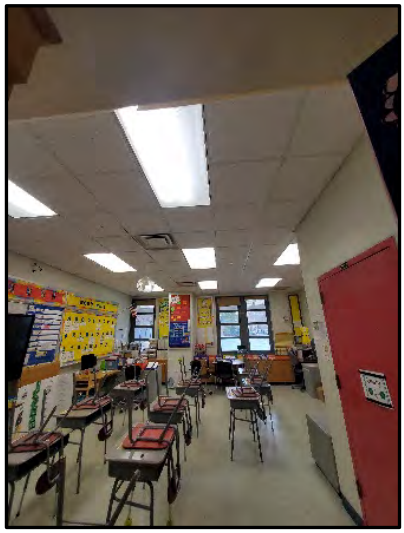

Photo 1. School A Typical classroom lighting layout

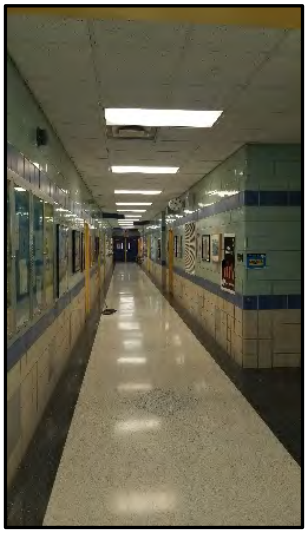

Photo 2. School A Hallway lighting layout

Each classroom throughout School B has a similar lighting fixture configuration. The fixtures in the classrooms typically consist of 2'x4' fixtures with 3 (32 W) T8 fluorescent bulbs and/or 2'x2' fixtures with 2 (31 W) T8 U6 fluorescent bulbs. Each classroom contains a range of 6 to 15 lighting fixtures, depending on the size of the classroom, with the most typical number of fixtures per classroom being 12 fixtures per classroom (4x3 arrangement). These fixtures are controlled by 2 light switches that split the classroom zones into a perimeter zone and an interior zone. The average LPD in the School B's classrooms is about 1.43 W/ft^2. A typical classroom fixture layout is shown in Photo 3. Classroom 308 in School B was measured to have a lighting level of about 89 FC.

Photo 3. School B 301 1st and 2nd Grade Classroom lighting layout

The Classroom hallways at School B contain 2'x2' recessed fixtures with 2 (31W) T8 U fluorescent bulbs, with similar fixtures throughout each floor of the building. These fixtures are controlled by the electrical panel in the hallway of the 1st floor. The average LPD of the School B's hallways is about 0.82 W/ft^2. A light level of about 55 FC was recorded in the hallways at School B.

2.2.2 Cafeteria, Kitchen, and Gym Lighting

The Cafeteria and Kitchen at School A, located on the 1st floor, are about 6,100 ft^2 total. The Cafeteria lighting consists of two different fixture types including 2'x4' fixtures with 3 (32 W) T8 fluorescent bulbs and 2'x2' fixtures with 2 (28 W) T8 U6 fluorescent bulbs. The LPD for the Cafeteria is about 1.51 W/ft^2 and the Kitchen is about 1.47 W/ft^2. A light level of about 47 FC was recorded in the Cafeteria. A light level of about 54 FC was recorded in the Kitchen. The lighting fixture layout for the Cafeteria is shown in Photo 4. Figure 3 shows the original lighting design plans for the Cafeteria.

The Gym at School A, located on the 1st floor, is about 7,700 ft^2 total. The lighting in the Gym consists of 2'x4' (surface mounted) fixtures with 2 (32 W) T8 fluorescent bulbs and (400 W) PR-Lamp fluorescent pendants. These fixtures are mounted and hung about 30' AFF. The LPD in the Gym is about 1.1 W/ft^2. A light level of 55 FC was recorded in the Gym. The lighting fixture layout for the Gym is shown in Photo 5 below. Figure 4 indicates the original/existing lighting design plans for the Gym in School A.

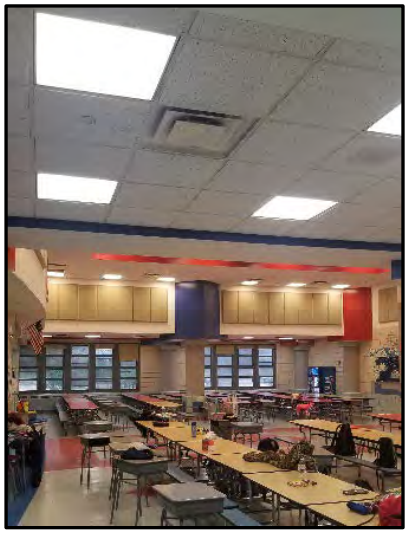

Photo 4 School A Cafeteria Lighting Fixture Layout

Photo 5. School A Gym Lighting Fixture Layout

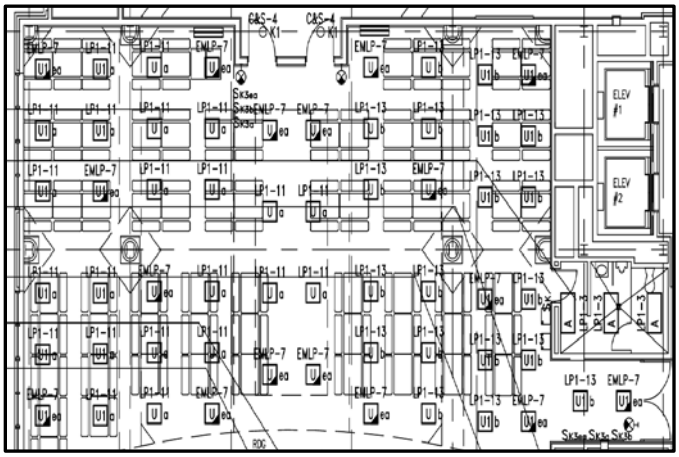

Figure 3. School A Original Lighting Design Floor plan for Cafeteria

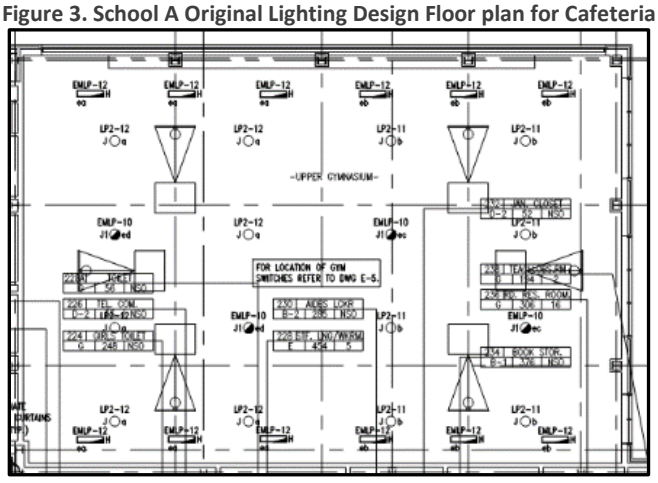

Figure 4. School A Original Lighting Design Floor Plan for Gym

The Student Dining/Multipurpose and Kitchen at School B, located on the 1st floor, are about 3,800 ft^2 total. The Student Dining/Multipurpose space consists of 2'x4' 3 (32 W) T8 fixtures, also installed in the Classrooms. The LPD in the Student Dining/Multipurpose is 1.29 W/ft^2. Photo 6 below shows the existing Student Dining/Multipurpose lighting

configuration. A light level of about 47 FC was recorded in this space. The LPD for the Kitchen area is 1.14 W/ft^2. Photo 7 below shows the Kitchen lighting configuration.

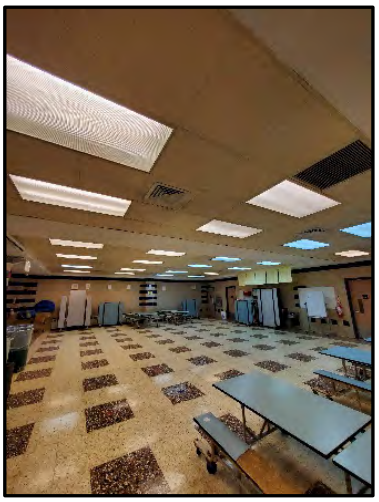

Photo 6. School B Student Dining/Multipurpose Lighting Configuration

Photo 7. School B Kitchen Lighting Configuration

2.2.3 Mechanical Room / Back of House Lighting

The back-of-house lighting in the stairs, mechanical rooms, and basement level at School A consists of 2'x4' pendant fixtures with 3 (32W) T8 fluorescent bulbs. According to the building engineer, these lighting fixtures are switched on typically for 4 hours per day. These fixtures are all connected to the same power switch.

The stairs and basement level corridors at School B contain 1'x4' pendant fixtures with 2 (32W) T8 fluorescent bulbs, as shown in Photo 8. According to the building engineer, the fixtures in the hallways are tied into the main lighting panel and remain on for majority of the day. The lighting within the mechanical and back of house areas are controlled by local switches.

Photo 8. School B Hallway lighting layout

2.2.4 Existing Building Lighting Controls System

At School A, the corridor lighting is controlled based on a manual wall mounted light switch in the building operator's room. The building operator noted that this switch turns on the corridor lighting from 5am to 7pm on weekdays.

At School B, there are minimal lighting controls. As seen in Photo 9, various wall mounted vacancy sensors were observed to be installed within some Classrooms & Offices. It was noted by the building operator that some of these sensors were not functional. A ceiling mounted vacancy sensor was also found to be installed in 309 Staff Lounge, as shown in Photo 10. It is unknown if this sensor is functional. The hallway and stair lighting for each floor are controlled by a manual switch connected to the main circuit panel located in the first-floor corridor. The building operator noted that this switch turns on the main hallway and stair lighting from 5am to 7pm on weekdays.

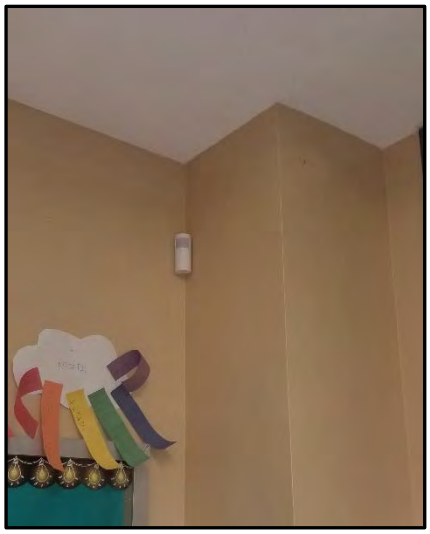

Photo 9. Wall Mounted Vacancy sensor in School B

Photo 10. Ceiling Mounted Vacancy sensor in School B

2.3 SCA Lighting Design Specifications

2.3.1 General Requirements

SCA has provided a set of design standards that must be met for all new construction, major modernization and capital improvement projects. The general lighting requirements/standards are outlined in *SCA Design Requirements (Electrical and Communication Services) Section 7.2 Lighting Systems*, which is included in Appendix C. Each bulb lamp, ballast, driver or fixture must be UL approved.

The *SCA Design Requirements (Electrical and Communication Services) Section 7.2.1C* notes that typical new classroom lighting shall consist of two (2) rows of direct/indirect, ceiling pendant-mounted luminaires spaced approximately 12' on center to produce optimum lighting. The lighting fixture arrangements in School A and School B do not match these requirements, with the existing layouts contributing to light levels being above current SCA requirements, even when replacing the currently installed fluorescent lighting fixtures with new high efficiency LED fixtures at the lowest available wattage.

New fixture type requirements in *SCA Design Requirements (Electrical and Communication Services) Section 7.2.1C* vary by space type. New classrooms and libraries require direct/indirect ceiling pendant luminaires, new offices and cafeterias require recessed 2' x 4' luminaires, new corridors require recessed 2' x 4' or 2’ x 2’ luminaires (based on ceiling grid selected) and new gymnasiums require high bay, non-glare luminaires with impact resistance lens.

2.3.2 Light Intensity

The *SCA Design Requirements (Electrical and Communication Services) Section 7.2.1B* also provide requirements regarding illumination levels or light intensity. Table 1 below indicates the SCA requirements for the illumination level and the maximum total average light power density (LPD) for typical functional spaces within the schools, from this document. Compliance with IES minimum recommended illumination levels and the 2020 NYCECC watts per square foot limitations are followed with these requirements.

Table 1. SCA Lighting Design Requirements

Space type	FC Level	Max LPD (w/ft^2)
Auditorium	40*	0.63
Boiler Room	30	0.39
Cafeteria / Lunchroom	30*	0.53
Classrooms	35*	0.50
Corridors	20	0.55
Gymnasium	30*	0.75
Kitchen	50	0.92
Library	40	0.77
Lobby	30	0.90
Offices	35	0.50
Restrooms	20	0.75

* Classroom and PA Space foot-candle calculations shall exclude the levels in the area 3 feet around the perimeter of each classroom but shall include lighitng over all teaching surfaces. Average maintainted level at 30" AFF shall be a minimum of 35 FC with an average to minimum ratio not to exceed 2.5.

SCA notes that the maximum LPD per space is required to be at or below ASHRAE 90.1-2016 levels, as modified by Appendix CA of the 2020 NYCECC. Total building lighting power density (LPD) using the 2020 NYCECC – ASHRAE 90.1-2016 whole building procedure shall be a maximum of 0.5 W/ft² for new primary schools, intermediate schools, high schools as well as Additions, Modernization and new Capital Improvement Projects. As noted previously, maintaining the required average illumination levels with the current lighting fixture arrangements in School A and School B is difficult even when converting to new higher efficency LED lighting, due to the large quantity of fixtures currently installed.

2.3.3 Lighting Control

Requirements for lighting controls are also outlined in *Section 7.2.1D* of the *SCA Design Requirements (Electrical and Communication Services)*. SCA notes that all interior lighting, except for emergency lighting, shall be automatically controlled by a programmable lighting control panel, provided at an electric closet in the school, with an integral clock. Any lighting that is not controlled by occupancy or vacancy sensors are required to be

controlled by this integral clock. However, retrofit projects do not require this time clock control.

SCA provides a table in the above section of the *SCA Design Requirements*, which provides guidelines for the individual lighting controls for each space. It is noted that the requirements in this table are similar to requirements provided in the 2020 NYC Energy Conservation Code.

Daylight harvesting is also noted as a requirement in *Section 7.2.1D* of the *SCA Design Requirements (Electrical and Communication Services).* The standard notes that every zone with a window shall be provided with daylight harvesting, where required by the 2020 NYC Energy Conservation Code. Typically, the daylight harvesting sensor is installed to control all the lighting in both classrooms and offices to maintain the required foot candle levels.

2.3.4 Lighting Color/ Quality

Regarding lighting color and quality, SCA notes in *SCA Design Specification 16502 – LED Interior Building Lighting* that Correlated Color Temperature (CCT) range should be between 3000K and 4000K and be correlated to chromaticity as defined by the absolute (X, Y) coordinates on the 2-D CIE chromaticity chart. This has been taken into consideration in selecting retrofit options and new lighting fixtures options for both schools in this study.

3 Lighting Upgrade Options / Recommendations

3.1 Retrofit Lighting Fixture Option

Following a review of the drawings and a site survey performed by OLA to investigate the layout/ condition of the existing fixtures at School A and School B, the feasibility of retrofitting or replacing the existing fixtures was assessed together with the help of lighting designer, Illuminations. The retrofit lighting fixture designs were based on the Lithonia brand fixtures (an SCA approved lighting fixture manufacturer) - references noted below are based on this brand's products. A lighting retrofit can have certain benefits over a new fixture replacement. First, the cost of a lighting retrofit kit is typically less and may provide similar performance and efficiency as compared to a new fixture replacement. The implementation of this option can therefore provide similar high energy savings and carbon emissions reduction to that of a new fixture replacement, without a full lighting redesign being required.

As seen in both School A and School B, many existing schools use traditional fluorescent lighting fixtures. There are a few typical methods to convert/retrofit the existing lighting system to LED including Type A, B and C retrofit options. As part of this study, each of these methods for retrofitting existing lighting systems were reviewed to determine which is the most feasible regarding efficiency and sustainability. For this study, Type C replacements were chosen after discussions and reviews with several lighting designers/vendors regarding the existing conditions of School A and School B lighting fixtures, along with SCA design requirements. Type C replacements consist of a direct replacement of the existing fixture with a new fixture configuration that fits within the existing fixture's location. This process requires minimal demolition as well as minimal wiring to integrate. The proposed Type C retrofit fixture replacement also meets the SCA requirement of being a UL listed configuration. It also provides drivers that allow for dimming of these fixtures, which is more in line with SCA current design requirements and can help to achieve SCA required light levels – whether the controls are implemented during the lighting upgrade or at a future time, this Type C retrofit allows for flexibility and "future proofing" to allow these fixtures to provide the required SCA lighting controls in the future.

The other lighting retrofit options considered were a Type A and Type B replacement. Type A involves replacing the existing fluorescent bulb with an LED equivalent. This is the most cost-effective solution but has many disadvantages. The existing fixtures found in the schools have not been tested with LED bulbs therefore removing their UL certification, a key SCA requirement. Another issue with Type A is that the ballast within the existing fixtures would have a reduced life span and would require replacement shortly after being installed. Many of the existing fixture lens are also discolored and difficult to reinstall, requiring possible replacement of existing light fixture lenses as well. Type B replacements include replacing the existing fluorescent bulb with an LED equivalent and removing the ballast by modifying the fixture. This replacement method also removes the UL certification and may require lens replacement.

The predominant existing fixtures installed throughout the two schools are the 2'x2' and the 2'x4' rectangular troffer T8 lighting fixtures. The proposed retrofit replacement kit for these two fixture types included Lithonia Lighting model numbers 2BLT4R 30L ADP (2'x4') and 2BLT2R 20L ADP (2'x2'). These lighting retrofit kits meet *SCA Design Requirement 7.2.1A – Energy Efficient Lighting Luminaires* as the fixtures include luminaries that are high efficiency LED and the fixture is UL certified. Cutsheets for the proposed retrofit 2'x4' fixtures have been provided in the Appendix F.

In order to verify how the lighting retrofit design would perform when installed, lighting level calculations were performed by the lighting designer for typical spaces within School A and School B. These calculations used the lighting design drawings for the schools along with the proposed lighting retrofits (and associated IES files) to generate light level calculations. A light loss factor of 0.8 was assumed for the retrofit option, which includes loss for the existing lens. The retrofit lighting plans provided by the lighting designer can be found in the Appendix D. Figure 5 below shows the light level readings in a typical Classroom within School A with the proposed retrofit design. Figure 6 below shows the light level readings in the Cafeteria of School B.

The lighting calculations were critical to the study to determine if the proposed retrofit or new fixture selections met SCA's light level requirements. Figure 7 shows the results of the lighting calculations for School A with the lighting retrofit design. As seen in Figure 7, 101 Kindergarten has an average to minimum FC ratio of 1.3 to 1, which does not exceed the 2.5 to 1 average to minimum ratio requirement listed within the *SCA Design Requirements*. However, this classroom space has a high average light level of 45.3 FC, which is well above the 35 FC requirement from SCA. Figure 7 also shows 105A General Office with an average light level reading of 31.5 FC, which is close to the 35 FC requirement from SCA. Figure 8 shows the results of the lighting calculations for School B with the retrofit design. As seen in Figure 8, the student Dining / Multipurpose room has an average to minimum FC ratio of 2.0 to 1, which does not exceed the 2.5 to 1 average to minimum ratio requirement listed within the Design Requirements. However, this space has a high average light level of 41.3 FC, which is well above the 30 FC requirement from SCA.

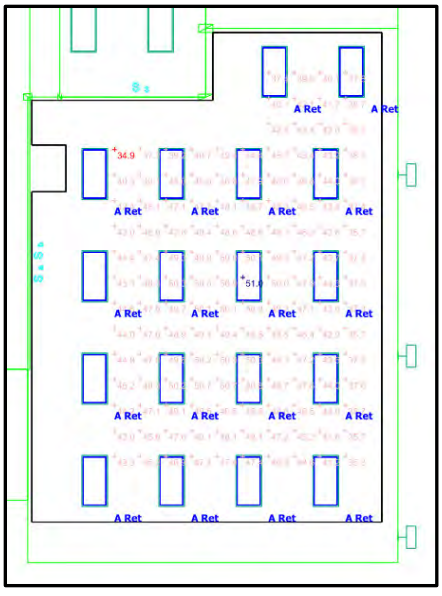

Figure 5. Foot Candle Readings in School A Classroom with proposed Retrofit Fixtures

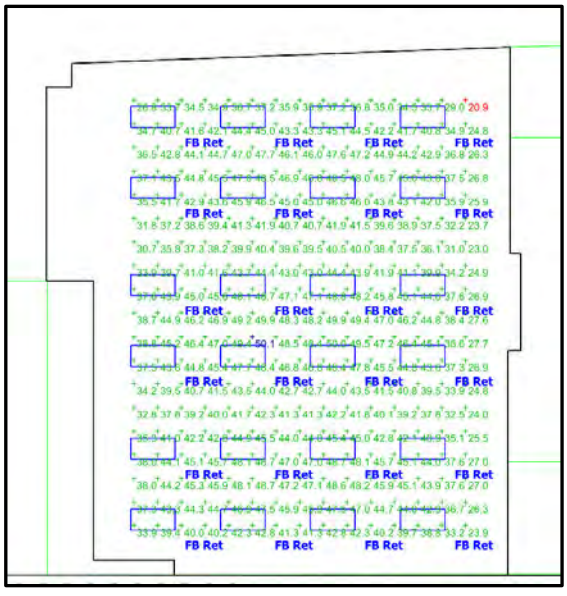

Figure 6. Foot Candle Readings in School B Gym/Cafeteria with proposed Retrofit Fixtures

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
101 Kindergarten @2.5'AFF	+	45.3 fc	51.0 fc	34.9 fc	1.5:1	1.3:1
105A General Office @2.5'AFF	+	31.5 fc	40.2 fc	17.9 fc	2.2:1	1.8:1
125 CW Spec. Ed @2.5'AFF	+	35.5 fc	44.0 fc	16.4 fc	2.7:1	2.2:1
263 Student Dining @2.5'AFF	+	29.9 fc	39.0 fc	11.9 fc	3.3:1	2.5:1

Figure 7: School A Retrofit Fixture Replacement Lighting Levels

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Student Dining/Multipurpose Room @2.5'AFF	+	41.3 fc	50.1 fc	20.9 fc	2.4:1	2.0:1

Figure 8: School B Retrofit Fixture Replacement Lighting Levels

3.2 New Lighting Fixture Options

Following a review of the drawings and a site survey performed by OLA to investigate the existing lighting layouts and condition of the existing fixtures at School A and School B, the feasibility of replacing the existing fixtures with new high efficiency LED fixtures was investigated together with the help of a lighting designer, Illuminations. In order to replace each existing fixture, the fixture types, sizes, and quantities through the building were assessed. Based on this existing fixture information and SCA design requirements, new lighting fixtures were proposed. This new lighting fixture design was based on the Lithonia brand fixtures (an SCA approved lighting fixture manufacturer), with references noted below are based on this brand's fixtures. Several benefits of a full lighting fixture replacement (as compared with a retrofit replacement) include long-term longevity for each fixture. Modern new LED fixtures can last from 5-10 years with minimal maintenance required. Another advantage is higher quality factory wiring at the fixtures as compared with field wiring required for retrofit kits. With new LED fixtures not only becoming more efficient, using less energy and producing more illumination, but also reducing material with panel fixture options, the difference in cost of new fixtures compared to retrofit fixtures is reducing.

As previously noted, the main existing fixtures installed throughout the schools are 2'x2' and 2'x4' rectangular troffer T8 lighting fixtures. The proposed new fixture replacement for these two fixture types included Lithonia Lighting model numbers EPANL 2'x4' 3000LMHE and EPANL 2'x2' 2000LMHE. Cutsheets for the proposed new 2'x2' and 2'x4' fixtures have been provided in Appendix F. These lighting fixtures meet *SCA Design Requirement 7.2.1A – Energy Efficient Lighting Luminaires* as the fixtures include luminaries that are high efficiency LED and the fixture is UL certified. These fixtures are also capable of increasing and reducing the lighting output directly at the fixture to meet SCA design requirements without requiring a fixture replacement, which is not the case for the retrofit option.

In order to verify the performance of the new proposed light fixtures installed throughout the schools, lighting calculations were performed by the lighting designer. These calculations used the lighting design drawings for the schools along with the proposed new lighting fixtures (and

associated IES files) to generate light level calculations. A light loss factor of 0.9 was assumed for these new LED fixtures. The calculations were performed in several typical spaces throughout the schools, to compare with SCA lighting requirements. These calculations performed by the lighting designer are indicated in Appendix E. The goal with this lighting design is to meet the SCA light level requirements as well as to reduce the space light power density and energy consumption. Figure 9 shows the library at School A with new fixtures. The average light level within the library was 41.9 FC, the average light level in the reading area was 42.8 FC and the average light level in the stacks was 44.5 FC. These appear to be just above the 40 FC requirement from SCA. Figure 10 shows a typical classroom lighting plan found throughout School B with the new fixtures installed. Figure 12 shows the results of the lighting calculations for School B with the new fixture design. As seen in Figure 12, 301 Classroom has an average to minimum FC ratio of 2.4 to 1, which does not exceed the 2.5 to 1 average to minimum ratio requirement listed within the SCA Design Requirements. However, this classroom has an average foot candle level of 59.4 FC, which far exceeds the 35 FC requirement from SCA.

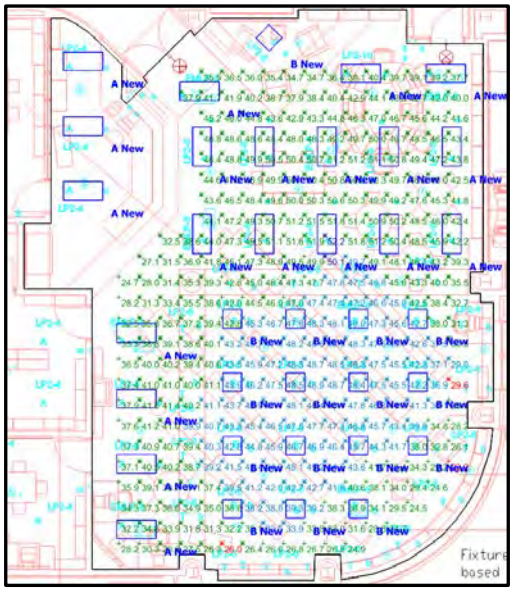

Figure 9. Calculated light levels in School A Library with New Fixtures

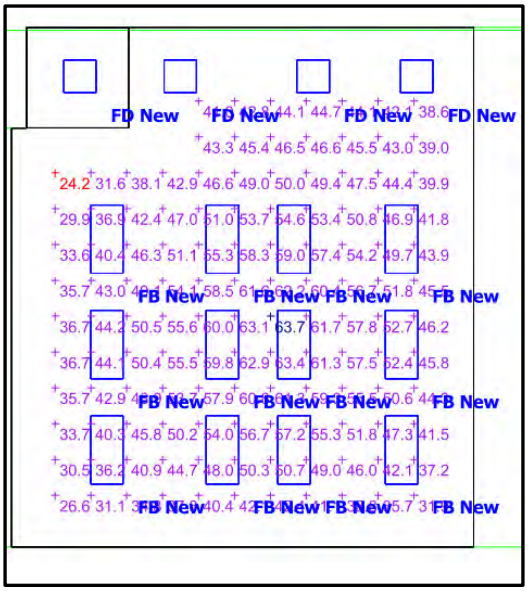

Figure 10. Calculated light levels in School B Classroom 305 with New Fixtures

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
113 Gymnasium @Floor	+	44.2 fc	52.4 fc	26.0 fc	2.0:1	1.7:1
211 Library General @2.5'AFF	+	41.9 fc	52.2 fc	23.2 fc	2.3:1	1.8:1

Figure 11. School A New Fixture Replacement Light Levels

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
ACD Kitchen 108 @2.5'AFF	+	23.8 fc	44.1 fc	6.9 fc	6.4:1	3.4:1
Classroom 301 @2.5'AFF	+	59.4 fc	95.5 fc	25.0 fc	3.8:1	2.4:1
Classroom 302 @2.5'AFF	+	38.1 fc	47.5 fc	18.8 fc	2.5:1	2.0:1
Classroom 305 @2.5'AFF	+	47.4 fc	63.7 fc	24.2 fc	2.6:1	2.0:1

Figure 12. School B New Fixture Replacement Lighting Levels

One possibility with the new lighting fixture option is that the lighting fixture layout can be altered to reduce the overall number of fixtures per space. With less fixtures, there would be reduced light levels in the spaces and reduced energy and carbon consumption. With the current fixture layouts in School A and School B, most space light levels are well above the SCA design requirements when installing new fixtures with even the lowest output available. Reduction in the total quantity of light fixtures in these spaces may be a feasible option with an existing school lighting upgrade project, to further reduce the light levels to within SCA design standards as well as to further reduce annual energy and carbon consumption. Typical classroom light levels were found to be about 43.5 FC when replacing the current existing light fixtures with the lowest output 2'x4' light fixture. When a row of lights was removed and the light fixtures were relocated within the classroom, the light levels were found to reduce to about 33 FC which is closer to the 35 FC threshold for classrooms indicated in *SCA Design Requirements section 7.2.1B – Illumination Levels*. It should be noted that there would be increased installation cost when altering the ceiling layout to reduce the number of light fixtures in the classrooms, but reduced material cost from reduced number of fixtures. New lighting floorplans with lighting level comparisons were provided by the lighting designer for a few select classrooms, which are shown in Appendix E. Figures 13 and 14 below show one sample classroom in both School A and School B with a reduced number of fixtures along with the respective foot candle calculations for the spaces. The light levels calculated with reduced new fixtures was found to be 35.8 FC (versus 47.8 FC) for the classroom in School A and 33.5 FC (versus 47.4 FC) for the classroom in School B as shown in Figures 15 and 16.

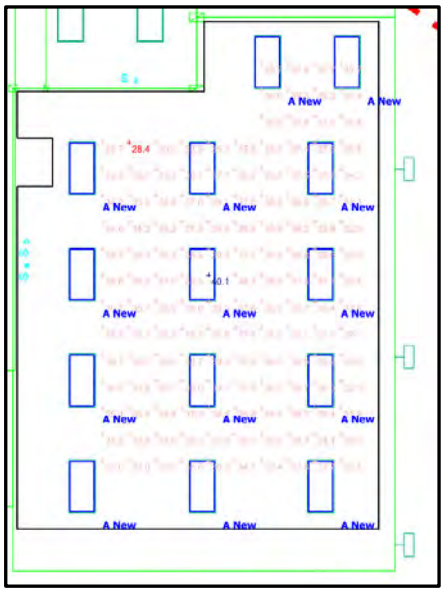

Figure 13. Calculated Light Levels in School A Classroom 101 with Reduced Number of Fixtures

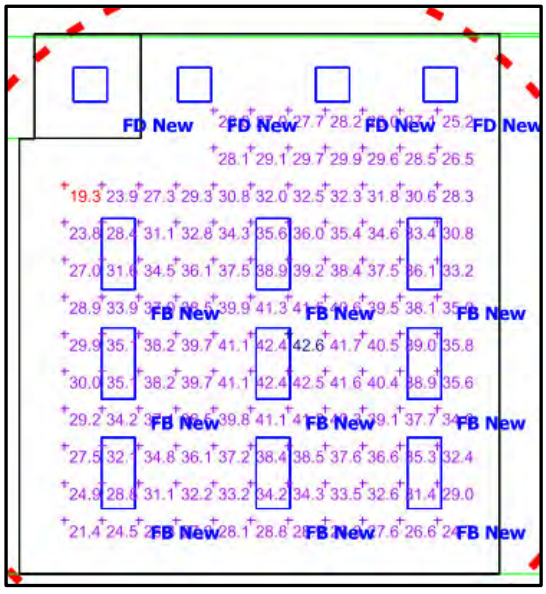

Figure 14. Calculated Light Levels in School B Classroom 305 with Reduced Number of Fixtures

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
101 Kindergarten @2.5'AFF	+	35.8 fc	40.1 fc	28.4 fc	1.4:1	1.3:1

Figure 15. School A Classroom 101 Reduced New Fixture Replacement Lighting Levels

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
ACD Kitchen 108 @2.5'AFF	+	23.8 fc	44.1 fc	6.9 fc	6.4:1	3.4:1
Classroom 301 @2.5'AFF	+	34.9 fc	47.4 fc	16.7 fc	2.8:1	2.1:1
Classroom 302 @2.5'AFF	+	32.8 fc	42.8 fc	17.0 fc	2.5:1	1.9:1
Classroom 305 @2.5'AFF	+	33.5 fc	42.6 fc	19.3 fc	2.2:1	1.7:1

Figure 16. School B Reduced New Fixture Replacement Lighting Levels

3.3 Lighting Controls Options

Although lighting fixture upgrade options was the focus of this study, lighting controls retrofit options to meet SCA school requirements was also evaluated as part of this study. The lighting controls upgrade recommendations between the retrofit and new fixture option are identical in scope and cost in this study. The goal of the lighting controls is to increase energy savings by reducing the operation of lighting fixtures (during unoccupied or daylit times) and ensure schools are meeting the SCA design standards regarding lighting control. Initially, there were two proposed options for installing lighting controls - wired and wireless lighting controls. Due to the lighting control equipment and labor cost associated with installation a wired lighting control system, the estimated cost of implementing wired lighting controls with a new or retrofit lighting fixture design was significantly more expensive than implementing a wireless lighting control system. Since this cost was significantly more expensive in an existing school than implementing a wireless lighting control system, further investigation into implementing a wired lighting control system was not pursued. The lighting control network riser diagrams and equipment cutsheets for both wired and wireless lighting control designs have been provided in Appendix G.

With LED lighting fixture upgrade advances, the lighting controls option that was considered is embedded controls within the luminaire. Embedded control within the fixtures not only reduces the field installation process and cost of lighting controls but also ensures that the lighting control is manufactured and tested prior to installation.

3.3.1 Wireless Embedded Lighting Control

As previously mentioned, requirements for lighting control are provided by SCA in *Section 7.2.1* of *SCA Design Requirements*. In working with the lighting designer, Illuminations, on this study, potential options for wireless lighting control were evaluated for all the room types with lighting control requirements as per *SCA Design Requirements*. The wireless embedded lighting controls design floor plans for typical rooms is shown in Appendix H. These wireless controls were based on the Acuity brand system (an SCA approved lighting controls manufacturer), with references noted below based on this brand's products.

With the wireless embedded lighting control option, the need for CAT 5e cable installation is not required, which may be the most flexible and cost-effective solution available for the existing schools. As indicated in Figure 17 below, provided by the lighting designer, the wiring configuration for the network backbone would require a cable from a PS 150 power source connected to the nLight air controller and the wireless network backbone.

The specific components for the study include an nLight ECLYPSE system controller to support connectivity and management over an IP network and a USB to CAT6 converter/extender and a nLight Air Adaptor, all of which can be seen in Figure 18 below. Beyond these central devices, lighting control components such as relay panels and power packs are also not required as a result of the wireless embedded lighting controls.

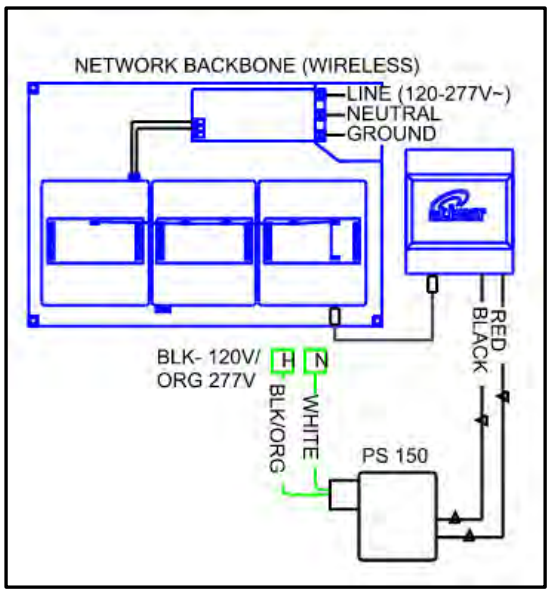

Figure 17. Wireless Lighting Control Network Riser

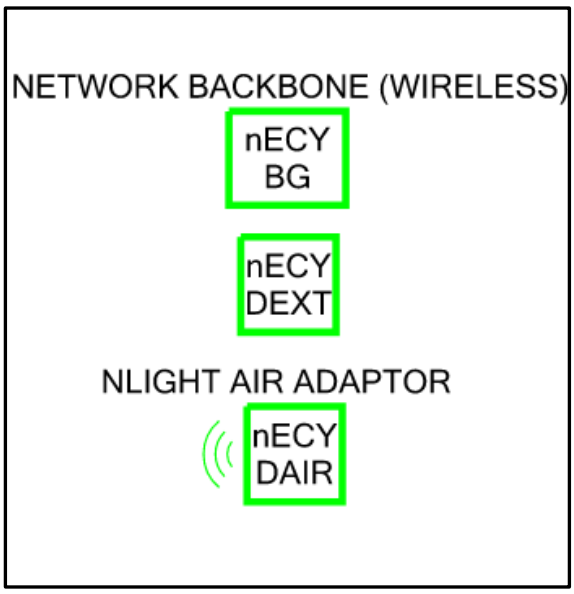

Figure 18. Components of the Wireless Lighting Control System

Each room type would have a different arrangement of lighting control devices for the specific lighting control requirements needed. A typical classroom would require the fixtures to be nLight Air enabled fixtures. The integral controls would include both occupancy sensors as well as daylight sensors for the fixtures in the daylighting zone. The daylight sensor would include a mounting height lens based on the ceiling height in the classrooms for proper daylight harvesting. The wall switch would be a 2-pole raise/lower dimming switch without wires. Figure 19 below indicates the network connectivity of the classrooms. The quantity of control devices would vary based on the room layout, but typically would include one (1) two pole switch to control nLight Air enabled lighting fixtures, as seen in Figure 20 below. Both the lighting fixture embedded sensors and the switches would be line voltage type rather than battery operated. It was confirmed with the lighting vendor that there is no cost difference between the two options.

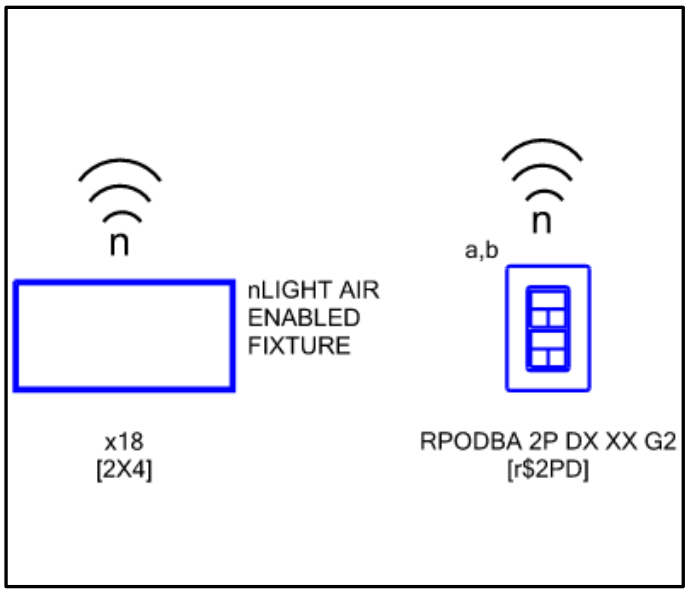

Figure 19. Typical Classroom Wireless Lighting Control Network Riser

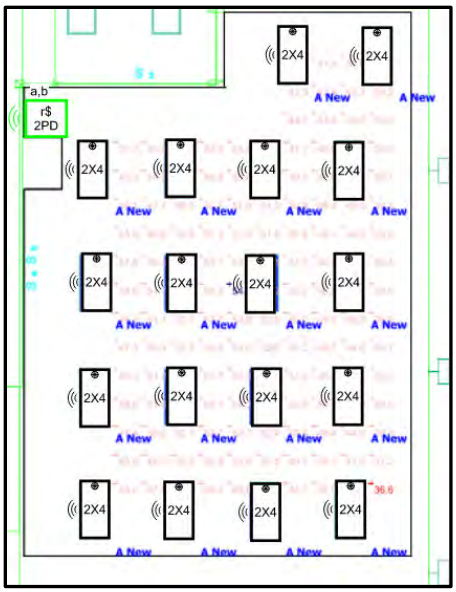

Figure 20. Typical Classroom wireless lighting control design

A typical office would be very similar to a typical classroom. The offices would also require nLight Air enabled lighting fixtures. The only difference would be that the wall switch would be an nLight preset wall controller with on/off and dimming capabilities. Figure 21 below indicates the rPODBA DX wall controller and Figure 22 indicates the typical office wireless lighting control design layout.

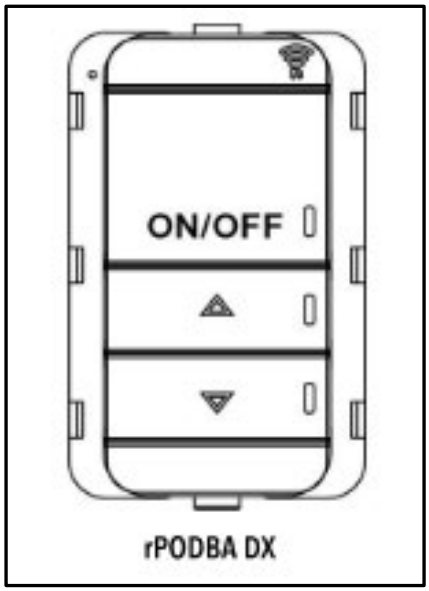

Figure 21. rPODA wireless wall controller

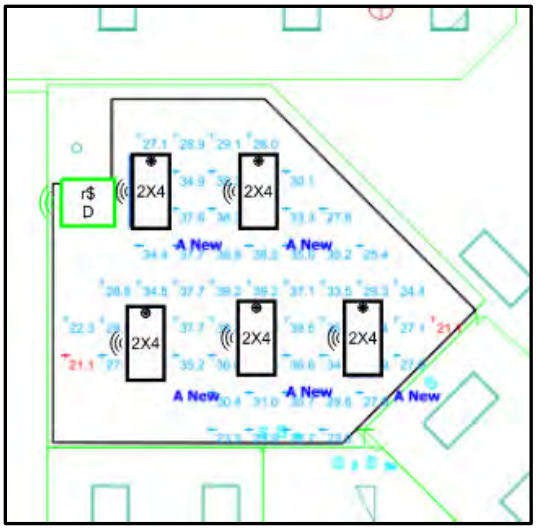

Figure 22. Typical Office wireless lighting control design

Corridors, lobbies and restrooms would all have similar lighting control layouts with the main difference being the lighting control wall switch. For the corridor, lobbies and restrooms, there are emergency light fixtures which would have a separate sequence of operation compared to the non-emergency lighting fixtures. The difference between lobbies/corridors and restrooms is the amount of wall switches due to the size of typical

corridors and lobbies. Two (2) wall switches are proposed on opposite ends of these spaces. The wall switch would be an nLight preset wall controller with on/off capabilities for the lobby, corridor and restroom.

The auditorium has two (2) different types of wall switches, including a wall switch with just on/off capabilities and a wall switch with 4 scene control and raise/lower dimming capabilities. The 4-scene control light switch, indicated in Figure 23 below, is also the proposed wall switch for the gymnasium and student dining area. Both the gymnasium and auditorium contain emergency light fixtures which would also need a separate lighting control sequence. Indicated in Figure 24 below is the proposed gym lighting control layout.

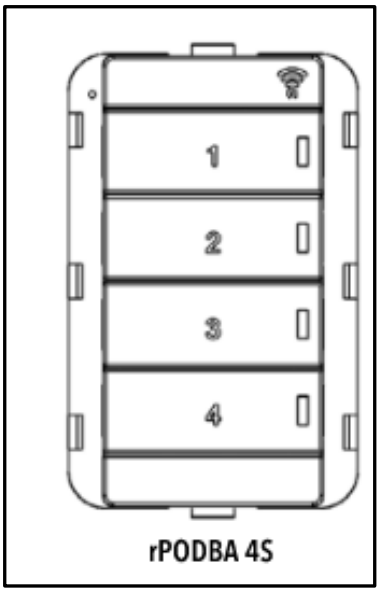

Figure 23. rPODA 4S wireless wall controller

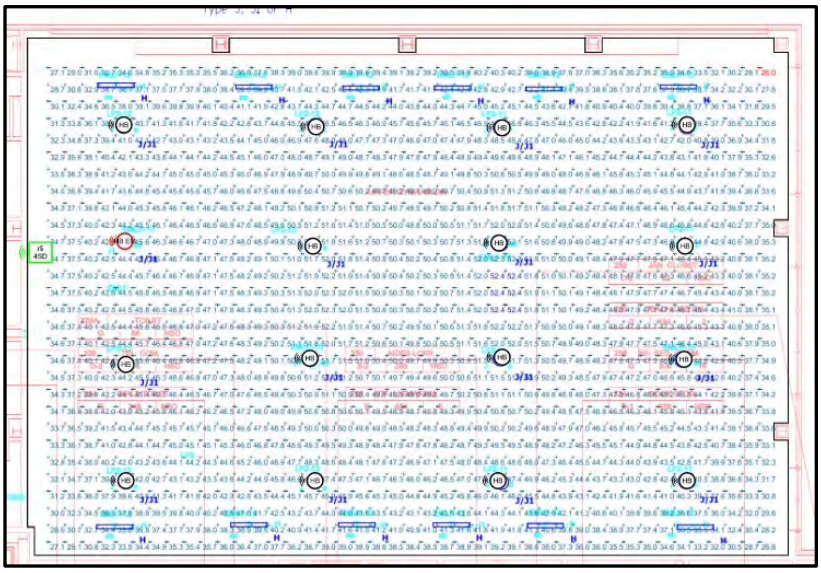

Figure 24. Typical Gymnasium wireless lighting control design

A typical library, due to the various lighting configurations, would require two (2) 4 scene control and raise/lower dimming capabilities. The library would require both the 2x2 and 2x4 fixtures to be nLight Air enabled fixtures.

Exterior lighting controls would require nLight AIR power/relay packs (one for each exterior lighting circuit) tied into the nLight ECLYPSE system controller, which already has an astronomical time clock built into the controller. Therefore, the backbone for the exterior lighting controls is already built into the wireless lighting controls system for the interior lighting controls and the only additional components needed are the power/relay packs noted.

4 Cost Assessment

4.1 Lighting Retrofit and New Fixture Material and Labor Costing

Costs not available for public version.

4.2 Lighting Controls Costing

For this study, both wired and wireless controls were initially investigated to determine which would be the best option to recommend for an existing building lighting retrofit. It was found, as noted previously, that the wired lighting controls option was significantly more expensive than the wireless option, with no additional energy savings or installation labor savings. Wireless lighting controls scope and costing were therefore evaluated for this study**.** Table 2 below shows the wireless controls devices required per typical space type which generates the estimated total equipment quantities for the schools. The quantities for these lighting control devices for each space type were provided by the lighting designer. The proposed lighting control design and the associated cutsheets for each equipment type can be found in Appendix G.

Table 2: Wireless Controls Equipment Quantities

Unit Type	nECYBG	nECYDAIR	nECYDEXT	r$ (RPODLA XX G2)	r$2PD (RPODLA 2P DX XX G2)	r$4SD (RPODLA 4S DX XX G2)	r$D (RPODLA DX XX G2)	rPP20	Equipment Quantity (per Space)
Room Type									
Auditorium					1		1		2
Corridor				2					2
Gym						1			1
Library						2			2
Lobby				2					2
Student Dining					1				1
Classroom					1				1
Office							1		1
Restroom				1					1
JC				1					1
Exterior								5	5
Network Backbone	1	1	1						3
Total Equipment Quantity (School A)	1	1	1	70	37	5	22	5	
Total Equipment Quantity (School B)	1	1	1	42	20	2	5	0	

Material and labor costing for the wireless lighting controls in each school were estimated based on the equipment quantities estimated in Table 2. Labor costing for the lighting control devices was provided by SCA. Material costing was provided by the lighting designer. The total lighting control costing includes the material and labor costing for School A and School B respectively.

4.3 Total Lighting Costing

A summary of the costs associated with the implementation of both the retrofit and new fixture replacement options for both schools was generated to determine a total cost estimate These costs include material and labor costs for the retrofits/fixtures, as well as material and labor costs for the control devices and programming. The calculations show the material cost for the retrofit replacement installation is less than the new fixture replacement for both schools. Labor cost for the retrofit replacement option is more than the new fixture replacement option for both schools. The controls device material and labor costs are the same between the retrofit and the new fixture options. A 50% additional cost has been applied by SCA to the material and labor costing to account for project overhead, profit, general conditions, and escalation.

5 Energy Assessment

5.1 Energy and Cost Savings

Replacing the existing fluorescent lighting fixtures at School A and School B with retrofit or new LED fixtures will result in significant energy savings and carbon reduction. As previously noted, the predominant light fixtures in both schools consist of T8 fluorescent lighting with aging ballasts. Minimal lighting control was also observed within both schools resulting in increased energy usage. As the currently installed ballasts continue to age the lamp life spans will shorten. Without a proper lighting controls system in place, lighting can also be left on in unoccupied and overlit spaces, resulting in increased energy usage.

Shown in Table 3 below are the energy, carbon emissions, and cost savings from implementing retrofit and new lighting fixture replacements at School A. The results show significant energy savings (3.3 to 3.6 kBtu/sf) and carbon savings (28.9 to 31.3 metric tons of CO_2e) for both options. The annual avoided cost ranges from about $35,700 to $40,000 for the two upgrade options. The new fixture replacement option shows both a (slightly) reduced capital cost and increased energy and carbon savings over the retrofit replacement option.

Table 3. School A Lighting Implemenation and Savings

Lighting Upgrade Option	Annual Lighting Savings (kWh)	Annual Cooling Savings (kWh)	Annual Oil Savings (gal)	Energy Savings (kBtu/sf)	GHG Emissions Savings (metric tons of CO_2e)	Annual Avoided Cost	Estimated Capital Construction Cost
Retrofit Fixtures	197,969	28,370	(2,702)	3.29	28.9	$35,700 - $40,000	Costs not available in public verison
New Fixtures	214,388	30,723	(2,926)	3.56	31.3	$35,700 - $40,000	Costs not available in public verison

Shown in Table 4 below are the energy, carbon emissions, and cost savings from implementing retrofit and new lighting fixture replacements at School B. The results show significant energy savings (3.6 to 3.8 kBtu/sf) and carbon savings (11.7 to 12.4 metric tons of CO_2e) for both options. The annual avoided cost ranges from about $12,900 to $13,800 for the two upgrade options. The new fixture replacement option shows both a (slightly) reduced capital cost and increased energy and carbon savings over the retrofit replacement option.

Table 4. School B Lighting Implemenation and Savings

Lighting Upgrade Option	Annual Lighting Savings (kWh)	Annual Cooling Savings (kWh)	Annual Oil Savings (gal)	Energy Savings (kBtu/sf)	GHG Emissions Savings (metric tons of CO_2e)	Annual Avoided Cost	Estimated Capital Construction Cost
Retrofit Fixtures	73,524	10,536	(910)	3.61	11.7	$12,900 - $13,800	Costs not available in public verison
New Fixtures	78,275	11,217	(975)	3.82	12.4	$12,900 - $13,800	Costs not available in public verison

As previously mentioned in Section 3.2 of this report, the light levels seen within the classrooms were well above the *SCA Design Requirements* and were above the threshold of 35 FC for classrooms set within these requirements. Due to the existing lighting arrangement of typically 12 fixtures (3x4) recessed in the classrooms, the light level requirement could not be achieved

even with the lowest lumen output new fixtures. The SCA light level design requirement was found to be more feasible when the light fixture layout is 2 rows of direct/indirect fixtures that distribute the light 70% up and 30% down. Since this is not the case in School A and School B ceilings, removal of a row of the light fixtures within the schools was reviewed with the lighting designer as a potential solution to help reduce the high light levels. Implementing this reduction in light fixtures in classrooms would not only allow the classrooms to be properly lit, but also result in additional energy and cost savings. The energy and cost savings are indicated in Table 5 below.

For School A, the typical classroom LPD would reduce from 0.35 W/ft^2 to 0.26 W/ft^2 and an addition annual lighting energy consumption savings of 8,739 kWh can be achieved.

For School B, the classroom LPD would reduce from 0.35 W/ft^2 to 0.27 W/ft^2 and an additional annual lighting energy consumption savings of 4,337 kWh can be achieved.

There would be an additional labor cost associated with implementing this lighting fixture reduction in classrooms above that of a 1:1 lighting fixture replacement, as previously determined.

Table 5. Lighting Savings with Removed Light Fixture Row

Lighting Upgrade Option	Annual Lighting Savings (kWh)	Annual Cooling Savings (kWh)	Annual Oil Savings (gal)	Energy Savings (kBtu/sf)	GHG Emissions Savings (metric tons of CO_2e)	Annual Avoided Cost
School A	8,739	1,252	(119)	1.1	1.3	$400 - $450
School B	4,337	68	(55)	1.0	0.5	$150 - $200

As previously noted in Section 3.3 of this report, the implementation of lighting controls throughout the spaces at School A and School B required per *SCA Design Requirements Section 7.2.1 D* would produce energy savings over the existing limited lighting controls within School A and School B. Currently, there are minimal automatic lighting controls in School B and no automatic lighting controls in School A. Wireless lighting control systems were researched throughout the study and were found to have many benefits over wired lighting control systems. Some benefits of wireless lighting controls include both a reduced labor and material cost when compared to a wired lighting control system. The proposed fixtures selected for this study for both retrofit and new fixture designs come standard with integrated controls allowing these fixtures to connect to the proposed wireless lighting control network.

Typical lighting energy reductions from implementing a lighting control system such as this were researched during this study. As indicated in a recent NEEA / DLC sponsored study "Energy Savings from Networked Lighting Control Systems with and without LLLC" completed in 2020, typical savings from implementing a lighting control system (similar to this Acuity type controls system that is part of this study) within studied existing schools was found to result in lighting energy savings ranging from 19 to 58% with an average savings of 41% in the education buildings. For the purposes of this study, a 30% lighting energy reduction, for implementing both occupancy and daylighting control in SCA required spaces, was assumed. This reduction was applied to the

already high efficiency low wattage lighting retrofit and new fixture designs, resulting in a modest energy and cost savings for the lighting controls implementation at both schools. Table 6 shows the potential energy and cost savings if SCA required controls are integrated into the lighting system at School A. As shown in the table a total of 18,299 kWh savings is estimated annually for the proposed retrofit lighting fixture option and 15,611 kWh for the proposed new lighting fixture option at School A, with full lighting control integration in required areas as per *SCA Design standard Section 7.2.1D Lighting Controls*. Table 7 below shows a total savings of 6,571 kWh for the proposed retrofit lighting fixture option and 5,732 kWh for the proposed new lighting fixture option at School B. Based on these results, applying lighting controls to the lighting fixture upgrade design is found to have a small energy and carbon savings impact since both the retrofit and new fixture designs have already reached fairly low wattages and energy consumption. However, SCA's approach and as required by code, the lighting controls would be upgraded at the same time as the lighting fixture upgrade.

Table 6. School A Lighting Controls Savings

Lighting Upgrade Option	Annual Lighting Savings (kWh)	Annual Cooling Savings (kWh)	Annual Oil Savings (gal)	Energy Savings (kBtu/sf)	GHG Emissions Savings (metric tons of CO_2e)	Annual Avoided Cost	Estimated Capital Construction Cost
Retrofit Fixtures	18,299	3,220	(307)	0.25	2.2	$800 - $850	Costs not available in public verison
New Fixtures	15,611	2,488	(237)	0.24	2.1	$700 - $750	Costs not available in public verison

Table 7. School B Lighting Controls Savings

Lighting Upgrade Option	Annual Lighting Savings (kWh)	Annual Cooling Savings (kWh)	Annual Oil Savings (gal)	Energy Savings (kBtu/sf)	GHG Emissions Savings (metric tons of CO_2e)	Annual Avoided Cost	Estimated Capital Construction Cost
Retrofit Fixtures	6,571	942	(115)	0.22	0.7	$250-$300	Costs not available in public verison
New Fixtures	5,732	821	(100)	0.19	0.6	$200-$250	Costs not available in public verison

6 Appendix

6.1 Appendix A – Original Lighting Design Drawing Floor Plans
6.2 Appendix B – OLA Existing Lighting Fixture Counts
6.3 Appendix C – SCA Lighting Design Standards/Requirements
6.4 Appendix D - Retrofit Lighting Fixture Designs & Light Level Calcs
6.5 Appendix E – New Lighting Fixture Designs & Light Level Calcs
6.6 Appendix F – Proposed Retrofit and New Lighting Fixtures
6.7 Appendix G – Proposed Lighting Control Network and Cutsheets
6.8 Appendix H – Typical Wireless Lighting Control Design Plans

6 Appendix

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6.8 Appendix H – Typical Wireless Lighting Control Design Plans

Appendix A:

Lighting Design Drawing Floor Plans

APPENDIX A - LIGHTING DESIGN DRAWINGS

POWER & SYSTEMS SYMBOL LIST

SYMBOL	DESCRIPTION	A.F.F.	BACK BOX TYPE	MFG
2,4	CONDUIT AND WIRE RUN CONCEALED IN FLOOR, CEILING OR WALL. HASH MARKS DENOTE NUMBER OF WIRES IF MORE THAN TWO ARE REQUIRED. ARROWS DENOTE HOMERUNS OF PARTICULAR CIRCUITS. MINIMUM 2 # 12 THWN IN 3/4" CONDUIT. ALL BRANCH CIRCUITS FOR 120V IF GREATER THAN 100 FEET SHALL BE ONE SIZE LARGER MINIMUM, AND FOR 277V IF MORE THAN 200 FEET ONE SIZE LARGER MINIMUM(BOTH TO MEET VOLTAGE DROP REQUIREMENTS) "1" DENOTES GROUND CONDUCTOR TO MATCH CIRCUIT WIRES			
2,4	CONDUIT WITH WIRE RUN EXPOSED IN CEILING OR WALL. HASH MARKS DENOTE NUMBER OF WIRES IF MORE THAN TWO ARE REQUIRED. ARROWS DENOTE HOMERUNS OF PARTICULAR CIRCUITS. MINIMUM 2 # 12 THWN IN 3/4" CONDUIT. ALL BRANCH CIRCUITS FOR 120V IF GREATER THAN 100 FEET SHALL BE ONE SIZE LARGER MINIMUM, AND FOR 277V IF MORE 200 FEET ONE SIZE LARGER MINIMUM(BOTH TO MEET VOLTAGE DROP REQUIREMENTS) "1" DENOTES GROUND CONDUCTOR TO MATCH CIRCUIT WIRES			
	CONDUIT RUN BURIED IN SLAB OR EARTH			
	RISER CONDUIT UP, WITH WIRING.			
	RISER CONDUIT DOWN, WITH WIRING.			
J F	JUNCTION/SPLICE BOX, SIZE AND MOUNTING AS REQUIRED. "F" INDICATES FLOOR MOUNTED. "C" INDICATES AUDITORIUM AISLE SEAT LIGHT CONNECTION. PROVIDE SEALTITE POWER CONNECTIONS TO ALL EQUIPMENT			
	JUNCTION BOX WITH 6' WHIP TO LIGHTING FIXTURES			
J	JUNCTION BOX/FLEXIBLE CONDUIT FOR EQUIPMENT CONNECTION WITH POWER AND GROUND WIRES. LIQUID TIGHT FLEXIBLE METAL CONDUIT.			
	WIRE TROUGH/SPLICE BOX. SIZE AS REQUIRED.			
	LIGHTING AND POWER PANEL BOARD, FLUSH MOUNTED IN WALL WITH COVER.			
	LIGHTING AND POWER PANEL BOARD, SURFACE MOUNTED ON WALL.			
S_G	SINGLE POLE TOGGLE SWITCH. SUBSCRIPT DENOTES FIXTURES CONTROLLED. "K" INDICATES KEY OPERATED. "3" INDICATES THREE-WAY SWITCH. "D" INDICATES DIMMER OPERATED. "K" INDICATES KEY OPERATED. "P" INDICATES WITH PILOT LIGHT. LIGHT SHALL BE ON WHEN SWITCH IS OFF UOI.			
S_{TK}	SINGLE POLE, KEY OPERATED TEST SWITCH FOR EMERGENCY LIGHTING.			
S_{MS}	MOTOR STARTER SNAP ACTION TOGGLE SWITCH WITH THERMO OVERLOAD.			
S	DUPLEX THREE WIRE GROUNDED RECEPTACLE, 15A, 125V. SUBSCRIPT 'S' INDICATES WITH SURGE SUPPRESSION. 'K' INDICATES SAFETY TYPE. 'IG' INDICATES WITH ISOLATED GROUND. AND 'GFI' INDICATES GROUND FAULT INTERRUPTER.			
	DUPLEX THREE WIRE GROUNDED RECEPTACLE, 20A, 125V.SUBSCRIPT 'S' INDICATES WITH SURGE SUPPRESION, 'K' INDICATES SAFETY TYPE. 'IG' INDICATES WITH ISOLATED GROUND, AND 'GFI' INDICATES GROUND FAULT INTERRUPTER.			
	SINGLE THREE WIRE GROUNDED RECEPTACLE, 20A, 125V.			
S	15A,125V DUPLEX THREE WIRE GROUNDED RECEPTACLE FLUSH MOUNTED IN FLOOR OUTLET BOX. SUBSCRIPT 'S' INDICATES SURFACE MOUNTED			
	SPECIAL PURPOSE RECEPTACLE. TO MATCH EQUIPMENT PLUG			
B_B	MOTOR STARTER OR CONTACTOR. SUBSCRIPT INDICATES TYPE.			
B_B	COMBINATION DISCONNECT SWITCH AND MOTOR STARTER. RATING AND FUSING NOTED. (30 = AMP. RATING; 2 U = FUSE SIZE ("U" IF UNFUSED); 2 = POLES)			
	DISCONNECT SWITCH, RATING AND FUSING NOTED. HORSEPOWER RATING AS REQUIRED BY MOTOR LOAD. 'WP' INDICATES WEATHERPROOF ENCLOSURE, OTHERWISE NEMA-1. INSCRIBED 'F' INDICATES FUSIBLE TYPE.			
5	MOTOR. HORSEPOWER INSCRIBED, NUMBER OF PHASES AS INDICATED BY CIRCUITING.			
MGGV	MASTER GAS CONTROL SOLENOID VALVE, 120V OR DC, AS NOTED.			
K,P	EMERGENCY KITCHEN GAS SHUT OFF FOR MASTER CONTROL VALVE. "K" INDICATES KEY OPERATED "ON" SWITCH. "P" INDICATES MUSHROOM TYPE PUSH BUTTON "OFF" SWITCH.			
S^{TM}_{HS}	THERMO OVERLOAD SNAP ACTION SWITCH CONTROL FOR HOOD EXHAUST KEY OPERATED "OFF" AND PUSH BUTTOM ON.			
G,K,P	EMERGENCY SCIENCE GAS SHUT OFF FOR MASTER CONTROL VALVE. "K" INDICATES KEY OPERATED "ON" SWITCH. "P" INDICATES MUSHROOM TYPE PUSH BUTTON "OFF" SWITCH.			
S^V	VIDEO SWITCH POWER CONTROL OF TELEVISION RECEPTACLE			
E,K,P	EMERGENCY ELECTRICAL SHUT OFF FOR ELECTRICAL "K" INDICATES KEY OPERATED "ON" SWITCH. "P" INDICATES MUSHROOM TYPE PUSH BUTTON "OFF" SWITCH.			
	20 AMP. DUPLEX RECEPTACLE OF CEILING MTD. RECOIL REELS. REELS COILS TO EXTEND UP 1' BELOW DESK.			
BG	BOILER CHILLER ROOM BREAK GLASS EMERGENCY "OFF" SWITCH. MOMENTARY CONTACT TYPE, FLUSH MOUNTED AT 4'-0" A.F.F.			
CS S	CONTROL STATION PUSH-BUTTON STOP KEY RESET TYPE. FLUSH MOUNTED SUBSCRIPT 'S' INDICATES SURFACE MOUNTED.			
C	CONTACTOR FOR KITCHEN EQUIPMENT, 120V, 20A.			
R	REMOTE CONTROL SWITCH/RELAY. RATING AS REQUIRED OR INDICATED.			
	CIRCUIT BREAKER.			
	FUSED SWITCH, RATING AND FUSING INDICATED.			
	UNFUSED SWITCH.			
	AUTOMATIC TRANSFER SWITCH.			
M	CURRENT TRANSFORMER AND METER.			
100KVA Δ Y	TRANSFORMER, DELTA PRIMARY, Y SECONDARY. RATING NOTED.			
	GROUND.			
RR	DIMMER CONSOLE RECEPTACLE, FLUSH MOUNTED AT 18" A.F.F.			

CLOCK AND PUBLIC ADDRESS SYSTEM SYMBOL LIST

SYMBOL	DESCRIPTION	A.F.F.	BACK BOX TYPE	MFG
	CEILING / WALL MOUNTED INDOOR / OUTDOOR CCTV CAMERA WITHIN A DOME HOUSING, AND WITH PAN, TILT, ZOOM CAPABITIES, AND ASSOCIATED EM PWR. REC.			

CLOCK AND PUBLIC ADDRESS SYSTEM SYMBOL LIST

SYMBOL	DESCRIPTION	A.F.F.	BACK BOX TYPE	MFG
S_P	PRIVACY/CALL-IN SWITCH, FLUSH MOUNTED AT 4'-0" A.F.F.			
	COMBINATION/SPEAKER CLOCK UNDER A COMMON FACE PLATE			
	LOUDSPEAKER ASSEMBLY-DOUBLE FACED			
$_A$	LOUDSPEAKER ASSEMBLY-CEILING FLUSH MOUNTED-SUBSCRIPT DENOTES TYPE.			
$_A$	LOUDSPEAKER ASSEMBLY-FLUSH MOUNTED-SUBSCRIPT DENOTES TYPE.			
WP	SOUND SYSTEM HORN - OUTDOOR TYPE WITH STEEL GUARD			
M	MICROPHONE OUTLET, FLUSH MOUNTED AT 18" A.F.F. "x" WHEN SHOWN INDICATES MICROPHONE DIRECTORY CONNECTED TO THE MAIN SOUND RACK			
M	MICROPHONE OUTLET-FLOOR MOUNTED.			
$_A$	ADMINISTRATIVE CONTROL STATION OUTLET WITH STANDARD INSTRUMENT WALL MTD.			
A/1	AUDIO INPUT OUTLET FOR VCR AUDIO OUTPUT, FLUSH MOUTED AT 18" A.F.F.			
	PRINCIPAL'S SOUND CONTROL PLATE, FLUSH MOUTED AT 4'-0" A.F.F. REFER TO SPECIFICATIONS			
V	REMOTE VOLUME CONTROL			
$_A$	ADMINISTRATIVE CONTROL STATION OUTLET FLUSH FLOOR MTD WITH STANDARD DESK INSTRUMENT.			
LSS	LOCATE SOUND SYSTEM			
A	AUDIO SPEAKER RECEPTACLE FOR LOCAL SOUND SYSTEM			
C	VIDEO CAMERA RECEPTACLE WALL MTD. 18" AFF			

SCHOOL A LIGHTING DESIGN DRAWINGS

LIGHTING SYMBOL LIST

SYMBOL	DESCRIPTION	A.F.F.	BACK BOX TYPE	MFG
	RECESSED MOUNTED 2' X 4' FLUORESCENT LIGHTING FIXTURE. INSCRIPTION DENOTES FIXTURE TYPE. SUBSCRIPTION DENOTES SWITCH CONTROL.			
	RECESSED MOUNTED 2' X 4' FLUORESCENT LIGHTING FIXTURE ON EMERGENCY INSCRIPTION DENOTES FIXTURE TYPE. SUBSCRIPTION DENOTES SWITCH CONTROL.			
	RECESSED MOUNTED 2' X 2' FLUORESCENT LIGHTING FIXTURE. INSCRIPTION DENOTES FIXTURE TYPE. SUBSCRIPTION DENOTES SWITCH CONTROL.			
	RECESSED MOUNTED 2' X 2' FLUORESCENT LIGHTING FIXTURE ON EMERGENCY INSCRIPTION DENOTES FIXTURE TYPE. SUBSCRIPTION DENOTES SWITCH CONTROL.			
A G	SURFACE OR PENDANT MOUNTED FLUORESCENT LIGHTING FIXTURE. INSCRIPTION DENOTES FIXTURE TYPE. SUBSCRIPT DENOTES SWITCH CONTROL.			
A G	RECESSED 1'X4' FLUORESCENT LIGHTING FIXTURE. INSCRIPTION DENOTES FIXTURE TYPE. SUBSCRIPT DENOTES SWITCH CONTROL.			
A	SURFACE OR PENDANT MOUNTED FLUORESCENT LIGHTING FIXTURE ON EMERGENCY CIRCUIT. INSCRIPTION DENOTES FIXTURE TYPE.			
A	RECESSED 1'X4' FLUORESCENT LIGHTING FIXTURE ON EMERGENCY CIRCUIT. INSCRIPTION DENOTES FIXTURE TYPE.			
A G	WALL MOUNTED FLUORESCENT LIGHTING FIXTURE. INSCRIPTION DENOTES FIXTURE TYPE.			
A	WALL MOUNTED FLUORESCENT LIGHTING FIXTURE ON EMERGENCY CIRCUIT. INSCRIPTION DENOTES FIXTURE TYPE.			
	RECESSED MOUNTED FLUORESCENT LIGHTING FIXTURE INSCRIPTION DENOTES FIXTURE TYPE.			
	RECESSED MOUNTED FLUORESCENT LIGHTING FIXTURE ON EMERGENCY CIRCUIT. INSCRIPTION DENOTES FIXTURE TYPE.			
G X1	WALL MOUNTED EXIT LIGHT. SUBSCRIPT DENOTES FIXTURE TYPE. DIRECTIONAL ARROWS INDICATED. SUBSCRIPT 'D' INDICATES EXIT FOR DESABLED. SUPERSCRIPT 'G' DENOTES WITH GUARD.			
X2	CEILING OR PENDANT MOUNTED EXIT LIGHT. SUBSCRIPT DENOTES FIXTURE TYPE. DIRECTIONAL ARROWS INDICATED.			
M	AUDITORIUM AISLE LIGHT			
	SITE LIGHTING POLE MOUNTED. FIXTURE WITH ROUND TAPERED STEEL 25' POLE.			
	SITE LIGHTING POLE MOUNTED. FIXTURE WITH ROUND TAPERED STEEL 12' POLE.			
	WALL MTD PIPE CHASE & ELEV PIT FLUORESCENT LTG. FIXTURE			
	OUTDOOR WEATHER PROOF WALL PACK			

FIRE DETECTION & ALARM SYSTEM SYMBOL LIST

SYMBOL	DESCRIPTION	A.F.F.	BACK BOX TYPE	MFG
FARA	FIRE ALARM REMOTE ANNUNCIATOR.			
FAPR	FIRE ALARM PRINTER.			
ER	ELEVATOR RECALL.			
DH	MAGNETIC DOOR HOLDER.			
DR	MAGNETIC DOOR RELEASE.			
TS	FIRE ALARM TAMPER SWITCH.			
WF	FIRE ALARM FLOW SWITCH.			
PS	FIRE ALARM PRESSURE SWITCH.			
SIL	SILENCER SWITCH.			
	FIRE DRILL PUSH BUTTON, MOUNTED AT 4'-0" A.F.F.			
T	6" TROUBLE BELL.			
SH	SMOKE HATCH.			
RSM	RELAY AND STATUS MODULE MOUNTED IN SINGLE GANG BOX LOCATED IN CEILING FOR SMOKE HATCH.			
A	10" ALARM BELL.			
FACP	FIRE SYSTEM CONTROL PANEL.			
FASP	FIRE SYSTEM SMOKE PURGE CONTROL PANEL.			
F NY	FIRE SYSTEM N.Y.C.F.D. MASTER (ERS BOX).			
F	FIRE SYSTEM PULL STATION.			
	FIRE SIGNAL HORN.			
F	FIRE SIGNAL PULL STATION WITH FIRE SIGNAL HORN ABOVE.			
G	FIRE SIGNAL STROBE. SUBSCRIPT 'G' DENOTES WITH GUARD.			
G	FIRE SIGNAL HORN WITH FIRE SIGNAL STROBE. SUBSCRIPT 'G' DENOTES WITH GUARD.			
G	FIRE SIGNAL SPEAKER WITH FIRE SIGNAL STROBE. SUBSCRIPT 'G' DENOTES WITH GUARD.			
F G	FIRE SIGNAL PULL STATION WITH HORN AND STROBE ASSEMBLY ABOVE. SUBSCRIPT 'G' DENOTES WITH GUARD.			
FCO	FUSE CUTOUT PANEL.			
S	CLG MTD. SMOKE DETECTOR			
D	DUCT MTD SMOKE DETECTOR			
H	CLG MTD HEAT DETECTOR.			
W	WATER FLOW ALARM BELL.			
S #1.3	MOTORIZED FIRE AND SMOKE DAMPER.			
CZ	CONTROL ZAM			
MZ	MONITOR ZAM			

CLOCK AND PUBLIC ADDRESS SYSTEM SYMBOL LIST

SYMBOL	DESCRIPTION	A.F.F.	BACK BOX TYPE	MFG
G	FLUSH MOUNTED SIGNAL FACE CLOCK. SUBSCRIPT 'G' DENOTES WITH GUARD.			
	DOUBLE FACE SURFACE MOUNTED CLOCK.			
T	TIME RECORDER, SURFACE MOUNTED AT 4'-0' A.F.F.			
	FLUSH MOUNTED SPEAKER AND CLOCK IN COMMON FACE PLATE			

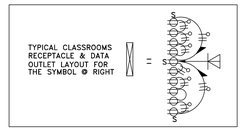
NOTES FOR FIRE ALARM DEVICES MOUNTING HEIGHTS

1. CENTERLINE ELEVATION FOR ALL GONGS AND STROBES TO BE LOCATED 80" MINIMUM ABOVE FLOOR OR 6" BELOW THE HUNG CEILING OR WHICHEVER IS LOWER.
2. CENTERLINE ELEVATION FOR ALL PULL STATIONS IS 48" ABOVE FLOOR.

TELECOMMUNICATION VIDEO & DATA SYSTEM SYMBOL LIST

SYMBOL	DESCRIPTION	A.F.F.	BACK BOX TYPE	MFG
IDF	TELEPHONE INTERCONNECTION BOARD MOUNTED AT 4'-6" A.F.F.			
WL	MULTIMEDIA WITH RJ45 JACK INSTALLED IN METAL LOCK BOX MOUNTED AT 4'-0" A.F.F.			
W	SAME AS ABOVE, EXCEPT WITHOUT METAL LOCK BOX.			
P	TELEPHONE OUTLET FOR PAY TELEPHONE, COORDINATED SO TOP OF INSTRUMENT AT 4'-0" A.F.F. "TDD" WHEN SHOWN MEAN TELEPHONE DEVICE FOR THE DEAF.			
C	TELEPHONE OUTLET FOR COURTESY PHONE, WITH SINGLE JACK AND PHONE, FLUSH MTD. AT 48" A.F.F. DESIGNATED AS POWER TRANSFERTROL DURING SYSTEM FAILURE.			
TDD	TELEPHONE OUTLET FOR TELECOM DEVICE FOR THE DEAF, FLUSH MOUNTED AT 18" A.F.F.			
	COMBINATION TRIPLEX WITH 1- RJ45 LABELED "DATA" & THE OTHER TWO (2) LABEL FAX & TELEPHONE OUTLET FLUSH MOUNTED AT 18" A.F.F.			
	SAME AS ABOVE BUT FLUSH FLOOR MOUNTED			
M	MASTER STATION FOR HOLDING AREA INTERCOM SYSTEM, FLUSH MOUNTED AT 4'-0" A.F.F.			
S	STAFF STATION FOR HOLDING AREA INTERCOM SYSTEM, FLUSH MOUNTED AT 4'-0" A.F.F.			
EL	MASTER STATION FOR ELEVATOR INTERCOM SYSTEM, FLUSH MOUNTED AT 4'-0" A.F.F.			
SE	PUBLIC STATION FOR ELEVATOR INTERCOM SYSTEM, FLUSH MOUNTED AT 4'-0" A.F.F.			
	PART OF ACCESS FLOOR WORK STATION MODULES FLUSH FLOOR MTD SINGLE JACK LABELED "DATA". REFER TO DWG. E-19. AND REFER DWG E-10 FOR COMP. CLRM POWER DATA DETAIL.			
	FLUSH FLOOR MTD TELEPHONE OUTLET WITH WIRING			
	TWO DUPLEX RECEPTACLE + 1- DATA OUTLET RJ45 JACK FLUSH FL MTD WITH CATEGORY 5E CABLES TO DATA JACK & POWER RECEPTACLE CIRCUITED AS INDICATED ON FL PLANS. CAST IRON WATER TIGHT, "WIRE MOLD" OMNIBOX/ WALKER FLOOR SYSTEM MODEL #880CS3-1 WITH #837B BRASS COMBINATION TILE & CARPET FLANGE WITH BRASS GFI COVER PLATE #628GFI OR APPROVED EQUAL			
	4-DUPLEX RECEPTACLE + 2-DUPLEX DATA OUTLET FLUSH FL MTD WITH CAT. 5E CABLES TO EACH DATA JACK. RECEPTACLE AS BE CIRCUITED AS FOLLOW: THE TOP FOUR (4) ON A CIRCUIT & THE BOTTOM FOUR (4) ON THE OTHER CIRCUIT. AMP MODEL #557801 OR APPROVED EQUAL FOR MOUNTING IN CONCRETE			
	MULTI-VIDEO INPUT BOX WITH FOUR A/V INPUT, FLUSH MOUNTED AT 18" A.F.F.			
	COMBINATION DUPLEX OUTLET WITH 1-RJ45 JACK LABELED DATA & THE OTHER LABELED VIDEO EACH WITH CAT. 5E CABLES RUN BACK TO ITS PATCH PANEL SYSTEM MOUNTED 18" AFF			
	COMBINATION FIBER & COPPER DATA JACKS WITH 2-RJ45 DATA JACK EACH WITH CAT. 5E CABLES & TWO (2) TYPE "SC" JACKS WITH 1-FIBER OPTIC CABLE WITH FOUR (4) STRAND FIBER OPTIC CONDUCTORS BACK TO PATCH PANELS.			
	DATA OUTLET "1-RJ45" JACK WITH CAT. 5E CABLES TO DATA RACK. MOUNTED 18" A.F.F.			
	VISUAL/AUDIBLE ANNUNCIATOR FOR THE HOLDING AREAS & ELEVATORS TO BE MTD IN THE GENERAL OFFICE. DEVICES LENS WHITE IN COLOR WITH A FLASH RATE 50-60 FLASHES PER MINUTE. (8 CANDELA & 85 DBA SEE SPECIFICATIONS)			

TYPICAL CLASSROOMS RECEPTACLE & DATA OUTLET LAYOUT FOR THE SYMBOL @ RIGHT



AUXILIARY SIGNALSYSTEM SYMBOL LIST

SYMBOL	DESCRIPTION	A.F.F.	BACK BOX TYPE	MFG
	NORMALLY OPEN LOW VOLTAGE PUSH BUTTON, MOUNTED AT 4'-0"A.F.F. AT EXTERIOR WALL.			
	AUXILIARY SIGNAL SYSTEM 6" VIBRATING BELL, MOUNTED AT 8'-0" A.F.F.			
RM	CONNECTION POINTS FOR MONITORING REFRIGERANT MONITORING SYSTEM PANEL BY THE AUXILIARY CONTROL PANEL			
ISC	INDICATING SYSTEM PANEL			
AUX	AUXILIARY SIGNAL SYSTEM PANEL @ THE GENERAL OFFICE			
HTA	CONNECTION POINTS FOR HIGH TEMPERATURE ALARM PANEL BY THE AUXILIARY CONTROL PANEL			
DLT	CONNECTION FOR POINTS DIESEL LEAK DETECTION SYSTEM & OVER FILL PANEL BY THE AUXILIARY CONTROL PANEL			
GD	CONNECTION POINTS FOR MONITORING GAS LEAK DETECTION SYSTEM PANEL BY THE AUXILIARY CONTROL PANEL			
RP21 RP22	CONNECTION POINTS FOR MONITORING RPZ#1 & RPZ#2 AUXILIARY CONTROL PANEL			
SP1 SP6	CONNECTION POINTS FOR MONITORING SUMP PUMPS #1 THOUGH #6A BY THE AUXILIARY CONTROL PANEL			
TLD	CONNECTION POINTS FOR MONITORING THE TANK LEAK DETECTION SYSTEM BY THE AUXILIARY CONTROL PANEL			
BZ	AUXILIARY SIGNAL SYSTEM BUZZER, MTD AT 8'-0" A.F.F. PROVIDED WITH STROBE WHEN INTALLED FOR REFRIGERATOR HIGH TEMP ALARM (WITH SAME VISUAL FEATURES AS UNIT FOR AREA OF REFUGE) LABELLED "HIGH TEMPERATURE ALARM"			

INTRUSION ALARM SYSTEM SYMBOL LIST

SYMBOL	DESCRIPTION	A.F.F.	BACK BOX TYPE	MFG
CP INT	INTRUSION ALARM SYSTEM CONTROL PANEL.			
W	PASSIVE INFRARED DETECTOR. INSCRIBE LETTER "W" INDICATES WIDE ANGLE AND INSCRIBE LETTER 'L' INDICATES LONG RANGE. ALL TO BE PROVIDED WITH GUARDS.			
	INTRUSION ALARM SIREN.			
	INTRUSION ALARM HORN/STROBE LIGHT.(WEATHERPROOF)			
	MAGNETIC DOOR CONTACTS.			
R	ROLL-UP DOOR CONTACTS.			
	INTRUSION ALARM PANIC SWITCH, FLUSH MOUNTED AT 4'-0" A.F.F.			
DP	INTRUSION ALARM ALPHANUMERIC DIGPAD, IN METAL ENCLOSURE, FLUSH MOUNTED AT 4'-0" A.F.F			
D	PASSIVE INFRARED AND ULTRASONIC INTRUSION ALARM DETECTOR			

ELECTRICAL DRAWING LIST

E-1	ABBREVIATIONS, GENERAL NOTES, SYBMOLS LIST, LIGHTING FIXTURE SCHEDULE
E-2	ELECTRICAL SITE PLAN
E-3	BASEMENTFLOOR LIGHTING PLAN
E-4A	BASEMENT FLOOR POWER, VOICE DATA & TV PLAN
E-4B	BASEMENT FLOOR FIRE ALARM & FIRE SMOKE DAMPER PLAN
E-4C	BASEMENT FLOOR PA/CLOCK, ELEVATOR & FIRE RESCUE, INTERCOM, INTRUSION, CCTV, MISC. & AUX. SIGNAL PLAN
E-5	FIRST FLOOR LIGHTING PLAN
E-6A	FIRST FLOOR POWER, VOICE DATA & TV PLAN
E-6B	FIRST FLOOR FIRE ALARM & FIRE SMOKE DAMPER PLAN
E-6C	FIRST FLOOR PA/CLOCK, ELEVATOR & FIRE RESCUE, INTERCOM, INTRUSION, CCTV, MISC. & AUX. SIGNAL PLAN
E-7	SECOND FLOOR LIGHTING PLAN
E-8A	SECOND FLOOR POWER, VOICE DATA & TV PLAN
E-8B	SECOND FLOOR FIRE ALARM & FIRE SMOKE DAMPER PLAN
E-8C	SECOND FLOOR PA/CLOCK, ELEVATOR & FIRE RESCUE, INTERCOM, INTRUSION, CCTV, MISC. & AUX. SIGNAL PLAN
E-9	THIRD FLOOR LIGHTING PLAN
E-10A	THIRD FLOOR POWER, VOICE DATA & TV PLAN
E-10B	THIRD FLOOR FIRE ALARM & FIRE SMOKE DAMPER PLAN
E-10C	THIRD FLOOR PA/CLOCK, ELEVATOR & FIRE RESCUE, INTERCOM, INTRUSION, CCTV, MISC. & AUX. SIGNAL PLAN
E-11	PENTHOUSE FLOOR LIGHTING PLAN
E-12A	PENTHOUSE POWER, VOICE DATA & TV PLAN
E-12B	PENTHOUSE FIRE ALARM & FIRE SMOKE DAMPER PLAN
E-12C	PENTHOUSE PA/CLOCK, ELEVATOR & FIRE RESCUE, INTERCOM, INTRUSION, CCTV, MISC. & AUX. SIGNAL PLAN
E-13	FIRST FLOOR KITCHEN POWER & SCHEDULE PART PLAN
E-14	ELECTRICAL SINGLE LINE DIAGRAM
E-15	ELECTRICAL LIGHTING AND POWER DISTRIBUTION RISER DIAGRAM
E-16	ELECTRICAL DISTRIBUTION BOARD AND PANEL SCHEDULES
E-17	ELECTRICAL PANEL SCHEDULES
E-18	ELECTRICAL PANEL SCHEDULES
E-19	ELECTRICAL TELECOMMUNICATIONS RISER DIAGRAM
E-20	ELECTRICAL DATA DISTRIBUTION SYSTEMS RISER DIAGRAM
E-21	ELECTRICAL CATV AND TELEVISION DISTRIBUTION RISER DIAGRAM
E-22	ELECTRICAL INTRUSION ALARM SYSTEM RISER DIAGRAM
E-22A	ELECTRICAL CCTV SYSTEM RISER DIAGRAM
E-23	FIRE ALARM SYSTEM RISER DIAGRAM
E-24	ELECTRICAL CLOCK AND PUBLIC ADDRESS SYSTEM RISER DIAGRAM
E-25	ELECTRICAL AUXILIARY BELL SYSTEM RISER DIAGRAM
E-26	ELECTRICAL EXIT LIGHTING RISER DIAGRAM
E-27	ELECTRICAL ELEVATOR AND HOLDING AREA COMMUNICATION SYSTEM RISER DIAGRAM
E-28	ELECTRICAL DETAILS AND SCHEMATIC WIRING DIAGRAMS
E-29	ELECTRICAL DETAILS AND SCHEMATIC WIRING DIAGRAMS
E-30	ELECTRICAL DETAILS AND SCHEMATIC WIRING DIAGRAMS
E-31	ELECTRICAL DETAILS AND SCHEMATIC WIRING DIAGRAMS
E-32	ELECTRICAL DETAILS AND SCHEMATIC WIRING DIAGRAMS
E-33	ELECTRICAL LIGHTNING PROTECTION SYSTEM PLAN
E-33A	ELECTRICAL LIGHTNING PROTECTION SYSTEM PLAN
E-33B	ELECTRICAL LIGHTNING PROTECTION DETAIL DIAGRAM
E-34	ELECTRICAL LIGHTNING PROTECTION SYSTEM SYMBOL LIST, NOTES AND DETAILS

LIGHTING FIXTURE SCHEDULE

TYPE	GENERAL LOCATION	MOUNTING	LAMPS	MANUFACTURER CATALOG NUMBER	BALLAST	VOLTS	REMARK'S
A	CLASS ROOMS, OFFICES, & CORRIDORS	RECESSED	3-32W-T8	LIGHTOLIER # NPRS2GRFVA340277SO	ELECTRONIC	277V	
B	STAIR CASE, STORAGE, LIBRARY	RECESSED	2-6U-T8	LIGHTOLIER # NVPS2G12PF326277SO			
C	KITCHEN	METAL CEILING RECESSED	2-6U-T8	LIGHTOLIER # WES2GFSVA26U277SO			METAL PAN CEILING
D	SHOWERS	RECESSED	1-13W-PL 2-PIN	LIGHTOLIER # 1178SH/1102F1			
E	COMPUTER RM	RECESSED	3-32W-T8	LIGHTOLIER # NVPS2G12PF32027SO			
G	BATHROOMS	RECESSED	2-32W-T8	LIGHTOLIER # SPS1GFSVA232277SO			
H	MECH. SPACES	SURFACE OR PENDANT	2-32W-T8	LIGHTOLIER # WB240277SO			
H1	TUNNEL SPACE ELEV. PIT, PIPE CHASE	WALL	1-32W HF COMPACT FLUORESCENT	EXCELINE # RL-W-32-HF-L-G-C-TW-4			
I	STUDENT DINING	RECESSED	400MH (RESTIKE)	EXCELINE# NRHLAF400MH-277-EM			WITH PRISMATIC LENS
J	GYMNASIUM	PENDANT	400W PR-LAMP METAL HALIDE	HOLOPHANE # EGP40LMH-MT-Q E3IFI09193-09162-3-LAMP			(WITH GUARDS)
J1	GYMNASIUM	PENDANT	400W PR-LAMP METAL HALIDE	HOLOPHANE # EGP40LMH-MT-Q E3IFI09193-09162-3-LAMP-EM (RESTIKE)			(WITH GUARDS)
K	AUDITORIUM	RECESSED	2-26W	LIGHTOLIER # 8096FCLW/7226H-277			
L	AUDITORIUM	PENDANT	400W	LIGHTOLIER # C12CL/CS12450MH		120V	LIGHTING FIXTURES ON EMERGENCY CIRCUIT AS BE PROVIDED WITH RESTIKE (EM)
L1	STAGE	PENDANT	250W	LIGHTOLIER # C12CL/CS12250MH		277V	LIGHTING FIXTURES ON EMERGENCY CIRCUIT AS BE PROVIDED WITH RESTIKE (EM)
M	CANOPYS	WALL	150W MH	ELLIPTIPAR # M151-150G SERIES			
M1	CANOPYS	RECESSED	150W MH	KIRLIN # RR40913			
N	LOBBY	RECESSED	1-70W PAR30	LIGHTOLIER # SRP30MH			
O	MECH. RMS/ STAIR CASE	PENDANT/ SURFACE	2-75W-96" SLIMLINE (T8)	LIGHTOLIER # KLT-2-96-277-SS			
O1	STAIR CASE	SURFACE OR WALL	2-40W (T8)	LIGHTOLIER # KLT-2-40-277-SS			
P	GAS METER RM	PENDANT	2-40W-(T8) BI-PIN	APPLETON # ARS240-277ESB			
Q	STORAGE	RECESSED SHEETROCK	3-T8	LIGHTOLIER # NPRA2FRFVE3U4277SO			
R	STORAGE	RECESSED SHEETROCK	3-T8	LIGHTOLIER # NPRA2FRFVE340277SO			
S	CORRIDORS	RECESSED	400W MH	HOLOPHANE # MU-400MH-277-G-ST-82MUBT-LAMP			
S1	CORRIDORS	RECESSED	400W MH+EM (RESTIKE)	HOLOPHANE # MU-400MH-277-G-ST-82MUBT-EM-LAMP			
T	LIBRARY	RECESSED	2-26W QUAD TUBE	LIGHTOLIER # 8056/7226HU-277			
U	STUDENT DINING	RECESSED	3-BAIX	LIGHTOLIER# NSPS2GFSVA3U4BX-SO-277			
U1	STUDENT DINING	RECESSED	2-U6	LIGHTOLIER# NSPS2GFSVAZU6-SO-277			
V	WALL PACK	WALL	150W	HOLOPHANE # WL2K-150MH-MT-BZ			
EXIT SIGNS	CORRIDORS & STAIRCASE	AS SHOWN ON DWGS	L.E.D.	SAFE-I-LITE # SE-EGLD-SERIES			

Drawing Title:

ELECTRICAL GENERAL NOTES, SYSMBOL LIST

Drawing No.:

E-1

PROPOSED INCOMING CABLE TELEVISION SERVICE, 1-4" INNER DIAMETER PVC SCHEDULE 40 CONDUITS WITH DRAG LINE TO UTILITY POLE # 75720 FROM THE TELECOMMUNICATIONS ROOM (CAPPED WITH WEATHER PROOF REMOVABLE CAP) COORDINATE ALL REQUIREMENTS WITH "TIME WARNER CABLE" CABLE COMPANY

PROPOSED INCOMING CABLE TELEVISION SERVICE, 2-2 1/2" INNER DIAMETER PVC SCHEDULE 40 CONDUITS WITH DRAG LINE VIA TYPE "A" MANHOLE TO SCHOOL TELECOMMUNICATIONS ROOM ON PENTHOUSE (CAPPED WITH WEATHER PROOF REMOVABLE CAP) COORDINATE ALL REQUIREMENTS WITH "TIME WARNER CABLE" CABLE COMPANY

PROPOSED INCOMING TELEPHONE SERVICE VIA TYPE "A" MANHOLE, 2-4" PVC SCHEDULE 40 CONDUITS WITH 2-45° OR 1-90° RADIAL SWEEP WITH DRAG LINE TO THE SCHOOL TELECOMMUNICATIONS ROOM LOCATED ON THE PENTHOUSE OF THIS SCHOOL . COORDINATE ALL REQUIREMENTS WITH VERIZON TELEPHONE COMPANY .

PROPOSED INCOMING CABLE TELEVISION SERVICE, 2-2 1/2" INNER DIAMETER PVC SCHEDULE 40 CONDUITS WITH DRAG LINE VIA TYPE "A" MANHOLE TO SCHOOL TELECOMMUNICATIONS ROOM ON PENTHOUSE (CAPPED WITH WEATHER PROOF REMOVABLE CAP) COORDINATE ALL REQUIREMENTS WITH "TIME WARNER CABLE" CABLE COMPANY

PROPOSED INCOMING FIRE ALARM SERVICE AREAL RUN FROM POLE # 75720 TO POLE #83551 WITH 1-4PAIR FIRE ALARM CABLE FROM THE NEAREST FIRE DEPARTMENT FIRE ALARM MANHOLE. COORDINATE ALL REQUIREMENT WITH THE FIRE DEPARTMENT.

PROPOSED INCOMING FIRE ALARM SERVICE 1-3" PVC SCHEDULE 40 CONDUIT & BEND WITH 1-4PAIR FIRE ALARM CABLE FROM THE NEAREST FIRE DEPARTMENT FIRE ALARM MANHOLE. COORDINATE ALL REQUIREMENT WITH THE FIRE DEPARTMENT

PROPOSED TYPE "A" FIRE DEPARTMENT MANHOLE

PROPOSED INCOMING FIRE ALARM SERVICE 1-3" PVC SCHEDULE 40 CONDUIT & BEND WITH 1-4PAIR FIRE ALARM CABLE TO POLE #75720 FOR AREAL RUN TO NEAREST FIRE DEPT MANHOLE. COORDINATE WITH THE FIRE DEPARTMENT

PROPOSED INCOMING TELEPHONE SERVICE VIA 2-4" PVC SCHEDULE 40 CONDUITS WITH 2-45° OR 1-90° RADIAL SWEEP WITH DRAG LINE TO UTILITY POLE # 75720 FROM THE TELEPHONE COMPANY ROOM (CAPPED WITH WEATHER PROOF REMOVABLE CAP) COORDINATE ALL REQUIREMENTS WITH THE TELEPHONE TELEPHONE COMPANY

PROPOSED INCOMING CABLE TELEVISION SERVICE, 2-2 1/2" INNER DIAMETER PVC SCHEDULE 40 CONDUITS WITH DRAG LINE VIA TYPE "A" MANHOLE TO SCHOOL TELECOMMUNICATIONS ROOM ON PENTHOUSE (CAPPED WITH WEATHER PROOF REMOVABLE CAP) COORDINATE ALL REQUIREMENTS WITH "TIME WARNER CABLE" CABLE COMPANY

PROPOSED INCOMING TELEPHONE SERVICE VIA TYPE "A" MANHOLE, 2-4" PVC SCHEDULE 40 CONDUITS WITH 2-45° OR 1-90° RADIAL SWEEP WITH DRAG LINE TO THE SCHOOL TELECOMMUNICATIONS ROOM LOCATED ON THE PENTHOUSE OF THIS SCHOOL . COORDINATE ALL REQUIREMENTS WITH VERIZON TELEPHONE COMPANY

PROPOSED TYPE "A" FIRE DEPARTMENT MANHOLE

4" FIBER GLASS CONDUIT FOR PRIMARY FEEDER 2'-6" BELLOW GRADE (TYPICAL OF 2) APPROXIMATELY 23.5' FROM THE OTHER PRIMARY FEEDER

1-4" FIBER GLASS CONDUIT FOR PRIMARY FEEDER 2'-6" BELLOW GRADE (TYPICAL OF 2) APPROXIMATELLY 23.5' FROM THE OTHER PRIMARY FEEDER

8 SETS OF 4#500 MCM FROM TRANSFORMER VAULTS #2 & #3 TO MANHOLES TO PROVIDE SPLICES TO EXTEND 10 SETS OF 4#500MCM TO PS-286, AND 14 SETS OF 4#300 MCM TO PS/IS 208 ELECTRICAL SERVICE ROOMS, RESPECTIVELY.

PROPOSED INCOMING TELEPHONE SERVICE VIA TYPE "A" MANHOLE, 2-4" PVC SCHEDULE 40 CONDUITS WITH 2-45° OR 1-90° RADIAL SWEEP WITH DRAG LINE TO THE VERIZON TELEPHONE COMPANY ROOM (CAPPED WITH WEATHER PROOF REMOVABLE CAP). COORDINATE ALL REQUIREMENTS WITH VERIZON TELEPHONE COMPANY .

RUN FROM VERIZON TELEPHONE COMPANY RM. 2-4" PVC SCHEDULE 40 CONDUITS WITH 2-45° OR 1-90° RADIAL SWEEP WITH DRAG LINE TO THE TYPE "A" MANHOLE FROM THE TELEPHONE COMPANY ROOM (CAPPED WITH WEATHER-PROOF REMOVABLE CAP) COORDINATE ALL REQUIREMENTS WITH THE "VERIZON" TELEPHONE COMPANY

10'X10' MINIMUM PHONE COMPANY'S ROOM RUN FROM THIS ROOM TO THE SCHOOL TELECOMMUNICATIONS ROOM 2-4" PVC SCHEDULE 40 CONDUITS WITH 2-45° OR 1-90° RADIAL SWEEP WITH DRAG LINE. COORDINATE ALL REQUIREMENTS WITH THE VERIZON TELEPHONE COMPANY

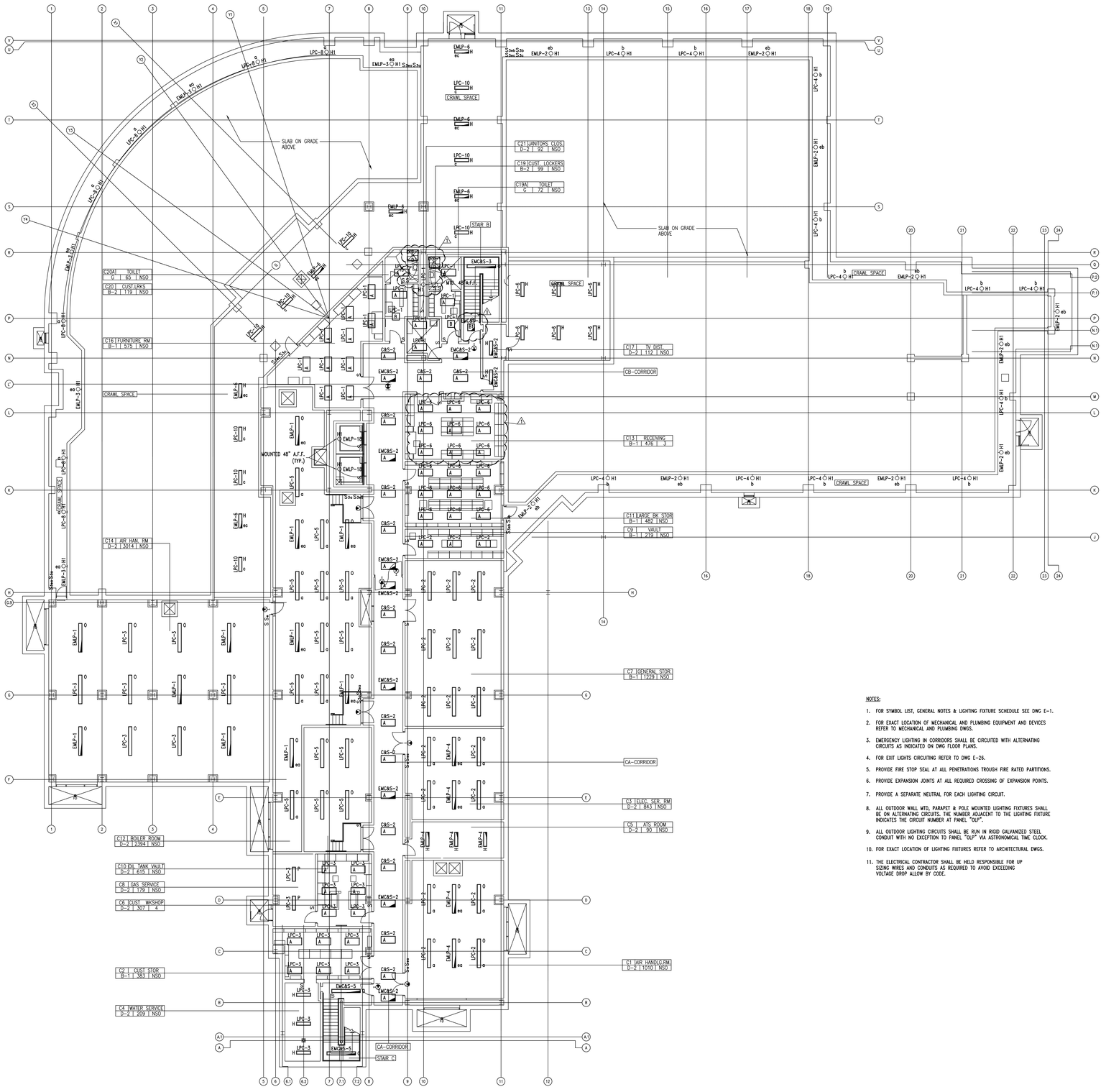
ELECTRIC DISTRIBUTION
ELECTRIC POWER (PRIMARY)
ELECTRIC POWER (SECONDARY)
FIRE ALARM SERVICE
TELEPHONE SERVICE
CABLE T.V. SERVICE

77TH CRESCENT
76TH AVENUE
REHABILITATION DRIVE
P.S./I.S.
P.S./I.S. PLAY YARD
PROPOSED TYPE "A" FIRE DEPARTMENT MANHOLE
HIGH SCHOOL
BLDG. 39
EXISTING UTILITY TUNNEL TO REMAIN
EXISTING ELECTRIC AND COMMUNICATION DUCTBANKS TO REMAIN
ADJUST ALL EXISTING AFFECTED MH, MHC/VALVES WITHIN PROJECT LIMITS TO FINAL GRADE (TYP.)
MAINTAIN EXISTING UNDERGROUND UTILITIES THROUGHOUT DURATION OF PROJECT. ADJUST MH RIMS AND VALVES TO FINAL GRADE AS REQUIRED. RELOCATE ANY/ALL UTILITIES AS REQUIRED. (TYPICAL)
PROPERTY LINE (TYP.)

Drawing Title:
ELECTRICAL
SITE PLAN

Drawing No.:
E-2

01



NOTES:

1. FOR SYMBOL LIST, GENERAL NOTES & LIGHTING FIXTURE SCHEDULE SEE DWG E-1.
2. FOR EXACT LOCATION OF MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES REFER TO MECHANICAL AND PLUMBING DWGS.
3. EMERGENCY LIGHTING IN CORRIDORS SHALL BE CIRCUITED WITH ALTERNATING CIRCUITS AS INDICATED ON DWG FLOOR PLANS.
4. FOR EXIT LIGHTS CIRCUITING REFER TO DWG E-26.
5. PROVIDE FIRE STOP SEAL AT ALL PENETRATIONS TROUGH FIRE RATED PARTITIONS.
6. PROVIDE EXPANSION JOINTS AT ALL REQUIRED CROSSING OF EXPANSION POINTS.
7. PROVIDE A SEPARATE NEUTRAL FOR EACH LIGHTING CIRCUIT.
8. ALL OUTDOOR WALL MTD, PARAPET & POLE MOUNTED LIGHTING FIXTURES SHALL BE ON ALTERNATING CIRCUITS. THE NUMBER ADJACENT TO THE LIGHTING FIXTURE INDICATES THE CIRCUIT NUMBER AT PANEL "OLP".
9. ALL OUTDOOR LIGHTING CIRCUITS SHALL BE RUN IN RIGID GALVANIZED STEEL CONDUIT WITH NO EXCEPTION TO PANEL "OLP" VIA ASTRONOMICAL TIME CLOCK.
10. FOR EXACT LOCATION OF LIGHTING FIXTURES REFER TO ARCHITECTURAL DWGS.
11. THE ELECTRICAL CONTRACTOR SHALL BE HELD RESPONSIBLE FOR UP SIZING WIRES AND CONDUITS AS REQUIRED TO AVOID EXCEEDING VOLTAGE DROP ALLOW BY CODE.

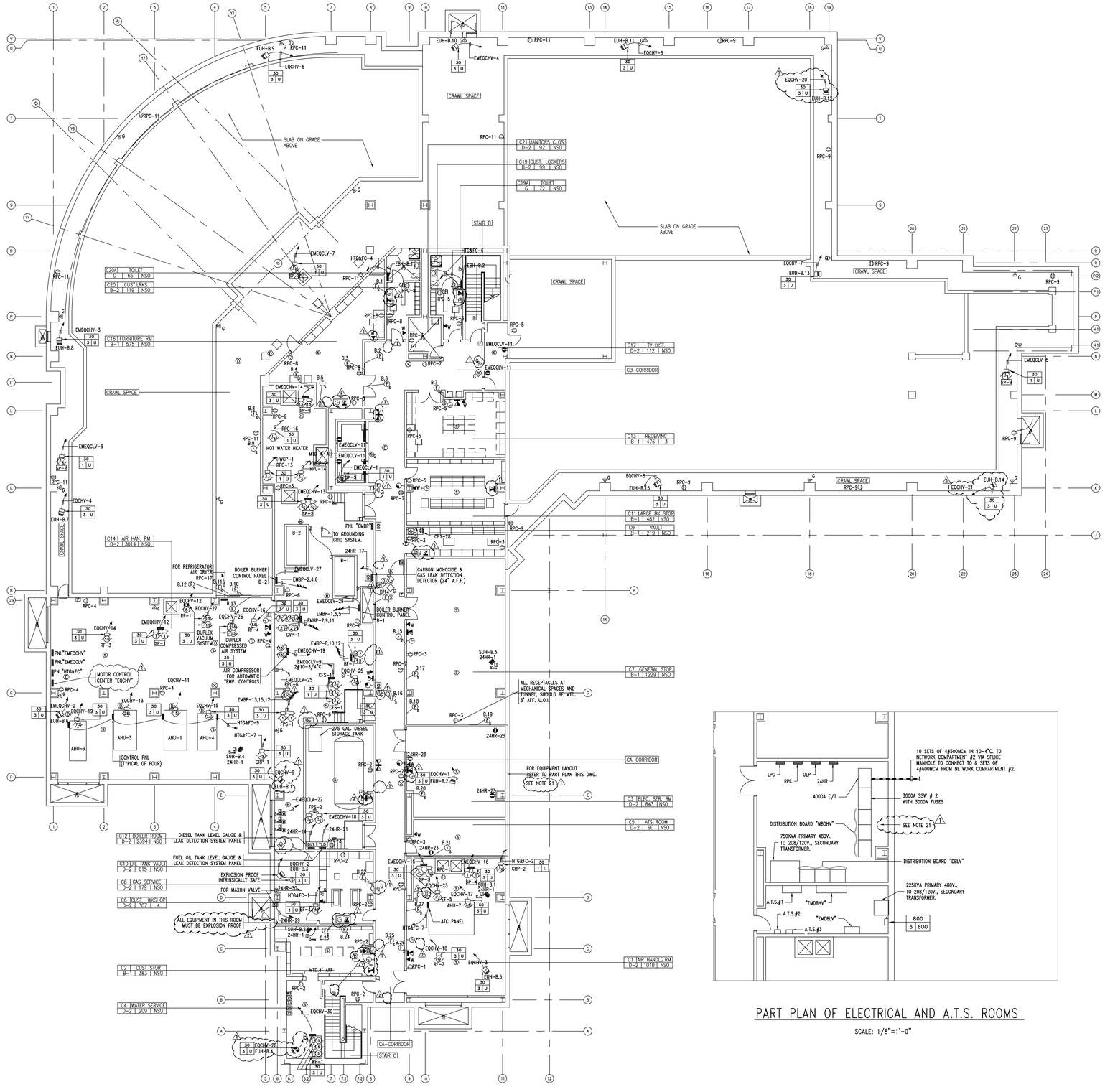
SCALE: 3/32" = 1'-0"
0 4' 8' 16' 32'
SCALE IN FEET

Drawing Title: ELECTRICAL BASEMENT LIGHTING PLAN

Drawing No.:

E-3

01



NOTES:

1. FOR SYMBOLS LIST, GENERAL NOTES, LIGHTING FIXTURE SCHEDULE AND ABBREVIATIONS REFER TO DWG. E-1
2. FOR EXACT LOCATION AND MOUNTING HEIGHTS OF PLUMBING AND HVAC EQUIPMENT REFER TO PLUMBING AND HVAC DWGS.
3. ALL CONDUIT PENETRATIONS THROUGH FIRE RATED PARTITIONS ARE TO BE PROVIDED WITH FIRE STOP SEALS AS REQUIRED BY CODE TO MAINTAIN FIRE RATING OF PARTITIONS
4. ALL FLUSH FLOOR AND PEDESTAL MOUNTING TELEPHONE, DATA, AND RECEPTACLE CONDUITS TO BE RUN IN FLOOR SLAB, ARE TO BE PROVIDED WITH RADIUS SWEEP TERMINATED IN FLOOR MOUNTED JUNCTION BOX.
5. PROVIDE STARTERS FOR ALL MOTORS.
6. ALL LOW VOLTAGE SYSTEMS (EXCLUDING FIRE ALARM, PUBLIC ADDRESS, HOLDING AREAS, AND AND ELEVATOR COMMUNICATIONS SYSTEMS) SHALL BE RUN TO CABLE TRAY AND TO TELECOMMUNICATIONS/SYSTEM CLOSETS/ROOMS.
ALL LOW VOLTAGE WIRING SHALL BE RUN IN CABLE TRAY ABOVE CEILING IN SPACES, TO SYSTEM CLOSET ON EACH FLOOR EXCEPT FOR SYSTEMS INDICATED ABOVE.
7. ALL COMPUTER CIRCUITS SHALL BE PROVIDED WITH THEIR OWN SEPARATE NEUTRAL AND GROUND CONDUCTORS.
8. ALL PENETRATIONS TO & IN BUILDING SHALL BE MADE VERMIN PROOF.
9. UNLESS OTHERWISE NOTED ON DRAWINGS EXACT LOCATION AND MOUNTING HEIGHTS OF OUTLETS, AND EQUIPMENT SHALL BE AS INDICATED ON SYMBOL LIST AND SPECIFICATIONS.
10. FOR SINGLE LINE DIAGRAM REFER TO DWGS E-14. FOR LIGHT AND POWER RISER DIAGRAM REFER TO DWGS E-15. FOR PANEL SCHEDULES (CONDUIT & CONDUCTORS SIZES) REFER TO DWGS E-16, E-17, & E-18.
11. FOR MOTOR STARTER SCHEDULE REFER TO DWG. E-1
12. ELECTRICAL CONTRACTOR TO PROVIDE ALL CONTROL WIRING FROM EACH A.T.S. PANEL TO GENERATOR AS REQUIRED FOR GENERATOR ACTIVATION.
13. FOR EXACT LOCATION OF ELECTRICAL EQUIPMENT & DEVICES REFER TO ARCHITECTURAL DWGS.
14. PROVIDE BREAK GLASS STATION FOR SHUTDOWN OF BOILER PANELS OUTSIDE ROOM C12 AND OUTSIDE CHILLER ROOM.
15. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE EXACT LOCATION, SIZE OF SERVICE END BOX, AND FINAL POINT OF SERVICE ENTRY WITH UTILITY COMPANY.

NOTES FOR FIRE ALARM DEVICES MOUNTING HEIGHTS

1. CENTERLINE ELEVATION FOR ALL GONGS AND STROBES TO BE LOCATED 80" MINIMUM ABOVE FINISH FLOOR OR 6" BELOW THE HUNG CEILING WHICHEVER IS LOWER.
2. CENTERLINE ELEVATION FOR ALL PULL STATIONS IS 48" ABOVE FINISHED FLOOR.

PART PLAN OF ELECTRICAL AND A.T.S. ROOMS

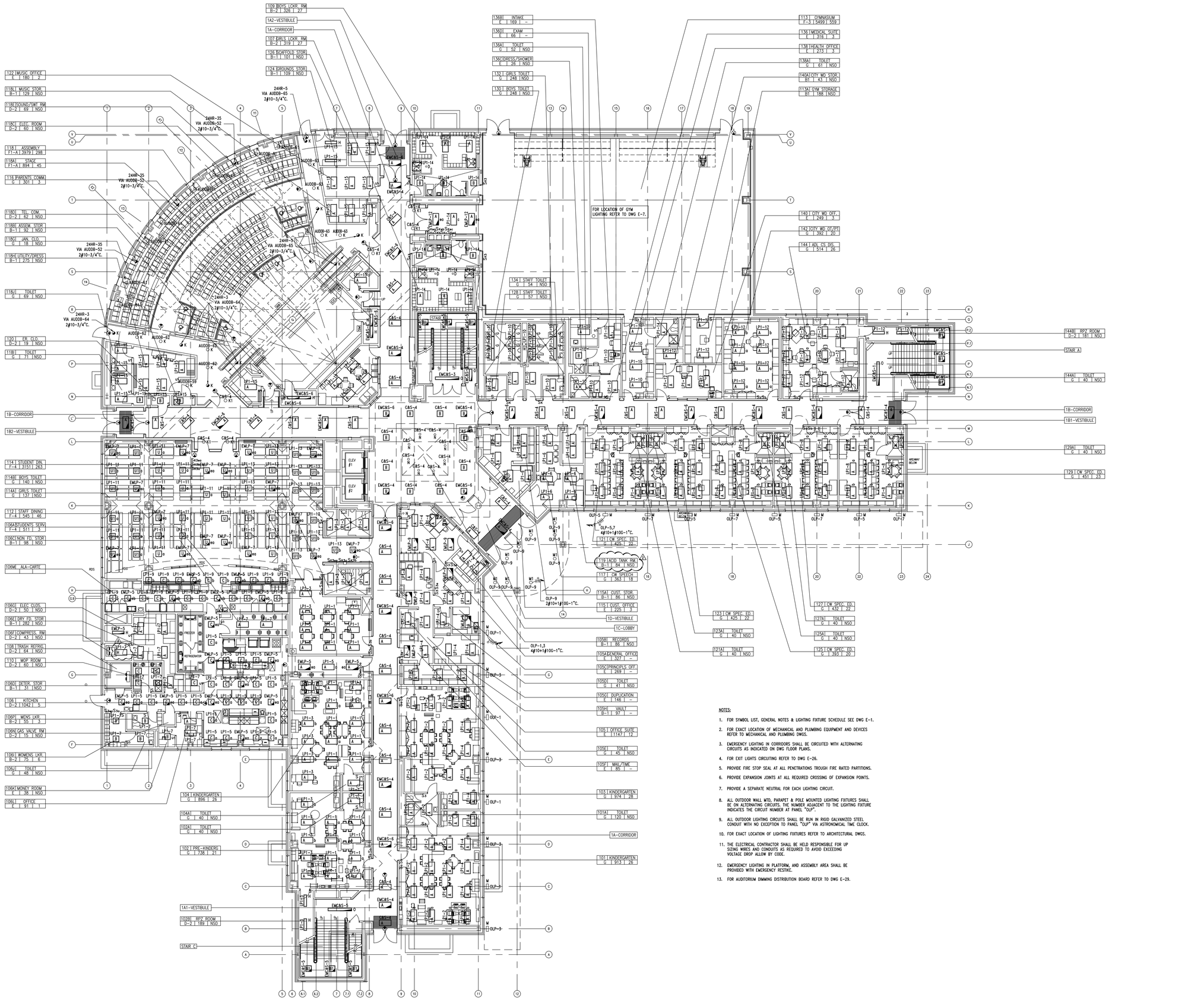
SCALE: 1/8"=1'-0"

SCALE: 3/32" = 1'-0"
0 4' 8' 16' 32'
SCALE IN FEET

Drawing Title:
ELECTRICAL
BASEMENT POWER
AND SYSTEMS PLAN

Drawing No.:
E-4

01



NOTES:

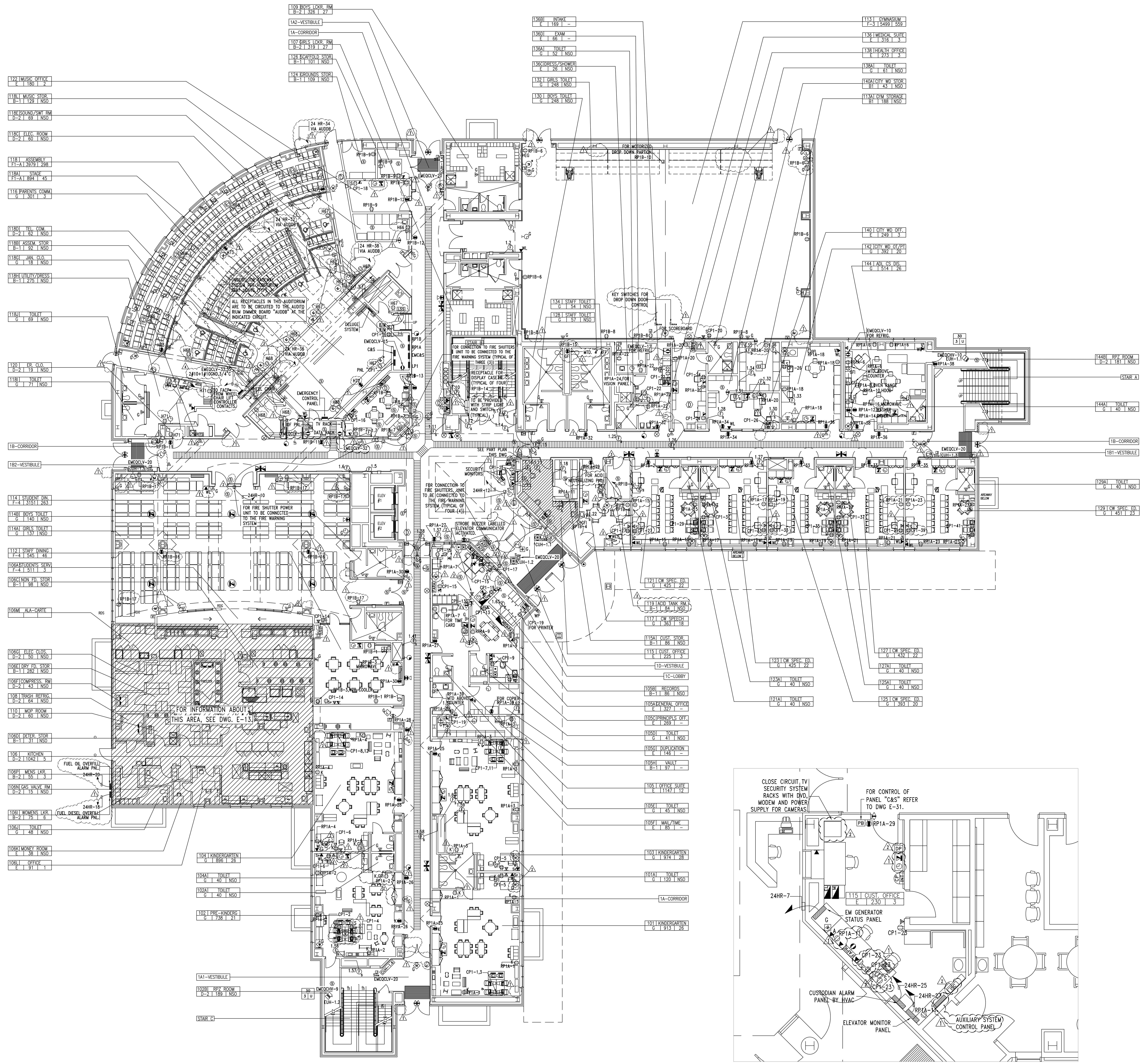
1. FOR SYMBOL LIST, GENERAL NOTES & LIGHTING FIXTURE SCHEDULE SEE DWG E-1.
2. FOR EXACT LOCATION OF MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES REFER TO MECHANICAL AND PLUMBING DWGS.
3. EMERGENCY LIGHTING IN CORRIDORS SHALL BE CIRCUITED WITH ALTERNATING CIRCUITS AS INDICATED ON DWG FLOOR PLANS.
4. FOR EXT LIGHTS CIRCUITING REFER TO DWG E-26.
5. PROVIDE FIRE STOP SEAL AT ALL PENETRATIONS TROUGH FIRE RATED PARTITIONS.
6. PROVIDE EXPANSION JOINTS AT ALL REQUIRED CROSSING OF EXPANSION POINTS.
7. PROVIDE A SEPARATE NEUTRAL FOR EACH LIGHTING CIRCUIT.
8. ALL OUTDOOR WALL MTD, PARAPET & POLE MOUNTED LIGHTING FIXTURES SHALL BE ON ALTERNATING CIRCUITS. THE NUMBER ADJACENT TO THE LIGHTING FIXTURE INDICATES THE CIRCUIT NUMBER AT PANEL "OLP".
9. ALL OUTDOOR LIGHTING CIRCUITS SHALL BE RUN IN RIGID GALVANIZED STEEL CONDUIT WITH NO EXCEPTION TO PANEL "OLP" VIA ASTRONOMICAL TIME CLOCK.
10. FOR EXACT LOCATION OF LIGHTING FIXTURES REFER TO ARCHITECTURAL DWGS.
11. THE ELECTRICAL CONTRACTOR SHALL BE HELD RESPONSIBLE FOR UP SIZING WIRES AND CONDUITS AS REQUIRED TO AVOID EXCEEDING VOLTAGE DROP ALLOW BY CODE.
12. EMERGENCY LIGHTING IN PLATFORM, AND ASSEMBLY AREA SHALL BE PROVIDED WITH EMERGENCY RESTIKE.
13. FOR AUDITORIUM DIMMING DISTRIBUTION BOARD REFER TO DWG E-29.

SCALE: 3/32" = 1'-0"
0 4' 8' 16' 32'
SCALE IN FEET

Drawing Title: ELECTRICAL FIRST FLOOR LIGHTING PLAN

Drawing No.: E-5

01



PART PLAN OF CUSTODIAN OFFICE

SCALE: 1/4"=1'-0"

NOTES:

1. FOR SYMBOLS LIST, GENERAL NOTES, LIGHTING FIXTURE SCHEDULE AND ABBREVIATIONS REFER TO DWG. E-1
2. FOR EXACT LOCATION AND MOUNTING HEIGHTS OF PLUMBING AND HVAC EQUIPMENT REFER TO PLUMBING AND HVAC DWGS.
3. ALL CONDUIT PENETRATIONS THROUGH FIRE RATED PARTITIONS ARE TO BE PROVIDED WITH FIRE STOP SEALS AS REQUIRED BY CODE TO MAINTAIN FIRE RATING OF PARTITIONS
4. ALL FLUSH FLOOR AND PEDESTAL MOUNTING TELEPHONE, DATA, AND RECEPTACLE CONDUITS TO BE RUN IN FLOOR SLAB, ARE TO BE PROVIDED WITH RADIUS SWEEP TERMINATED IN FLOOR MOUNTED JUNCTION BOX.
5. PROVIDE STARTERS FOR ALL MOTORS.
6. ALL LOW VOLTAGE SYSTEMS (EXCLUDING FIRE ALARM, PUBLIC ADDRESS, HOLDING AREAS, AND AND ELEVATOR COMMUNICATIONS SYSTEMS) SHALL BE RUN TO CABLE TRAY AND TO TELECOMMU NICATIONS/SYSTEM CLOSETS/ROOMS.
   ALL LOW VOLTAGE WIRING SHALL BE RUN IN CABLE TRAY ABOVE CEILING IN SPACES, TO SYSTEM CLOSET ON EACH FLOOR EXCEPT FOR SYSTEMS INDICATED ABOVE.
7. MAGNETIC DOOR HOLDERS SHALL BE CIRCUITED TO ONE CIRCUIT BREAKER AT ONE EMERGENCY PANEL (TYPICAL FOR EACH FLOOR).
8. ALL COMPUTER CIRCUITS SHALL BE PROVIDED WITH THEIR OWN SEPARATE NEUTRAL AND GROUND CONDUCTORS.
9. ALL PENETRATIONS TO/IN BUILDING SHALL BE MADE VERMIN PROOF.
10. UNLESS OTHERWISE NOTED ON DRAWINGS EXACT LOCATION AND MOUNTING HEIGHTS OF OUTLETS, AND EQUIPMENT SHALL BE AS INDICATED ON SYMBOL LIST AND SPECIFICATIONS.
11. PROVIDE CABLE TRAY AS SHOWN ON DWGS. REFER TO SPECIFICATION SECTION 16110-4.J. FOR CABLE TRAY DIMENSION, MOUNTING, AND ETC..
12. FOR SINGLE LINE DIAGRAM REFER TO DWGS E-14. FOR LIGHTAND POWER RISER DIAGRAM REFER TO DWGS E-15. FOR PANEL SCCHEDULES (CONDUIT & CONDUCTORS SIZES) REFER TO DWGS E-16, E-17, & E-18.
13. FOR MOTOR STARTER SCHEDULE REFER TO DWG. E-1
14. ELECTRICAL CONTRACTOR TO PROVIDE ALL CONTROL WIRING FROM EACH A.T.S. PANEL TO GENERATOR AS REQUIRED FOR GENERATOR ACTIVATION.
15. CITY POLICE SYSTEM TO BE PART OF CITY F.A. SYSTEM. FIRE ALARM BOX TO CONTAIN SEPARATE CITY POLICE & FIRE DEPARTMENT CALL STATIONS.
16. PROVIDE INTERCONNECTION FROM MASTER CLOCK SYSTEM (AT TELECOMMUNICATION ROOM) TO TIME RECORDER IN CUSTODIANS OFFICE.
17. PROVIDE 1-2" RGS CONDUIT WITH DRAG LINE FROM TELECOMMUNICATION ROOM TO TERMINATE AT A JUNCTION BOX LOCATED ABOVE HUNG CEILING IN CUSTODIANS OFFICE.
18. FOR EXACT LOCATION OF ELECTRICAL EQUIPMENT & DEVICES REFER TO ARCHITECTURAL DWGS.
19. "PB" PUSHBUTTOM CONTROL FOR PANEL "C&S" LIGHTING.

NOTES FOR FIRE ALARM DEVICES MOUNTING HEIGHTS

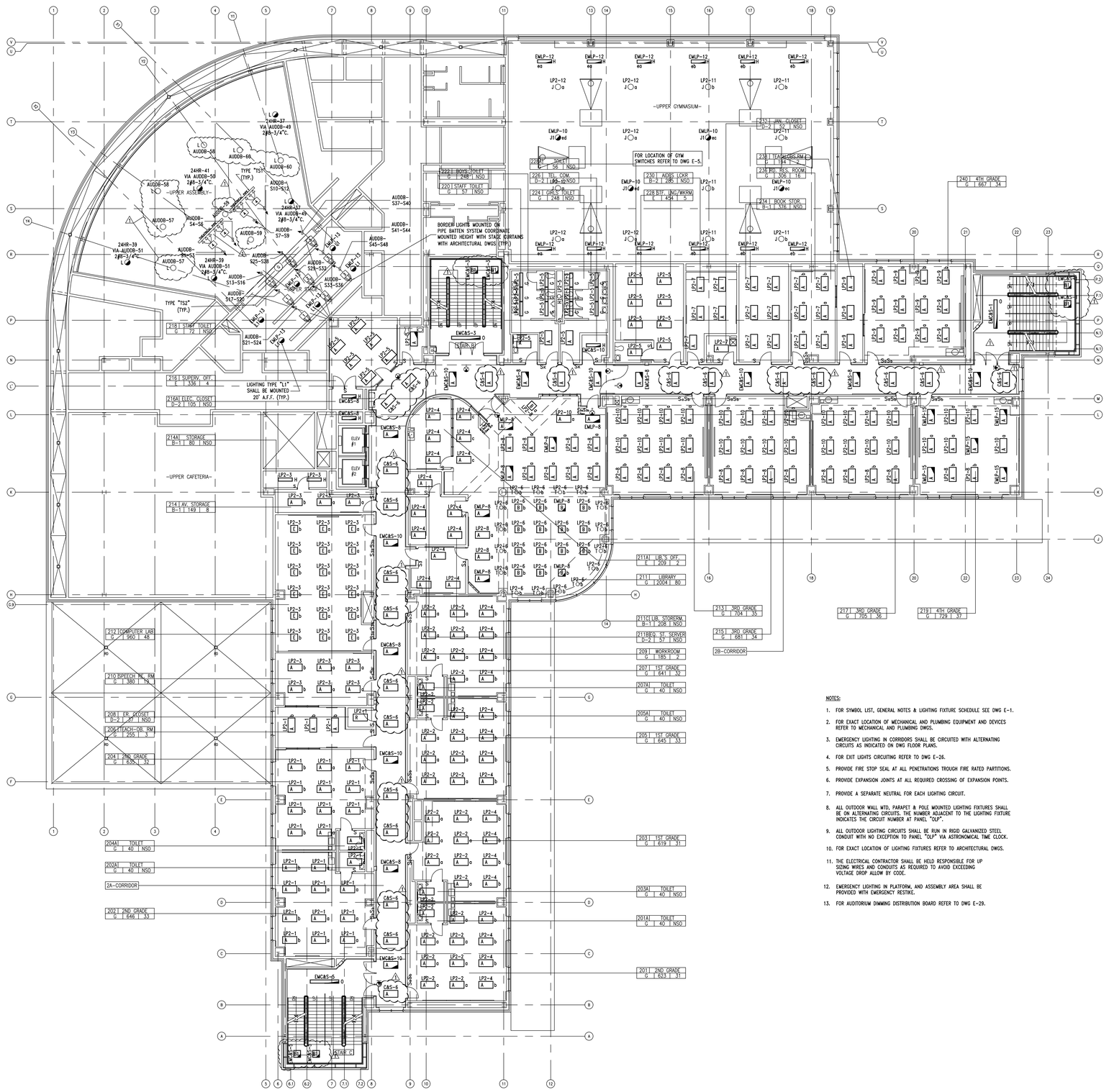
1. CENTERLINE ELEVATION FOR ALL GONGS AND STROBES TO BE LOCATED 80" MINIMUM ABOVE FINISH FLOOR OR 6" BELOW THE HUNG CEILING WHICHEVER IS LOWER.
2. CENTERLINE ELEVATION FOR ALL PULL STATIONS IS 48" ABOVE FINISHED FLOOR.

SCALE: 3/32" = 1'-0"
0 4' 8' 16' 32'
SCALE IN FEET

Drawing Title:
ELECTRICAL
FIRST FLOOR
POWER AND SYSTEMS PLAN

Drawing No.:
E-6

01



NOTES:

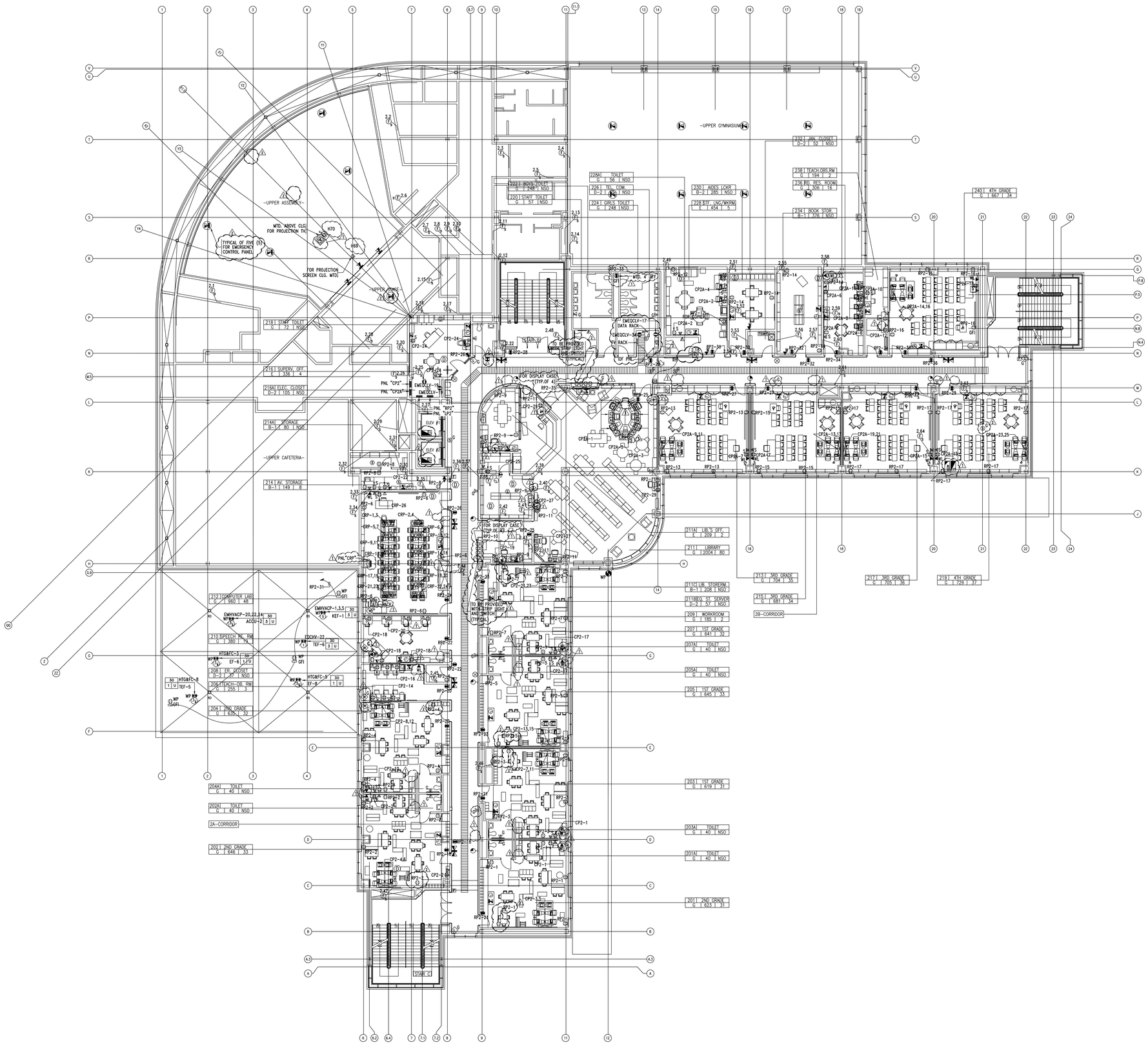
1. FOR SYMBOL LIST, GENERAL NOTES & LIGHTING FIXTURE SCHEDULE SEE DWG E-1.
2. FOR EXACT LOCATION OF MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES REFER TO MECHANICAL AND PLUMBING DWGS.
3. EMERGENCY LIGHTING IN CORRIDORS SHALL BE CIRCUITED WITH ALTERNATING CIRCUITS AS INDICATED ON DWG FLOOR PLANS.
4. FOR EXIT LIGHTS CIRCUITING REFER TO DWG E-26.
5. PROVIDE FIRE STOP SEAL AT ALL PENETRATIONS TROUGH FIRE RATED PARTITIONS.
6. PROVIDE EXPANSION JOINTS AT ALL REQUIRED CROSSING OF EXPANSION POINTS.
7. PROVIDE A SEPARATE NEUTRAL FOR EACH LIGHTING CIRCUIT.
8. ALL OUTDOOR WALL MTD, PARAPET & POLE MOUNTED LIGHTING FIXTURES SHALL BE ON ALTERNATING CIRCUITS. THE NUMBER ADJACENT TO THE LIGHTING FIXTURE INDICATES THE CIRCUIT NUMBER AT PANEL "DLP".
9. ALL OUTDOOR LIGHTING CIRCUITS SHALL BE RUN IN RIGID GALVANIZED STEEL CONDUIT WITH NO EXCEPTION TO PANEL "DLP" VIA ASTRONOMICAL TIME CLOCK.
10. FOR EXACT LOCATION OF LIGHTING FIXTURES REFER TO ARCHITECTURAL DWGS.
11. THE ELECTRICAL CONTRACTOR SHALL BE HELD RESPONSIBLE FOR UP SIZING WIRES AND CONDUITS AS REQUIRED TO AVOID EXCEEDING VOLTAGE DROP ALLOW BY CODE.
12. EMERGENCY LIGHTING IN PLATFORM, AND ASSEMBLY AREA SHALL BE PROVIDED WITH EMERGENCY RESTIKE.
13. FOR AUDITORIUM DIMMING DISTRIBUTION BOARD REFER TO DWG E-29.

SCALE: 3/32" = 1'-0"
0 4' 8' 16' 32'
SCALE IN FEET

Drawing Title: ELECTRICAL SECOND FLOOR LIGHTING PLAN

Drawing No.: E-7

01



NOTES:

1. FOR SYMBOLS LIST, GENERAL NOTES, LIGHTING FIXTURE SCHEDULE AND ABBREVIATIONS REFER TO DWG. E-1
2. FOR EXACT LOCATION AND MOUNTING HEIGHTS OF PLUMBING AND HVAC EQUIPMENT REFER TO PLUMBING AND HVAC DWGS.
3. ALL CONDUIT PENETRATIONS THROUGH FIRE RATED PARTITIONS ARE TO BE PROVIDED WITH FIRE STOP SEALS AS REQUIRED BY CODE TO MAINTAIN FIRE RATING OF PARTITIONS
4. ALL FLUSH FLOOR AND PEDESTAL MOUNTING TELEPHONE, DATA, AND RECEPTACLE CONDUITS ON EXPOSED SLAB ON GRADE ARE TO BE PROVIDED WITH RADIUS SWEEP TERMINATED IN FLOOR MOUNTED JUNCTION BOX.
5. PROVIDE STARTERS FOR ALL MOTORS.
6. ALL LOW VOLTAGE SYSTEMS (EXCLUDING FIRE ALARM, PUBLIC ADDRESS, HOLDING AREAS, AND AND ELEVATOR COMMUNICATIONS SYSTEMS) SHALL BE RUN TO CABLE TRAY AND TO TELECOMMUNICATIONS/SYSTEM CLOSETS/ROOMS.
   ALL LOW VOLTAGE WIRING SHALL BE RUN IN CABLE TRAY ABOVE CEILING IN SPACES, TO SYSTEM CLOSET ON EACH FLOOR EXCEPT FOR SYSTEMS INDICATED ABOVE.
7. MAGNETIC DOOR HOLDERS SHALL BE CIRCUITED TO ONE CIRCUIT BREAKER AT ONE EMERGENCY PANEL (TYPICAL FOR EACH FLOOR).
8. ALL COMPUTER CIRCUITS SHALL BE PROVIDED WITH THEIR OWN SEPARATE NEUTRAL AND GROUND CONDUCTORS.
9. ALL PENETRATIONS TO/IN BUILDING SHALL BE MADE VERMIN PROOF.
10. UNLESS OTHERWISE NOTED ON DRAWINGS EXACT LOCATION AND MOUNTING HEIGHTS OF OUTLETS, AND EQUIPMENT SHALL BE AS INDICATED ON SYMBOL LIST AND SPECIFICATIONS.
11. PROVIDE CABLE TRAY AS SHOWN ON DWGS. REFER TO SPECIFICATION SECTION 16110-4.J. FOR CABLE TRAY DIMENSION, MOUNTING, AND ETC..
12. FOR SINGLE LINE DIAGRAM REFER TO DWGS E-14. FOR LIGHT AND POWER RISER DIAGRAM REFER TO DWG E-15. FOR PANEL SCCHEDULES (CONDUIT & CONDUCTORS SIZES) REFER TO DWGS E-16, E-17, & E-18.
13. FOR MOTOR STARTER SCHEDULE REFER TO DWG. E-1
14. ELECTRICAL CONTRACTOR TO PROVIDE ALL CONTROL WIRING FROM EACH A.T.S. PANEL TO GENERATOR AS REQUIRED FOR GENERATOR ACTIVATION.
15. CITY POLICE SYSTEM TO BE PART OF CITY F.A. SYSTEM. FIRE ALARM BOX TO CONTAIN SEPARATE CITY POLICE & FIRE DEPARTMENT CALL STATIONS.
16. PROVIDE INTERCONNECTION FROM MASTER CLOCK SYSTEM (AT TELECOMMUNICATION ROOM) TO TIME RECORDER IN CUSTODIANS OFFICE.
17. PROVIDE 1-2" RGS CONDUIT WITH DRAG LINE FROM TELECOMMUNICATION ROOM TO TERMINATE AT A JUNCTION BOX LOCATED ABOVE HUNG CEILING IN CUSTODIANS OFFICE.
18. FOR EXACT LOCATION OF ELECTRICAL EQUIPMENT & DEVICES REFER TO ARCHITECTURAL DWGS.

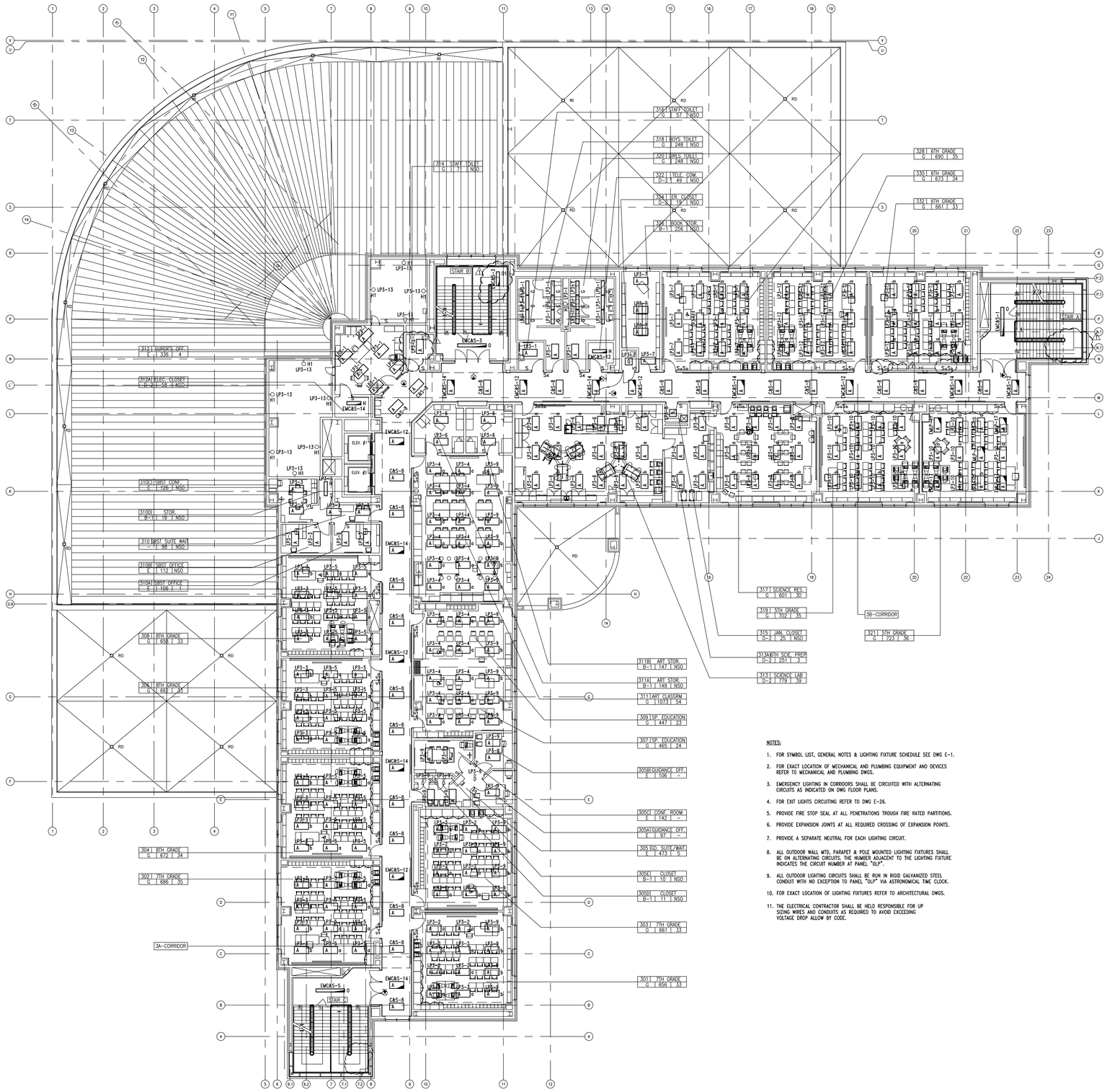
NOTES FOR FIRE ALARM DEVICES MOUNTING HEIGHTS

1. CENTERLINE ELEVATION FOR ALL GONGS AND STROBES TO BE LOCATED 80" MINIMUM ABOVE FINISH FLOOR OR 6" BELOW THE HUNG CEILING WHICHEVER IS LOWER.
2. CENTERLINE ELEVATION FOR ALL PULL STATIONS IS 48" ABOVE FINISHED FLOOR.

SCALE: 3/32" = 1'-0"
0 4' 8' 16' 32'
SCALE IN FEET

Drawing Title:
ELECTRICAL
SECOND FLOOR
POWER AND SYSTEMS PLAN

Drawing No.:
E-8



NOTES:

1. FOR SYMBOL LIST, GENERAL NOTES & LIGHTING FIXTURE SCHEDULE SEE DWG E-1.
2. FOR EXACT LOCATION OF MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES REFER TO MECHANICAL AND PLUMBING DWGS.
3. EMERGENCY LIGHTING IN CORRIDORS SHALL BE CIRCUITED WITH ALTERNATING CIRCUITS AS INDICATED ON DWG FLOOR PLANS.
4. FOR EXIT LIGHTS CIRCUITING REFER TO DWG E-2B.
5. PROVIDE FIRE STOP SEAL AT ALL PENETRATIONS TROUGH FIRE RATED PARTITIONS.
6. PROVIDE EXPANSION JOINTS AT ALL REQUIRED CROSSING OF EXPANSION POINTS.
7. PROVIDE A SEPARATE NEUTRAL FOR EACH LIGHTING CIRCUIT.
8. ALL OUTDOOR WALL MTD, PARAPET & POLE MOUNTED LIGHTING FIXTURES SHALL BE ON ALTERNATING CIRCUITS. THE NUMBER ADJACENT TO THE LIGHTING FIXTURE INDICATES THE CIRCUIT NUMBER AT PANEL "OLP".
9. ALL OUTDOOR LIGHTING CIRCUITS SHALL BE RUN IN RIGID GALVANIZED STEEL CONDUIT WITH NO EXCEPTION TO PANEL "OLP" VIA ASTRONOMICAL TIME CLOCK.
10. FOR EXACT LOCATION OF LIGHTING FIXTURES REFER TO ARCHITECTURAL DWGS.
11. THE ELECTRICAL CONTRACTOR SHALL BE HELD RESPONSIBLE FOR UP SIZING WIRES AND CONDUITS AS REQUIRED TO AVOID EXCEEDING VOLTAGE DROP ALLOW BY CODE.

SCALE: 3/32" = 1'-0"
0 4' 8' 16' 32'
SCALE IN FEET

Drawing Title: ELECTRICAL THIRD FLOOR LIGHTING PLAN

Drawing No.: E-9

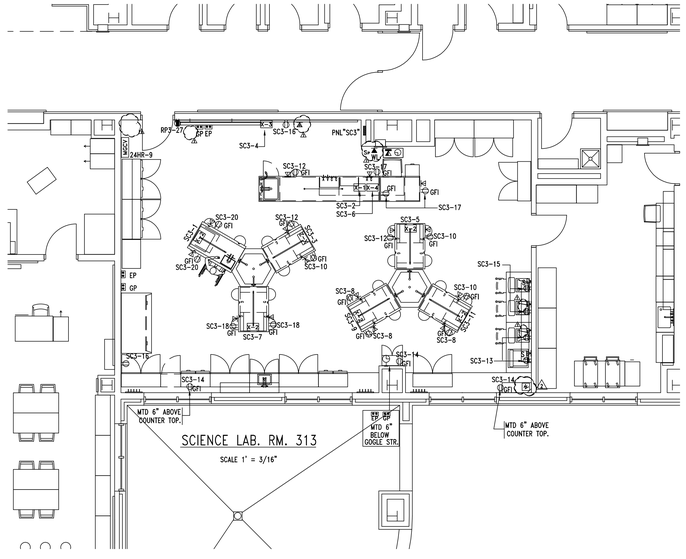
01

NOTES:

1. FOR SYMBOLS LIST, GENERAL NOTES, LIGHTING FIXTURE SCHEDULE AND ABBREVIATIONS REFER TO DWG. E-1
2. FOR EXACT LOCATION AND MOUNTING HEIGHTS OF PLUMBING AND HVAC EQUIPMENT REFER TO PLUMBING AND HVAC DWGS.
3. ALL CONDUIT PENETRATIONS THROUGH FIRE RATED PARTITIONS ARE TO BE PROVIDED WITH FIRE STOP SEALS AS REQUIRED BY CODE TO MAINTAIN FIRE RATING OF PARTITIONS
4. ALL FLUSH FLOOR AND PEDESTAL MOUNTING TELEPHONE, DATA, AND RECEPTACLE CONDUITS TO BE RUN IN FLOOR SLAB, ARE TO BE PROVIDED WITH RADIUS SWEEP TERMINATED IN FLOOR MOUNTED JUNCTION BOX.
5. PROVIDE STARTERS FOR ALL MOTORS.
6. ALL LOW VOLTAGE SYSTEMS (EXCLUDING FIRE ALARM, PUBLIC ADDRESS, HOLDING AREAS, AND AND ELEVATOR COMMUNICATIONS SYSTEMS) SHALL BE RUN TO CABLE TRAY AND TO TELECOM MUNICATIONS/SYSTEM CLOSETS/ROOMS.
   ALL LOW VOLTAGE WIRING SHALL BE RUN IN CABLE TRAY ABOVE CEILING IN SPACES, TO SYSTEM CLOSET ON EACH FLOOR EXCEPT FOR SYSTEMS INDICATED ABOVE.
7. MAGNETIC DOOR HOLDERS SHALL BE CIRCUITED TO ONE CIRCUIT BREAKER AT ONE EMERGENCY PANEL (TYPICAL FOR EACH FLOOR).
8. ALL COMPUTER CIRCUITS SHALL BE PROVIDED WITH THEIR OWN SEPARATE NEUTRAL AND GROUND CONDUCTORS.
9. ALL PENETRATIONS TO/IN BUILDING SHALL BE MADE VERMIN PROOF.
10. UNLESS OTHERWISE NOTED ON DRAWINGS EXACT LOCATION AND MOUNTING HEIGHTS OF OUTLETS, AND EQUIPMENT SHALL BE AS INDICATED ON SYMBOL LIST AND SPECIFICATIONS.
11. PROVIDE CABLE TRAY AS SHOWN ON DWGS. REFER TO SPECIFICATION SECTION 16110-4.J. FOR CABLE TRAY DIMENSION, MOUNTING, AND ETC..
12. FOR SINGLE LINE DIAGRAM REFER TO DWGS E-14, FOR LIGHT AND POWER RISER DIAGRAM REFER TO DWG E-15, FOR PANEL SCHEDULES (CONDUIT & CONDUCTORS SIZES) REFER TO DWGS E-16, E-17, & E-18.
13. FOR MOTOR STARTER SCHEDULE REFER TO DWG. E-1
14. ELECTRICAL CONTRACTOR TO PROVIDE ALL CONTROL WIRING FROM EACH A.T.S. PANEL TO GENERATOR AS REQUIRED FOR GENERATOR ACTIVATION.
15. CITY POLICE SYSTEM TO BE PART OF CITY F.A. SYSTEM. FIRE ALARM BOX TO CONTAIN SEPARATE CITY POLICE & FIRE DEPARTMENT CALL STATIONS.
16. PROVIDE INTERCONNECTION FROM MASTER CLOCK SYSTEM (AT TELECOMMUNICATION ROOM) TO TIME RECORDER IN CUSTODIANS OFFICE.
17. PROVIDE 1-1" RGS CONDUIT WITH DRAG LINE FROM TELECOMMUNICATION ROOM TO TERMINATE AT A JUNCTION BOX LOCATED ABOVE HUNG CEILING IN CUSTODIANS OFFICE.
18. FOR EXACT LOCATION OF ELECTRICAL EQUIPMENT & DEVICES REFER TO ARCHITECTURAL DWGS.

NOTES FOR FIRE ALARM DEVICES MOUNTING HEIGHTS

1. CENTERLINE ELEVATION FOR ALL GONGS AND STROBES TO BE LOCATED 80" MINIMUM ABOVE FINISH FLOOR OR 6" BELOW THE HUNG CEILING WHICHEVER IS LOWER.
2. CENTERLINE ELEVATION FOR ALL PULL STATIONS IS 48" ABOVE FINISHED FLOOR.

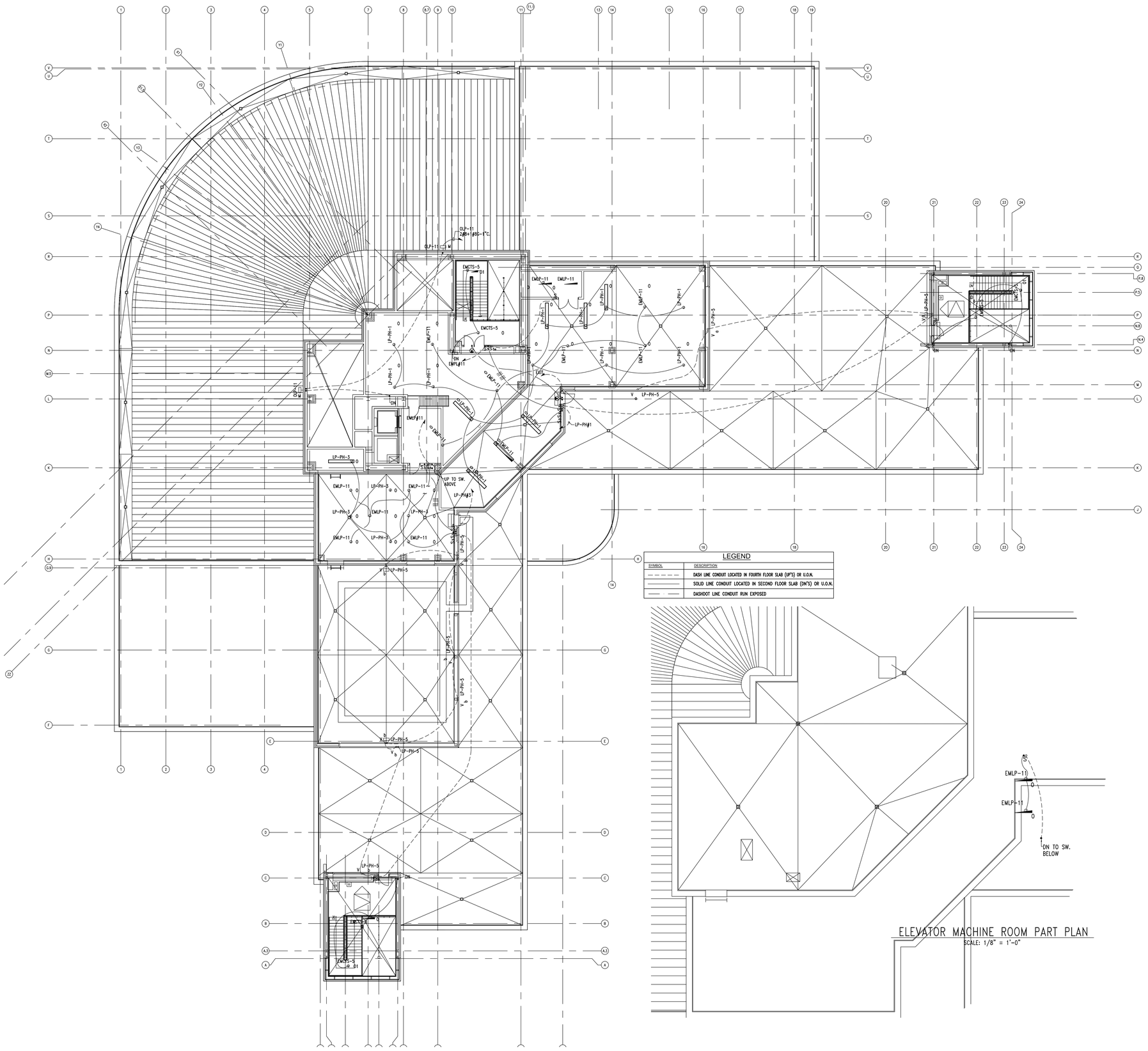


SCALE: 3/32" = 1'-0"
0 4' 8' 16' 32'
SCALE IN FEET

Drawing Title:
ELECTRICAL
POWER AND SYSTEMS PLAN
THIRD FLOOR

Drawing No.:
E-10

01



LEGEND

SYMBOL	DESCRIPTION
	DASH LINE CONDUIT LOCATED IN FOURTH FLOOR SLAB (UP'S) OR U.O.N.
	SOLID LINE CONDUIT LOCATED IN SECOND FLOOR SLAB (DN'S) OR U.O.N.
	DASHDOT LINE CONDUIT RUN EXPOSED

ELEVATOR MACHINE ROOM PART PLAN
SCALE: 1/8" = 1'-0"

Drawing Title:
PENTHOUSE
LIGHTING PLAN

Drawing No.:
E-11

SCHOOL B LIGHTING DESIGN DRAWINGS

SYMBOL LIST

LIGHTING

- FC — PENDANT/RECESSED MTD. FLUORESCENT FIXTURE "FC" DENOTES FIXTURE TYPE (TYP.)
- SURFACE/PENDANT MTD. LIGHTING FIXTURE.
- WALL MOUNTED FIXTURE (INTERIOR OR EXTERIOR)
- EMERGENCY FLUORESCENT FIXTURE
- FLUORESCENT STRIPLIGHT
- EMERGENCY LIGHTING UNIT W/ 2 ADJUSTABLE LAMP HEADS
- EXIT LIGHT (WALL, CEILING MOUNTED)

SWITCHES

- S — SINGLE POLE TOGGLE SWITCH, 20 AMP, 125 VOLT
- S3 — THREE WAY SWITCH, 20 AMP, 125 VOLT
- SK — KEY OPERATED SWITCH, 20 AMP., 125 VOLT
- Sφ — COMBINATION 20 AMP, SINGLE POLE TOGGLE SWITCH AND 15 AMP. DUPLEX RECEPTACLE.

RECEPTACLES

- 15 AMP 125V GRD TYPE DUPLEX RECEPTACLE
- K — 15 AMP 125V GRD TYPE SAFETY TYPE RECEPTACLE
- 15 AMP 125V GRD FAULT INTERRUPTING TYPE DUPLEX RECEPTACLE
- 20 AMP 125V GRD TYPE DUPLEX RECEPTACLE
- K — 20 AMP 125V GRD TYPE SAFETY TYPE DUPLEX RECEPTACLE
- FLOOR MOUNTED 15 AMP 125V GRD TYPE DUPLEX RECEPTACLE (U.O.N.)
- VC — 20 AMP. 125V DUPLEX VACUUM CLEANER OUTLET
- P — SURGE PROTECTED 15 AMP 125V GRD TYPE DUPLEX RECEPTACLE
- K — DOUBLE DUPLEX RECEPTACLE 15A 125V GROUNDING SAFETY TYPE
- SINGLE RECEPTACLE 20A 125V GROUNDING TYPE
- 30 AMP, 208V SINGLE GROUNDING RECEPTACLE FOR DRYERS
- P — DOUBLE DUPLEX SURGE PROTECTED 15AMP, 125V GROUNDING TYPE
- SR — FLOOR MOUNTED SINGLE RECEPTACLE GRD. TYPE, RATINGS AS SHOWN ON DWG.

RACEWAYS

- CONDUIT RUN CONCEALED IN FLOOR SLAB. HATCH MARKS DENOTES No. OF #12 WIRES IF MORE THAN TWO.
- CONDUIT RUN CONCEALED IN WALLS AND CEILINGS. HATCH MARKS DENOTE No. OF #12 WIRES IF MORE THAN TWO.
- EMERGENCY BRANCH CIRCUITING RUN CONCEALED IN WALLS AND CEILING
- HOMERUN TO PANEL: ARROWHEAD DENOTES NO. OF CIRCUITS, HATCH MARKS DENOTE NO. OF #12 WIRES IF MORE THAN TWO
- FLEXIBLE CONDUIT CONNECTION TO MOTOR OR VIBRATING EQUIPMENT
- GROUND CONNECTION
- CONDUIT TURNING UP
- CONDUIT TURNING DOWN
- CRP/15 — BRANCH CIRCUIT DESIGNATION: "CRP" DENOTES PANEL DESIGNATION; "15" DENOTES CIRCUIT NUMBER.
- STUBBED-OFF CONDUIT WITH PLASTIC BUSHING ON END OF CONDUIT.

FIRE ALARM

- TROUBLE BELL
- HORN & STROBE LIGHT
- PULL STATION
- STROBE LIGHT WALL MOUNTED
- IONIZATION TYPE SMOKE DETECTOR
- DUCT SMOKE DETECTOR
- PHOTOELECTRIC TYPE SMOKE DETECTOR
- CITY FIRE ALARM SWITCH
- NORMALLY CLOSED PUSH BUTTON FOR F.A. (FIRE DRILL SWITCH)
- FACP — FIRE ALARM CONTROL PANEL
- M — DESK MOUNTED HOLDING SYSTEM MASTER INTERCOM STATION
- FLUSH WALL MOUNTED HOLDING AREA SYSTEM INTERCOM STATION
- TS — TAMPER SWITCH
- FS — FLOW SWITCH
- SD — MOTORIZED SMOKE/FIRE DAMPER (FURNISHED AND INSTALLED BY OTHERS. WIRED BY THIS CONTRACTOR
- FCO — FUSE CUT-OUT BOX
- RAP FA — REMOTE ANNUNCIATOR PANEL
- PRINTER FA — PRINTER
- INTERCONNECTION BOX. NUMBER DENOTES FLOOR NUMBER.

TV SYSTEM

- TV — TV ANTENNA OUTLET BOX AND JACK
- TV2 — TV SPLICE/PULLBOX. NUMBER DENOTES FLOOR.

TELEPHONE/DATA SYSTEM

- SINGLE LINE TELEPHONE INSTRUMENT & RJ11 JACK IN FLUSH WALL MOUNTED LOCKBOX
- C — TRANSFER PHONE (COURTESY PHONE) DESK MTD. WITH WALL MTD. RJ11 JACK.
- WALL MOUNTED SINGLE LINE TELEPHONE INSTRUMENT & RJ11 JACK
- DATA OUTLET BOX
- H — DESK MOUNTED MULTI-LINE TELEPHONE INSTRUMENT WITH WALL MOUNTED RJ11 JACK "H" DENOTES SET WITH SPEAKER AND LCD DISPLAY
- PT — PUBLIC TELEPHONE
- UNINTERRUPTABLE POWER SUPPLY.
- H — DESK MOUNTED MULTI-LINE TELEPHONE INSTALLED WITH RJ11 JACK MOUNTED IN FLOOR OUTLET BOX
- MDF — MAIN DISTRIBUTION FRAME
- IDF2 — INTERMEDIATE DISTRIBUTION FRAME. (NUMBER DENOTES FLOOR).
- D — DESK MTD. SINGLE LINE TEL. INSTRUMENT WITH WALL MTD. RJ11 JACK.

CLOCK/SOUND SYSTEM

- DOUBLE FACED CLOCK AND OUTLET
- TR — TIME RECORDER
- COMBINATION CLOCK AND SPEAKER IN COMMON HOUSING
- WP, D — SPEAKER (ONE DIRECTIONAL). "D" LETTER DENOTES SPEAKER TYPE "WP" DENOTES OUTDOOR WETHER PROOF SPEAKER.
- AP — ADMINISTRATIVE PHONE (DESK MTD.) WITH WALL MTD. OUTLET
- DOUBLE SPEAKER (BI-DIRECTIONAL) CORRIDOR
- PROGRAM BELL
- V — VOLUME CONTROL BOX
- M — MICROPHONE OUTLET
- SPS — SOUND SYSTEM PRIVACY SWITCH
- WEATHERPROOF PUSHBUTTON AT ENTRANCE (CUSTODIAN CALL)
- SINGLE FACED CLOCK AND OUTLET

SECURITY SYSTEM

- XL — PASSIVE INFRARED LONG RANGE SENSOR. 'L' DENOTES 120' SENSING FIELD. 'XL' DENOTES OVER 120' SENSING FIELD
- PASSIVE INFRARED ALARM WIDE ANGLE SHORT RANGE SENSOR
- DC — INTRUSION ALARM MAGNETIC DOOR CONTACT
- WP — WEATHER PROOF OUTDOOR SIREN FOR INTRUSION ALARM
- INTERIOR INTRUSION ALARM SIREN
- PANIC BUTTON
- ENTRANCE/EXIT ARM/DISARM KEYPAD

MISCELLANEOUS

- BRANCH CIRCUIT PANELBOARD (SURFACE, FLUSH MTD.)
- SURFACE MTD POWER OR DISTRIBUTION PANEL
- 2/30 — 240v HORSEPOWER RATED DISCONNECT SWITCH W/NUMBER OF POLES/SWITCH SIZE AS INDICATED ON THE DWG.
- 3/30/15 — FUSED DISCONNECT SWITCH W/NUMBER OF POLES/SWITCH SIZE/FUSE SIZE AS INDICATED IN THE DRAWING.
- COMBINATION MOTOR STARTER, LETTER DENOTES STARTER TYPE
- ST — MANUAL MOTOR STARTER
- MOTOR FURNISHED AND INSTALLED BY OTHERS, WIRED BY THIS CONTRACTOR NUMBER INDICATES HORSEPOWER
- POLICE CALL SWITCH
- FLUSH WALL MTD. ELEVATOR INTERCOM MASTER STATION IN ELEVATOR CAB.
- TS — TIME SWITCH FOR CONTROLING SITE LIGHTING
- UTILITY METER
- SEB — SERVICE END BOX
- BG — BREAK GLASS STATION
- SV — SOLENOID VALVE
- SVCP — GAS SOLENOID CONTROL PANEL
- SVPB — GAS SOLENOID VALVE PUSH BUTTON
- JUNCTION BOX - CEILING MT
- JUNCTION BOX - WALL MT
- WP — JUNCTION BOX - WEATHER PROOF
- FLUSH WALL MOUNTED ELEVATOR INTERCOM MASTER STATION
- FC — JUNCTION BOX FOR CONNECTION TO WALL MOUNTED FAN-COIL UNIT
- FC — JUNCTION BOX FOR CONNECTION TO CLG. MOUNTED FAN-COIL UNIT
- CUSTODIAN INDICATION PANEL
- FWCP — FACTORY WIRED CONTROL PANEL.
- AUTOMATIC TRANSFER SWITCH
- M — MOTORIZED DAMPER (PROVIDED BY OTHERS WIRED BY THIS CONTRACTOR).
- PHOTOCELL

FIXTURE SCHEDULE

TYPE	LAMPS	MANUFACTURER'S CATALOG No. & DESCRIPTION*
FA	2-F32T8-SP30	LUMAX #RG23224-EOIFBRS OR ACCEPTED EQUAL BY LIGHTOLIER, DAYBRITE. RECESSED 2 LAMP 2'x4' FLUORESCENT TROFFER SUITABLE FOR INSTALLATION IN A SUSPENDED 2'X2' ACCOUSTICAL CEILING TILE SYSTEM
FB	3-F32T8-SP30	LUMAX # RG33224-EOIEBRS OR ACCEPTED EQUAL BY LIGHTOLIER OR DAYBRITE. RECESSED 3 LAMP 2'X4' FLUORESCENT TROFFER SUITABLE FOR INSTALLATION IN A SUSPENDED 2'X2' ACCOUSTICAL CEILING TILE SYSTEM
FC	2-F32T8-SP30	LUMAX # RG23214-EO-I-FB-RS OR APPROVED EQUAL BY LIGHTOLIER, DAY-BRITE. RECESSED 2 LAMP 1' x 4' FLUORESCENT TROFFER SUITABLE FOR INSTALLATION IN A SUSPENDED 2' x 2' ACCUSTICAL TILE CEILING.
FD	2-F32T8-U SP30	LUMAX# RG2U622EOIFBRS OR APPROVED EQUAL BY LIGHTOLIER, DAY-BRITE. SIMILAR TO "FA" EXCEPT 2' x 2' WITH "U" LAMPS.
FE	2-F32T8 SP30	SIMILAR TO TYPE 'FA' EXCEPT SUITABLE FOR MOUNTING IN GYPSUM BOARD CEILING
FF	3-F32T8-SP30	SIMILAR TO TYPE 'FB' EXCEPT SUITABLE FOR MOUNTING IN GYPSUM BOARD CEILING
FG	2-F32T8-SP30	SIMILAR TO TYPE 'FC' EXCEPT SUITABLE FOR MOUNTING IN GYPSUM BOARD CEILING.
FH	2-F32T8-U SP30	SIMILAR TO TYPE 'FD' EXCEPT SUITABLE FOR MOUNTING IN GYPSUM BOARD CEILING.
FK	2-F32T8-SP30	LUMAX # TV23248-BHBA-EO. CHAIN MOUNTED INDUSTRIAL FLUORESCENT FIXTURE 14"X48". REFLECTOR SHALL BE BAKED WHITE ENAMEL WITH MINIMUM 85% REFLECTANCY
FL	2-F32T8-SP30/RS	APPLETON # ARS240-118 OR ACCEPTED EQUAL BY MARK, OTHERS. PENDANT MOUNTED 1'x4' EXPLOSION PROOF FLUORESCENT FIXTURE
FM	2-PL13	EDISON PRICE # BAFLUX/8 COL -120V OR APPROVED EQUAL, 8" RECESSED MOUNTED 2 LAMP COMPACT FLUORESCENT DOWNLIGHT FIXTURE
FN	1-70W HPS E-17 CLEAR MED BASE	MOLDCAST # PCL-1/02/70/12/BZ/BLT/PCR WALL MTD. HID WALL PACK. FIXTURE TO BE CONSTRUCTED HEAVY DUTY CAST ALUMINIUM HOUSING & HINGED DOOR FRAME. FIXTURE OPTICAL REFLECTOR SHALL CONSIST OF A HYDROFORMED SPECULAR ALZAK MAIN REFLECTOR WITH BOTH PARABOLIC & CYLINDRICAL REFLECTOR SURFACES (VANDAL RESISTANT)
FP	1-400W HPS E-18 CLEAR MED BASE	[illegible] # BN11-[illegible] OR ACCEPTED EQUAL [illegible] WITH [illegible] AND REFLECTOR & 6V×6H BEAM SPREAD. PARAPET MOUNTED (VANDAL RESISTANT)
FQ	1-F32T8 SP30	LEGION # 310-140-ESB/EBO, OR ACCEPTED EQUAL BY NATIONAL OR DAY-BRITE. 48" LONG FLUORESCENT STRIPLIGHT.
XA	2-F8T5-120V	McPHILBEN # 40W-BF WALL MOUNTED EXIT LIGHT WITH 8" LETTERS
XB	2-F8T5-120V	SIMILAR TO TYPE 'XA' EXCEPT DOUBLE FACED END MOUNTED. # 40E-2BF
XC	2-F8T5-120V	SIMILAR TO TYPE 'XA' EXCEPT PENDANT MOUNTED, SINGLE FACE TO 8'-6" A.F.F. MAX. #40P-BF
XD	2-F8T5-120V	SIMILAR TO TYPE 'XC' EXCEPT DOUBLE FACED. # 40P-2BF
FQ1	2-F32T8 SP30	SAME AS FQ EXCEPT WITH TWO LAMPS. LEGION #2410-240-ESB/EBO OR ACCEPTED EQUAL BY NATIONAL OR DAY-BRITE.
FS	1-F22T9	PROGRESS # P7383-88 OR ACCEPTED EQUAL. WEATHERPROOF SURFACE WALL MTD. FLUORESCENT LIGHTING FIXTURE WITH CLEAR PRISMATIC SHOCK RESISTANT DIFFUSER
FT	2-F32T8	LUMAX # TC 23248-BHIB-EO OR ACCEPTED EQUAL BY LIGHTOLIER, DAY BRITE. 48" LONG FLUORESCENT STRIPLIGHT
FU	2-F32T8	LUMAX # WA 23248-CO1SA OR ACCEPTED EQUAL BY LIGHTOLIER, DAY BRITE. 48"LONG x 11"WIDE FLUORESCENT FIXTURE WITH WRAPAROUND PRISMATIC ACRYLIC LENS
FV	1-F8T5	ALKCO # HP-108 OR ACCEPTED EQUAL BY LIGHTOLIER, LEGION. 12"LONG x 5"WIDE x 1-1/8"DEEP UNDERCOUNTER FLUORESCENT FIXTURE WITH TRANSLUCENT ACRYLIC LENS
FV1	2-F8T5	SIMILAR TO TYPE 'FV' EXCEPT 24"LONG WITH TWO LAMPS. ALKCO # HP-116 OR EQUAL
FW	3-F32T8	GUTH # 2P-2433G-ITAKI-EG OR ACCEPTED EQUAL. RECESSED 2'x4' FLU. TROFFER WITH ACRYLIC LENS AND U.L. LISTED FOR WET LOCATIONS.
FX	2-F32T8 "U"	SIMILAR TO 'FW' EXCEPT 2'x2' GUTH # 2P-2233G-ITAKI-EG OR ACCEPTED EQUAL.

* ALL FIXTURES ARE 120 VOLTS UNLESS OTHERWISE NOTED.

GENERAL NOTES

THE FOLLOWING NOTES SHALL APPLY THROUGHOUT, EXCEPTIONS ARE SPECIFICALLY NOTED ON EACH DRAWING.

1. THIS CONTRACTOR SHALL CHECK THE LOCATION, NUMBER, AND SIZE OF ALL CHASES, PROVIDED FOR HIM ON CONSTRUCTION PLANS AND SHALL ARRANGE AT HIS OWN EXPENSE, FOR ANY OTHERS REQUIRED FOR CABINETS OR BOXES.
2. THIS CONTRACTOR SHALL COORDINATE WITH HVAC, PLBG, KITCHEN CONTRACTORS FOR EXACT LOCATIONS OF MOTORS ROUGHIND OUTLETS & EQUIPMENT IN ORDER TO AVOID INTERFERENCE WITH OTHER TRADES.
3. THIS CONTRACTOR SHALL CHECK THE LOCATION OF STEEL PLATE FIRE STOPS IN CORRIDOR HUNG CEILINGS, AND SHALL FURNISH THE SIZES AND LOCATIONS OF OPENINS NECESSARY TO ACCOMODATE THE ELECTRICAL CONDUITS PIERCING SUCH FIRE STOPS.
4. IN UNFINISHED PORTIONS OF BUILDING SUCH AS BOILER ROOM, FAN ROOMS, PIPE SPACES, ETC., LOCATIONS OF CONDUIT AND OUTLETS ARE APPROXIMATE AND SHALL CLEAR PIPING AND ALL OTHER CONSTRUCTION. CONDUITS IN THESE PORTIONS OF BUILDING SHALL BE RUN EXPOSED, BUT MAY BE RUN CONCEALED WITH THE UNDERSTANDING THAT ALL OUTLETS MUST BE EXTENDED AS DIRECTED TO CLEAR ANY INTERFERENCE WITH THE FIXTURE.
5. IN BOILER ROOM, SYSTEM CONDUITS SUCH AS CONDUITS FOR LIGHT AND POWER FEEDERS, LOW VOLTAGE, FIRE SIGNAL, ETC., SHALL NOT BE RUN OVER BOILERS.
6. NO CONDUIT SHALL BE RUN IN CONTACT WITH THE EARTH UNLESS OTHERWISE DIRECTED ON THE PLAN. IN SUCH AREAS, CONDUIT FOR MOTORS AND STARTERS SHALL BE RUN OVERHEAD, SUPPORTED AS DIRECTED.
7. PULLS AND JUNCTION BOXES SHALL BE SURFACE TYPE IN UNFINISHED AREAS AND FLUSH TYPE IN FINISHED AREAS UNLESS OTHERWISE INDICATED. THEY SHALL BE LOCATED APPROXIMATELY WHERE INDICATED ON WALLS, CEILINGS, BEAMS OR SUSPENDED FROM CEILING TO SUIT CONDUIT ENTRNCE, BUT SHALL IN ALL CASES BE LOCATED TO AVOID INTERFERENCE WITH EQUIPMENT OF OTHER TRADES, AND WITH COVERS READILY ACCESSIBLE.
8. COMBINATION SWITCH AND RECEPTACLE IN PIPE-SPACE SHALL BE LOCATED EXPOSED WHERE DIRECTED AND KEYLESS RECEPTACLE SHALL BE ℄ +5'-6".
9. EXCEPT AS OTHERWISE NOTED ON FLOOR PLANS OR IN FLOOR PLAN NOTES, CLOCKS AND LOUDSPEAKERS IN OFFICES AND ROOMS OF INSTRUCTION SHALL BE INSTALLED WITH ℄ +7-6" A.F.F. WHERE DISPLAY BOARDS OR OTHER ENCUMBRANCES PREVENT INSTALLATION AT THIS HEIGHT. CLOCKS AND LOUDSPEAKERS SHALL BE CENTERED IN THE AVAILABLE SPACE BETWEEN THE CEILING AND THE ENCUMBRANCE.
10. EXCEPT AS OTHERWISE NOTED ON FLOOR PLANS OR IN FLOOR PLAN NOTES, NEW SWITCHES SHALL BE INSTALLED WITH ℄ +4'-0" A.F.F.
11. SEE SPECIFICATIONS FOR ALL ITEMS.
12. ALL EQUIPMENT CALLED FOR IN THE ABOVE SYMBOL MEANINGS SHALL BE FURNISHED AND INSTALLED WITH A SUITABLE ROUGHING BACKBOX, CONDUIT OUTLET BOX, OR ENCLOSING CABINET FLUSH-IN WALL (FOR NEW CONSTRUCTION) OR SURFACE TYPE (FOR EXISTING CONSTRUCTION). SEE SPECIFICATIONS.

ABBREVIATIONS

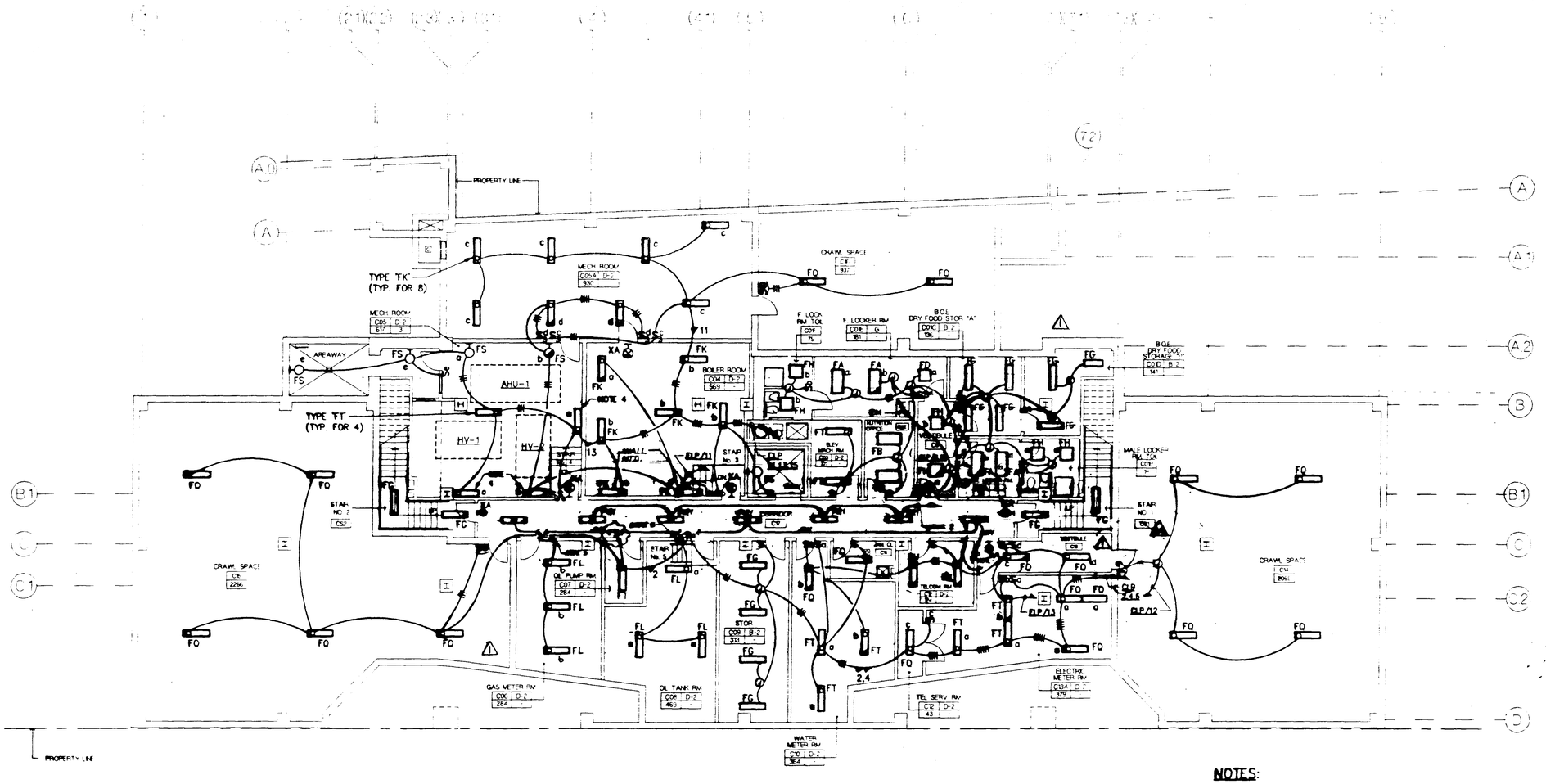
A.	AMPERE	GRD.	GROUND
AC	AIR CONDITIONER	HT	HEIGHT
AFF	ABOVE FINISHED FLOOR	IC	INTERRUPTING CAPACITY
AIC	AMPERE INTERRUPTING CAPACITY	JB	JUNCTION BOX
ATC	AUTOMATIC TEMPERATURE CONTROL	KVA	KILOVOLT-AMPERE
ATS	AUTOMATIC TRANSFER SWITCH	KW	KILOWATT
BO	BY OTHERS	L	LONG
BOT	TO BOTTOM	LP	LIGHTING PANEL
C	CONDUIT	MATV	MASTER ANTENNA TELEVISION
CB	CIRCUIT BREAKER	MCC	MOTOR CONTROL CENTER
CCTV	CLOSET CIRCUIT TELEVISION	MER	MECHANICAL EQUIPMENT ROOM
CH	COUNTER HEIGHT	MTD.	MOUNTED
CKT	CIRCUIT	MTG.	MOUNTING
℄	TO CENTERLINE	MW	MICROWAVE
CL	CLEANING	N	NEUTRAL
CLG	CEILING	NIC	NOT IN CONTRACT
CM	COPY MACHINE	NL	NIGHT LIGHT
COMM	COMMUNICATIONS	O.C.	ON CENTER
CP	COMPUTER PANEL	P	POLE
CU	COPPER	PB	PULL BOX
DIST.	DISTRIBUTION	PBX	PUBLIC BRANCH EXCHANGE
DF	DRINKING FOUNTAIN	PP	POWER PANEL
DP	DISTRIBUTION PANEL	PRT	PRINT MACHINE
EC	EMPTY CONDUIT	REF	REFRIGERATOR
EM	EMERGENCY	TEL.	TELEPHONE
E.R.	EXIST. BATTERY UNIT TO REMAIN	TV	TELEVISION
EWC	ELECTRIC WATER COOLER	TYP	TYPICAL
EXIST	EXISTING	UON	UNLESS OTHERWISE NOTED
FA	FIRE ALARM	V	VOLTS
FC	FAN COIL UNIT	VM	VENDING MACHINE
FIXT	FIXTURE	W	WITH
FL	FLOOR	WP	WEATHERPROOF
FLUOR	FLUORESCENT	W/O	WITHOUT
GC	GENERAL CONTRACTOR	XP	EXPLOSIONPROOF
GFI	GROUND FAULT INTERRUPTER		

Drawing Title: SYMBOL LIST, NOTES & FIXTURE SCHEDULE

Trade: ELECTRICAL

Drawing No: 2E-1

Sheets in Sec.: 18 OF 120



CELLAR PLAN

0 8' 16' 24' FT

SCALE 1/8"=1'-0"

NOTES:

1. REFER TO DRAWING 2E-1 FOR SYMBOLS.
2. RUN CIRCUITING TO PANEL ELP, CIRCUIT #9, VIA LIGHTING RELAY MOUNTED NEXT TO PANEL ELP.
3. RUN CIRCUITING TO PANEL ELP, CIRCUIT #16, VIA LIGHTING RELAY PANEL MOUNTED NEXT TO PANEL ELP.
4. SURFACE WALL MOUNT TYPE 'FT' LIGHTING FIXTURES INDICATED.
5. *PROVIDE CONDUIT SEAL AS SHOWN AT POINT OF ENTRY INTO GAS METER ROOM AND OIL TANK ROOM.*

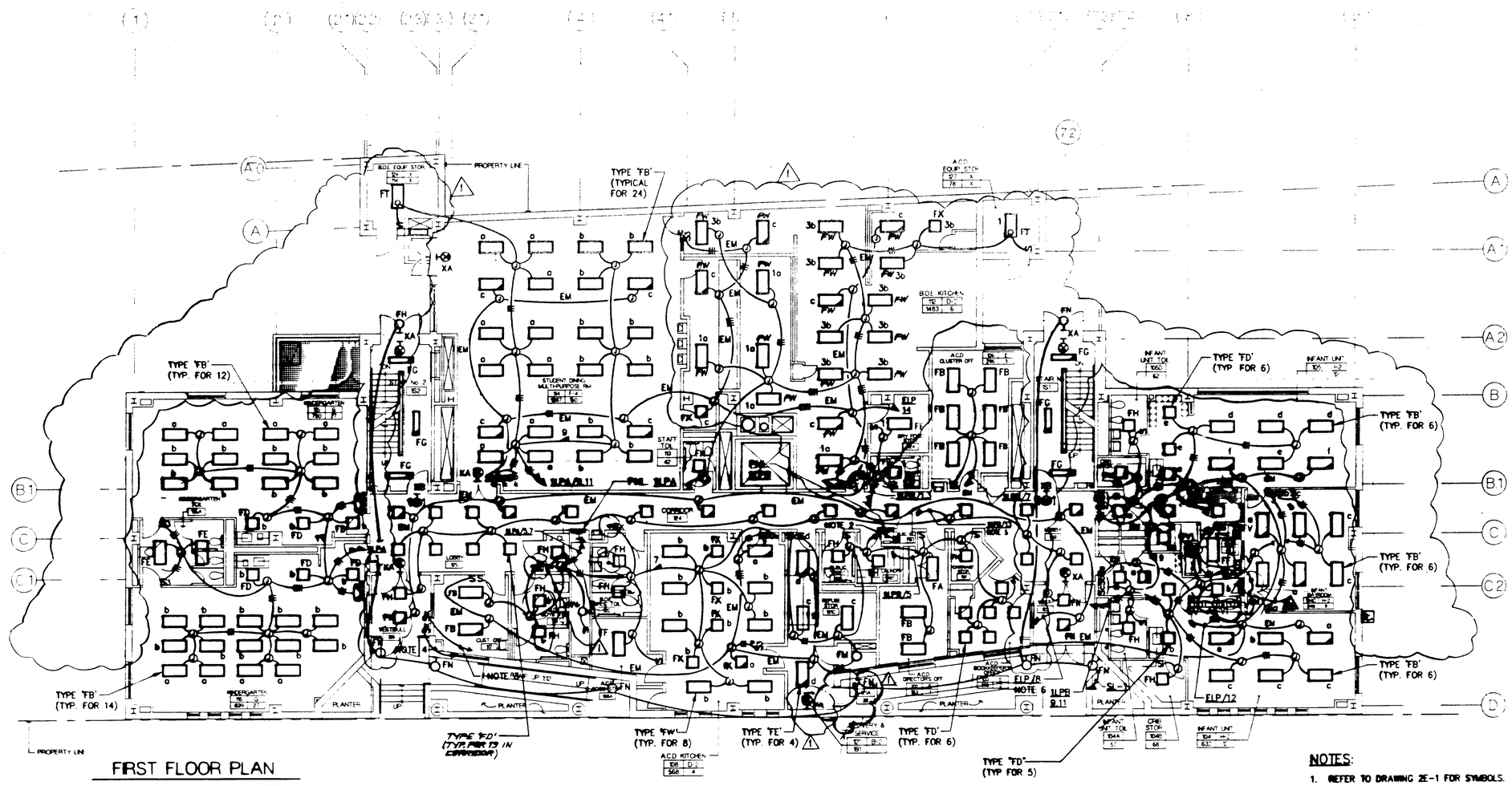
PLAN NORTH

Drawing Title: CELLAR PLAN LIGHTING

Trade: ELECTRICAL

Drawing No.: 2E-3

Sheets in Set: 100 of 120



FIRST FLOOR PLAN

0 8' 16' 24' FT

SCALE: 1/8"=1'-0"

NOTES:

1. REFER TO DRAWING 2E-1 FOR SYMBOLS.
2. RELAY IN ELECTRIC CLOSET FOR CORRIDOR LIGHTING.
3. 2#10 AWG INSIDE 3/4" CONDUIT TO COIL OF EMERGENCY RELAY PANEL MOUNTED NEXT TO PANEL ELP IN CELLAR.
4. 2#10 AWG INSIDE 3/4" CONDUIT TO CONTROL COILS OF CORRIDOR LIGHTING RELAYS IN ELECTRIC CLOSETS IN CELLAR AND ON 1st, 2nd AND 3rd FLOORS.
5. RUN CIRCUITING TO PANEL VIA LIGHTING RELAY IN ELECTRIC CLOSET.
6. RUN CIRCUITING TO PANEL VIA LIGHTING RELAY PANEL MOUNTED NEXT TO PANEL ELP IN CELLAR
7. 2#10, 1#12 GRD. 3/4"C

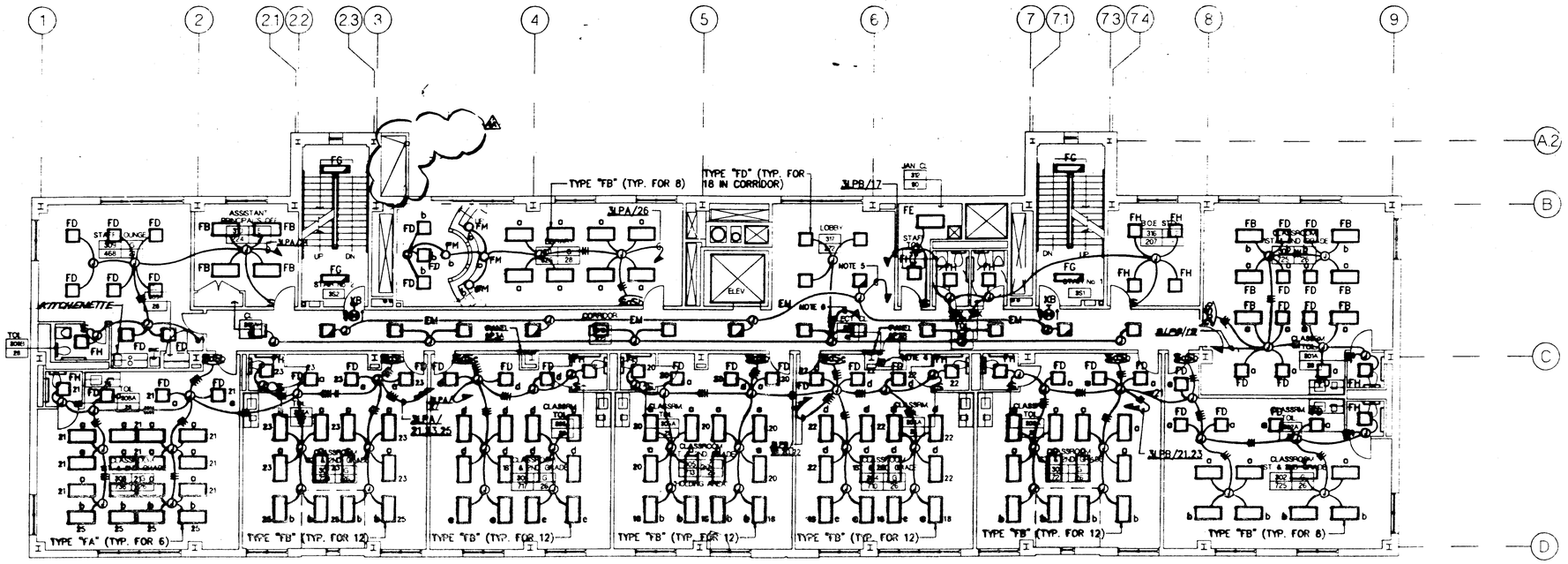
PLAN NORTH

Drawing Title
FIRST FLOOR PLAN LIGHTING

Trade ELECTRICAL

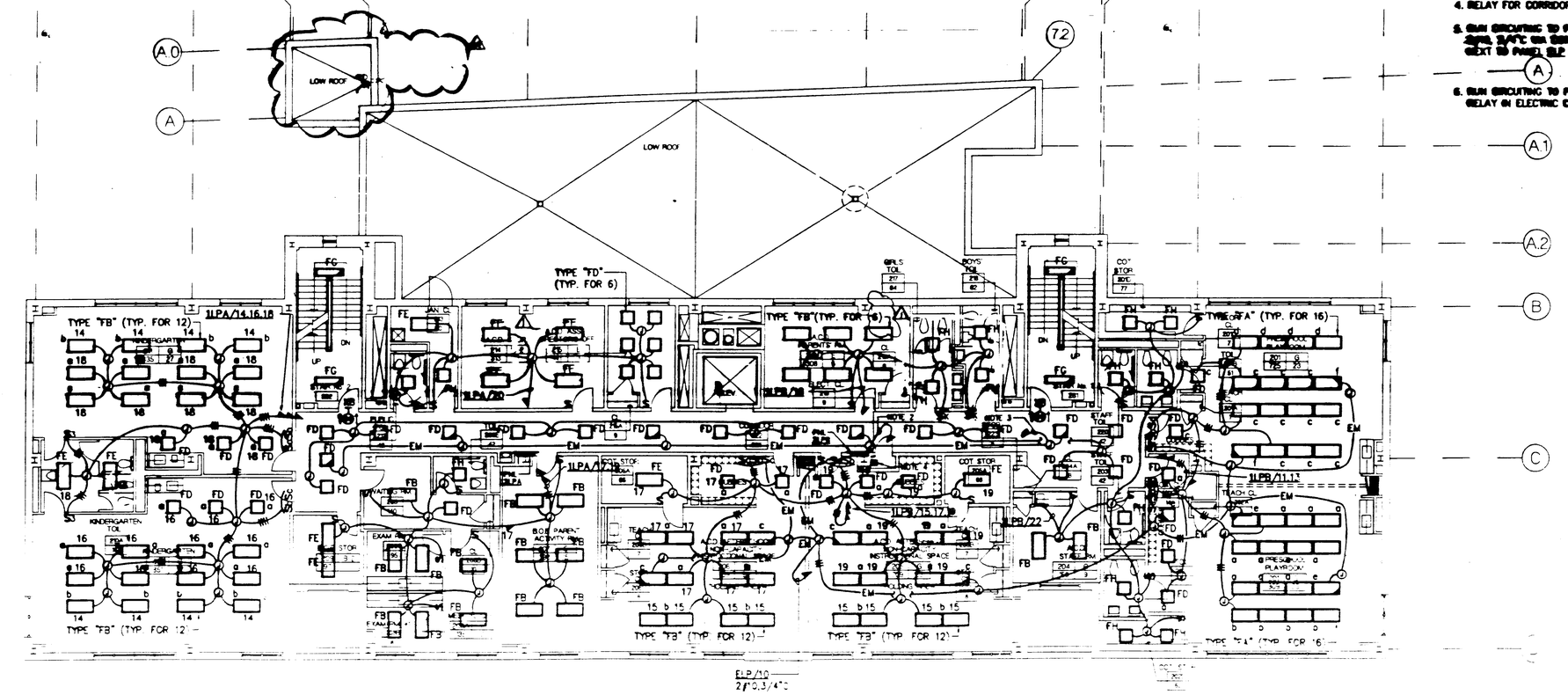
Drawing No.
2E-4

Sheets in Set
101 of 120



THIRD FLOOR PLAN

SCALE: 1/8"=1'-0"



SECOND FLOOR PLAN

SCALE: 1/8"=1'-0"

NOTES:

1. REFER TO DWG 2E-1 FOR SYMBOLS.
2. RUN CIRCUITING TO PANEL 3LPB, CIRCUIT #21 VIA RELAY IN ELECTRIC CLOSET.
3. RUN CIRCUITING TO PANEL ELP, CIRCUIT #6, 2#10, 3/4"C VIA CORRIDOR LIGHTING RELAY PANEL NEXT TO PANEL ELP IN CELLAR.
4. RELAY FOR CORRIDOR LIGHTING.
5. RUN CIRCUITING TO PANEL ELP, CIRCUIT #4 2#10, 3/4"C VIA CORRIDOR LIGHTING RELAY PANEL NEXT TO PANEL ELP IN CELLAR.
6. RUN CIRCUITING TO PANEL 3LPB, CIRCUIT #15, VIA RELAY IN ELECTRIC CLOSET.

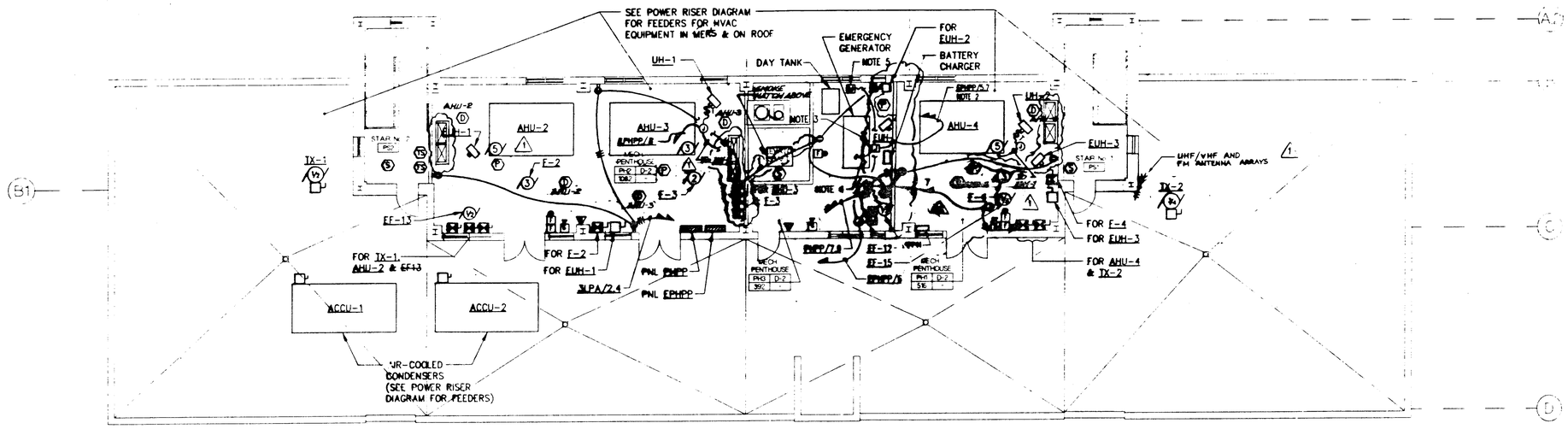
PLAN NORTH

Drawing Title
SECOND & THIRD FL. PLANS LIGHTING

Trade ELECTRICAL

Drawing No
2E-5

Sheets in Set
482 OF 639



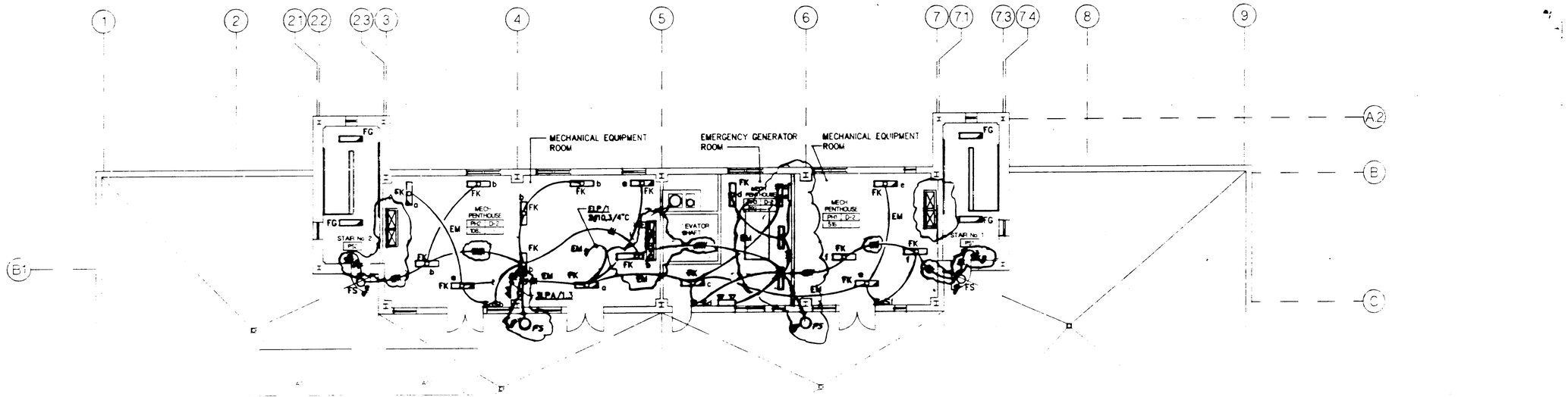
ROOF PLAN - POWER

0 8' 16' 24' FT

SCALE: 1/8"=1'-0"

NOTES:

1. REFER TO DRAWING 2E-1 FOR SYMBOLS.
2. 2#8, 2#12 & 1#12 GROUND INSIDE 3/4" CONDUIT.
3. 2#8 & 1#12 GROUND INSIDE 3/4" CONDUIT. CONNECT TO JACKET WATER HEATER.
4. 2#12 & 1#12 GROUND INSIDE 3/4" CONDUIT. CONNECT TO CONTROL PANEL.
5. MOTORIZED DAMPER FOR VENTILATION LOUVER.



ROOF PLAN - LIGHTING

SCALE: 1/8"=1'-0"

PLAN NORTH

Drawing Title: ROOF PLANS POWER & LTG.

Trade: ELECTRICAL

Drawing No: 2E-6

Sheets in Set: 103 OF 120

Appendix B:

OLA Lighting Fixture Counts

APPENDIX B - LIGHTING FIXTURE COUNTS

School A Lighting Fixture Counts

			Fixture	A	A (emerg.)	B	B (Emerg.)	C	C (EMERG.)	D	E	G	H	H (Emerg.)	H1	H1 (EMERG.)	I	NOT USED	J	J1	J1 (EMERG.)	K	K(EMERG.)	L	L1	M	M1	N	O	O (emerg.)	O1	P	Q	R	S	S1	T	U	U (EMERG)	V	U1 (EMERG)	U1	Design			NYCECC 2020 Appendix CA Baseline LPD (W/ft²)
			LED (Y/N)																			Y		Y		Y																			
ROOM NAME / Number	ROOM TYPE	AREA (ft²)	Watts	90	90	64	64	56	56	13	51	56	56	56	32	32	400		400	400	400	56	56	400	250	50	150	95	90	90	80	64	64	36	400	400	56	64	64	150	82	82	Total (W)	LPD (W/ft2)	Fixture Count	
BASEMENT																																													
C1 - Air Handling Room	Electrical/Mechanical	1198.9																										4	2													540	0.45	6	0.39
C2 - Cust Stor	Storage	409.75		3																																						270	0.66	3	0.43
C3 - Electrical Ser. RM	Electrical/Mechanical	743																										4	2													540	0.73	6	0.39
C4 - Water Service	Electrical/Mechanical	278											3																														168	0.60	3	0.39
C5 - ATS Room	Electrical/Mechanical	307												1																													168	0.55	3	0.39
C6 - Cust Workshop	Laboratory	321		6																																						540	1.68	6	1.04
C7 -General Storage	Storage	1338																										9														810	0.61	9	0.43
C8 - Gas Service	Electrical/Mechanical	274.2																													2											128	0.47	2	0.39
C9 - Vault	Storage	245		3																																						270	1.10	3	0.43
C10 - Oil Tank Vault	Electrical/Mechanical	652		6																																						540	0.83	6	0.39
C11 - Large BK Storage	Storage	536		9																																						810	1.51	9	0.43
C12 - Boiler Room	Electrical/Mechanical	2582																										8	6													1,260	0.49	14	0.39
C13 - Receiving	Storage	538.4		9																																						810	1.50	9	0.43
C14 - Air Hand Rm 2	Electrical/Mechanical	3198																										7	5													1,080	0.34	12	0.39
C16 - Furniture Room	Storage	616.9		7																																						630	1.02	7	0.43
C17 - TV Dist.	Electrical/Mechanical	139.6												2																												112	0.80	2	0.39
C19A - Toilet	Restrooms	92.3		1						1																																103	1.12	2	0.75
C19 - Cust. Lockers	Locker Room	112.9		1		1																																				154	1.36	2	0.45
C20A - Toilet	Restrooms	89		1						1																																103	1.16	2	0.75
C20 - Cust Lrks	Locker Room	134		1		1																																				154	1.15	2	0.45
C21 - Janitors Closet	Storage	112.8		2																																						180	1.54	2	0.43
CA - Corridor	Corridor	1596		10		7																																				1,530	0.96	17	0.58
C8 - Corridor	Corridor	409.26		3		2																																				450	1.10	5	0.58
Stair B	Stair	196.9					1																						1												154	0.78	2	0.5
Stair C	Stair	304																											2												180	0.59	2	0.5
Crawl Spaces	Storage	9771.19											27	7	10	12																									2,608	0.27	56	0.43
FIRST FLOOR																																										-			
101 - Kindergarten	Classroom	1130.7		18																						3																1,770	1.57	21	0.74
101A - Toilet	Restrooms	126.08		2																																						180	1.43	2	0.75
102 - Pre - K	Classroom	882		13																																						1,170	1.33	13	0.74
102A - Toilet	Restrooms	47		1																																						90	1.91	1	0.75
102B - RPZ Room	Corridor	108.5											2																													112	1.03	2	0.58
103 - Kindergarten	Classroom	1069		16																																						1,440	1.35	16	0.74
104 - Kindergarten	Classroom	1008		16																																						1,440	1.43	16	0.74
104A - Toilet	Restrooms	47		1																																						90	1.91	1	0.75
105 - Office Suite	Office	402		6		1																																				630	1.57	7	0.85
105A - General office	Office	372				2																						1													545	1.47	6	0.85
105B - Records	Storage	112		2																																						180	1.61	2	0.43
105C - Principals office	Office	298.4		2		2																																				360	1.21	4	0.85
105D - Toilet	Restrooms	41.5		1																																						90	2.17	1	0.75
105E - Toilet	Restrooms	44.4		1																																						90	2.03	1	0.75
105F - Mail/Time	Copy Room	118		1		1																																				180	1.53	2	0.5
105G - Duplication	Copy Room	168.8		2																																						180	1.07	2	0.5
105H - Vault	Storage	202		3																																						270	1.34	3	0.43
106 - Kitchen	Kitchen	1325		1		2		21		9																																1,950	1.47	33	0.92
106C - NON FD. Stor	Storage	173.5		2																																						180	1.04	2	0.43
106D - Deter. Stor	Storage	34.4				1																																				64	1.86	1	0.43
106E - Dry FD. Stor	Storage	294.3		5																																						450	1.53	5	0.43
106F - Compress. Rm.	Storage	68.62											1																														56	0.82	1	0.43
106G - Elec. Clos.	Electrical/Mechanical	63.3												1																													56	0.88	1	0.39
106I -Women's LKR	Locker Room	107.6				2																																				128	1.19	2	0.45
106J - Toilet	Restrooms	64.5				1																																				64	0.99	1	0.75
106K - Money Room 5	Copy Room	49				1																																				64	1.31	1	0.5
106L - Office	Office	115.5		2																																						180	1.56	2	0.85
106M - Ala-Carte + student serve	Cafeteria	650.9						16		6																																1,232	1.89	22	0.53
106N - Gas Valve Room	Electrical/Mechanical	18.8	none																																							-	0.00	0	0.39
106P - Men's LKR	Locker Room	57.6				1																																				64	1.11	1	0.45
107 - Girls locker room	Locker Room	584.13		3		3				4																																514	0.88	10	0.45
108 - Trash Refrig.	Storage	77.5	none																																							-	0.00	0	0.43
109 - Boys Locker room	Locker Room	568		3		3				3																																501	0.88	9	0.45
110 - Mop Room.	Storage	106	na																																							-	0.00	0	0.43
112 - Staff Dining	Cafeteria	613.4		10																																						900	1.47	10	0.53
113 - Gymnasium	Gymnasium	5771.03												12					11		4																					6,672	1.16	27	0.75
113A - Gym Storage	Storage	207.6		2																																						180	0.87	2	0.43
114 - Student Din.	Cafeteria	3505																																					21	10	7	19	4,116	1.17	57	0.53
114A - Girls Toilet	Restrooms	177.3		3																																						270	1.52	3	0.75
114B - Boys Toilet	Restrooms	150.5		3																																						270	1.79	3	0.75
115 - Cust office	Office	255		4																																						360	1.41	4	0.85
115A - Cust. Stor.	Storage	98.1		2																																						180	1.83	2	0.43
116 - Parents Comm.	Office	317.5		4																																						360	1.13	4	0.85
117 - CW Speech	Classroom	367.7		4																																						360	0.98	4	0.74
118 - Assembly	Auditorium	4163																				16	11	12																		6,312	1.52	39	0.63
118A - Stage	Auditorium	860																							6																	1,500	1.74	6	0.63
118B - Assem Stor	Storage	99.32		1																																						90	0.91	1	0.43
118 C - Elec. Room	Electrical/Mechanical	68											2																													112	1.65	2	0.39
118 D - Tel. Com.	Office	68.27											2																													112	1.64	2	0.85
118 E - Sound Room	Storage	84		1																																						90	1.07	1	0.43
118 G - Jan. Clo.	Storage	29.4				1																																				64	2.18	1	0.43
118 H - Utility / Dress	Storage	298.7		5																																						450	1.51	5	0.43
118 I - Toilet	Restrooms	71.5		2																																						180	2.52	2	0.75
118L - Music Stor.	Storage	152.08		3																																						270	1.78	3	0.43
119 - Acid Tank RM	Electrical/Mechanical	25		2																																						180	1.88	2	0.39
120 - Elt. Clo.	Electrical/Mechanical	25				1																																			64	2.56	1	0.39
121 - CW Spec. ED.	Classroom	548		8																																						720	1.31	8	0.74
121A - Toilet	Restrooms	46		1																																						90	1.96	1	0.75
122 - Music Office	Office	199.1		3																																						270	1.36	3	0.85
123 - CW Spec. Ed.	Classroom	545		8																																						720	1.32	8	0.74
123A - Toilet	Restrooms	46		1																																						90	1.96	1	0.75
124 - Grounds Stor.	Storage	136.04											2																													112	0.82	2	0.43
125 - CW Spec. ED	Classroom	511		7																																						630	1.23	7	0.74
125A - Toilet	Restrooms	46		1																																						90	1.96	1	0.75
126 - Scaffold Stor.	Storage	134.6		2																																						180	1.34	2	0.43
127 - CW Spec. ED	Storage	560		8																																						720	1.29	8	0.43
127A - Toilet	Restrooms	46		1																																						90	1.96	1	0.75
128 - Staff Toilet	Restrooms	61.69		1																																						90	1.46	1	0.75
129 - CW Spec. ED.	Classroom	589.1		8																																						720	1.22	8	0.74
129A - Toilet	Restrooms	53		1																																						90	1.70	1	0.75
130 - Boys Toilet	Restrooms	269.8		1								6																														426	1.58	7	0.75
132 - Girls Toilet	Restrooms	269.7		1								6																														426	1.58	7	0.75
134 - Staff Toilet	Restrooms	53		1																																						90	1.70	1	0.75
136 - Medical Suite	Exam/Treatment Room	89		2																																						180	2.02	2	1.16
136A - Toilet	Restrooms	57.5		1																																						90	1.57	1	0.75
136B - intake	Exam/Treatment Room	189.9		2																																						180	0.95	2	1.16
136C - Dress / Shower	Restrooms	36.94				1																																				64	1.73	1	0.75
136D - Exam	Exam/Treatment Room	105.7		1																																						90	0.85	1	1.16
138 - Health Office	Office	306		4																																						360	1.18	4	0.85
138A - Toilet	Restrooms	104.5		1																																						90	0.86	1	0.75
140 - City WD OFF.	Office	270.8		3																																						270	1.00	3	0.85
140A - City WD Stor.	Storage	52		1																																						90	1.73	1	0.43
142 - City WD OT/PT	Office	540.7		8																																						720	1.33	8	0.85
144 - ADL CS DIS.	Office	669.5		11																																						990	1.48	11	0.85
144A - Toilet	Restrooms	44.26		1																																						90	2.03	1	0.75
144B RPZ Room	Corridor	116											2																													112	0.97	2	0.58
1A - Corridor	Corridor	1986.4		11	10																																				1,890	0.95	21	0.58
1A1 - Vestibule	Corridor	286.3		1																																						90	0.31	1	0.58
1B - Corridor +1B2 VEST.	Corridor	2035.9		5	3																																				720	0.35	8	0.58
1B1 - Vestibule + Stair A	Stair	767.11		7	6																																				1,170	1.53	13	0.5
1C - Lobby	Lobby	1106.4		2	1	8	4																					8													1,798	1.62	23	0.9
Stair C	Stair	449.5					3																						1												282	0.63	4	0.5
Stair A	Stair	655					3																						1												282	0.43		0.5
Stair B	Stair	709					3																						2												372	0.52		0.5
Second Floor																																													
201 - Second Grade	Classroom	803		11																																						990	1.23	11	0.74
201A - Toilet	Restrooms	46		1																																						90	1.96	1	0.75
202 - 2nd grade	Classroom	783.5		11																																						990	1.26	11	0.74
202A - Toilet	Restrooms	44		1																																						90	2.05	1	0.75
203 - 1st Grade	Classroom	743.5		11																																						990	1.33	11	0.74
203A - Toilet	Restrooms	46		1																																						90	1.96	1	0.75
204 - 2nd grade	Classroom	752.75		10		1																																				964	1.28	11	0.74
204A - Toilet	Restrooms	44		1																																						90	2.05	1	0.75
205 - 1st Grade	Classroom	736.7		11																																						990	1.34	11	0.74
205A - Toilet	Restrooms	46		1																																						90	1.96	1	0.75
206 - Teach-Oli. RM	Office	289		3																																						270	0.93	3	0.85
207 - 1st Grade	Classroom	717		10		1																																				964	1.31	11	0.74
207A - Toilet	Restrooms	46		1																																						90	1.96	1	0.75
208 - ER. Closet	Storage	47																																1								36	0.77	1	0.43
209 - Workroom	Laboratory	195		3																																						270	1.38	3	1.04
210 - Speech Re. RM	Classroom	410		6																																						540	1.23	6	0.74
211 - Library	Library (General)	2228		14	6	13	2																																	16				3,656	1.64	51	0.94
211A - Lib's office	Office	223		3																																						270	1.21	3	0.85
211B - Eq. St. Server	Storage	66		1																																						90	1.36	1	0.43
211C - Lib. Store.	Storage	228		4																																						360	1.58	4	0.43
212 - Computer Lab	Laboratory	1089.9									18																															918	0.84	18	1.04
213 - 3rd Grade	Classroom	792.5		12																																						1,080	1.36	12	0.74
214 - AV. Storage	Storage	168		3																																						270	1.61	3	0.43
214A - Storage	Storage	95											2																													112	1.18	2	0.43
215 - 3rd Grade	Classroom	773.3		11		1																																			1,054	1.36	12	0.74
216 - Superv. Off	Office	361.8		6																																						540	1.49	6	0.85
216A - Elec. Closet	Storage	62												2																												112	1.81	2	0.43
217 - 3rd Grade	Classroom	799.3		12																																						1,080	1.35	12	0.74
218 - Staff Toilet	Restrooms	79.5			1																																					90	1.13	1	0.75
219 - 4th Grade	Classroom	869.9		7	5																																					1,080	1.24	12	0.74
220 - Staff Toilet	Restrooms	62.3		1																																						90	1.44	1	0.75
222 - Boys Toilet	Restrooms	303.7		1								6																														426	1.41	7	0.75
224 - Girls Toilet	Restrooms	271.6		1								6																														426	1.57	7	0.75
226 - Tel. Com.	Storage	60												1																												56	0.93	1	0.43
228 - Sst. LNG/WKRM	Lounge/Breakroom	482.6		7																																						630	1.31	7	0.44
228A - Toilet	Restrooms	65		1																																						90	1.38	1	0.75
230 - Aides locker	Locker Room	341.4		5																																						450	1.32	5	0.45

232 - Jan. Closet	Storage	71.5		1																																						90	1.26	1	0.43
234 - Book Stor.	Storage	403.5		6																																						540	1.34	6	0.43
236 - RD. Res. Room	Restrooms	360.8		6																																						540	1.50	6	0.75
238 - Teach. Obs. Rm	Lounge/Breakroom	218.3		3																																						270	1.24	3	0.44
240 - 4th Grade	Classroom	863.5		12																																						1,080	1.25	12	0.74
Stair A	Stair	702.9					2																							1												218	0.31	3	0.5
Corr A	Corridor	1625		12	6																																					1,620	1.00	18	0.58
Corr B	Corridor	1432.5		9	7																																					1,440	1.01	16	0.58
Stair B	Stair	627.4					2																							1												218	0.35	3	0.5
Stair C	Stair	930					2																							1												218	0.23	3	0.5
Third Floor																																										-			
301 7th Grade	Classroom	868.9		12																																						1,080	1.24	12	0.74
302 - 7th Grade	Classroom	852.9		12																																						1,080	1.27	12	0.74
303 - 7th Grade	Classroom	761.3		12																																						1,080	1.42	12	0.74
304 - 8th Grade	Classroom	813.7		12						1																																1,093	1.34	13	0.74
305 - GD, Suite/Wait.	Corridor	139.2		2																																						180	1.29	2	0.58
305A - Guidance off	Office	114		1																																						90	0.79	1	0.85
305B - Guidance off	Office	125.6		2																																						180	1.43	2	0.85
305C - Conf. Room	Office	156.3		2																																						180	1.15	2	0.85
305D - Closet	Storage	14.3								1																																13	0.91	1	0.43
305E - Closet	Storage	14.3								1																																13	0.91	1	0.43
306 - 8th Grade	Classroom	783.1		12																																						1,080	1.38	12	0.74
307 -SP. Education	Classroom	547.5		9																																						810	1.48	9	0.74
308 - 8th Grade	Classroom	817.4		12																																						1,080	1.32	12	0.74
309 - SP. Education	Classroom	503.2		6																																						540	1.07	6	0.74
310 - SBST suite wait	Lounge/Breakroom	109.5		2																																						180	1.64	2	0.44
310A - SBST office	Office	114.9		2																																						180	1.57	2	0.85
310B - SBST office	Office	129.6		2																																						180	1.39	2	0.85
310C - SBST conf	Conference	162.3		2																																						180	1.11	2	0.93
310D - Stor.	Storage	23.9											1																													56	2.34	1	0.43
311 - Art Classroom	Classroom	1134.5		18																																						1,620	1.43	18	0.74
311A - Art Stor.	Storage	184		2																																						180	0.98	2	0.43
311B - Art Stor.	Storage	182.9		2																																						180	0.98	2	0.43
312 - Super's off	Office	363.7		6																																						540	1.48	6	0.85
312A - Elec. Closet	Storage	62												1																												56	0.90	1	0.43
313 - Science Lab	Laboratory	1191.4		18																																						1,620	1.36	18	1.04
313A - 6th Scie. Prep	Laboratory	351		5																																						450	1.28	5	1.04
314 - Staff Toilet	Restrooms	78.5		1																																						90	1.15	1	0.75
315 - Jan Closet	Storage	37.8				1																																				64	1.69	1	0.43
316 - Staff Toilet	Storage	62.3		1																																						90	1.44	1	0.43
317 - Science Res.	Restrooms	780.5		12																																						1,080	1.38	12	0.75
318 - Boys toilet	Restrooms	270.3		1								6																														426	1.58	7	0.75
319 - 5th Grade	Classroom	798.3		12																																						1,080	1.35	12	0.74
320 - Girls Toilet	Restrooms	271.5		1								6																														426	1.57	7	0.75
321 - 5th Grade	Classroom	864.8		7	5																																					1,080	1.25	12	0.74
322 - Tele com	Storage	60												1																												56	0.93	1	0.43
324 - ER. Closet	Storage	28.8																														1										64	2.22	1	0.43
326 - Book Store	Library (General)	291.5		4																																						360	1.23	4	0.94
328 - 6th Grade	Classroom	826.6		12																																						1,080	1.31	12	0.74
330 - 6th Grade	Classroom	808.3		12																																						1,080	1.34	12	0.74
332 - 6th Grade	Classroom	813.5		12																																						1,080	1.33	12	0.74
3A Corr	Corridor	1573.3		12	6																																					1,620	1.03	18	0.58
Stair A	Stair	741.4																												1												90	0.12	1	0.5
3B Corr	Corridor	1532.9		10	8																																					1,620	1.06	18	0.58
Stair B	Stair	672.2																												1	1											170	0.25	2	0.5
Stair C	Stair	770.6																												1												90	0.12	1	0.5
Mechanical Penthouse																																										-			
Stair	Electrical/Mechanical	552.8																												2												180			
Air Handler Room	Electrical/Mechanical	4484.2																											13	6												1,710			
Chiller Room	Electrical/Mechanical	1322.5																											5	5												900			
Electrical Closets	Electrical/Mechanical	165.7																												2												180			
Exterior																																										-			
	First Floor	**N/A**																								16																	800			
	Penthouse	**N/A**																								2														8			1,300			
	Total	**119,767**	**-**	**798**	**81**	**42**	**22**	**37**	**15**	**12**	**18**	**36**	**44**	**30**	**10**	**12**	**-**	**-**	**11**	**-**	**4**	**16**	**11**	**12**	**6**	**21**	**-**	**9**	**50**	**43**	**1**	**2**	**1**	**1**	**-**	**-**	**16**	**21**	**10**	**8**	**7**	**19**	124,663	1.04	1,426	

School B Lighting Fixture Counts

ROOM TYPE	ROOM TYPE	AREA (ft²)	Fixture	FA	FB	FC	FD	FE	FF	FG	FH	FK	FL	FM	FN	FQ	FS	FT	FW	FX	VS	OS	Design			Fixture Count	NYCECC 2020 Appendix CA Baseline LPD (W/ft²)
			LED (Y/N)																								
			Watts	86.4	86.4	55.8	55.8	86.4	86.4	57.6	55.8	57.6	57.6	23.4	23.4	28.8	48.6	57.6	86.4	55.8			Total (W)	Total (W) w.VS/OS	LPD (W/ft2)		
BASEMENT																										0	
Crawl Space 1	Storage	2067.6														4							115	115	0.06	4	0.43
Electric meter Room	Electrical/Mechanical	434.8														3		3					259	259	0.60	6	0.39
Tel Serv Rm	Electrical/Mechanical	48														1							29	29	0.60	1	0.39
Tel Com Rm	Electrical/Mechanical	129														2							58	58	0.45	2	0.39
Vestibule 1	Corridor	129														2							58	58	0.45	2	0.58
Stair 1	Stair	179								2													115	115	0.64	2	0.5
male locker room	Locker Room	180									2					2							169	169	0.94	4	0.45
Vestibule 2	Corridor	93.4									2												112	112	1.19	2	0.58
Dry food storage A+B	Storage	318								7													403	403	1.27	7	0.43
F LOCKER ROOM	Locker Room	189		2			1																229	229	1.21	3	0.45
F LOCKER ROOM TOILET	Restroom	96									2												112	112	1.16	2	0.75
OFFICE??	Office	103			2																		173	173	1.68	2	0.85
ELEVATOR MECH RM	Electrical/Mechanical	103																2					115	115	1.12	2	0.39
WATER METER ROOM	Electrical/Mechanical	363.5														1		3					202	202	0.55	4	0.39
STORAGE	Storage	326.7								4													230	230	0.71	4	0.43
OIL TANK ROOM	Electrical/Mechanical	487											3					1					230	230	0.47	4	0.39
OIL PUMP ROOM	Electrical/Mechanical	302.8											3										173	173	0.57	3	0.39
CORRIDOR	Corridor	524								7													403	403	0.77	7	0.58
CRAWL SPACE 2	Storage	2273.4														5							144	144	0.06	5	0.43
MECH ROOM 1	Electrical/Mechanical	611.6															2	4					328	328	0.54	6	0.39
BOILER ROOM	Electrical/Mechanical	616										7											403	403	0.65	9	0.39
MECH ROOM 2	Electrical/Mechanical	965.8										8											461	461	0.48	8	0.39
CRAWL SPACE 3	Storage	867.4														2							58	58	0.07	2	0.43
FIRST FLOOR																											
KIDERGARDEN	Classroom	836.8			12		3														1		1,204	1,084	1.44	15	0.74
KIDERGARDEN TOILET	Restroom	163.3						2															173	173	1.06	2	0.75
STAIRS A	Stair	250								3	1												229	229	0.91	5	0.5
STUDENT DINING	Cafeteria	1612.4			24																		2,074	2,074	1.29	24	0.53
BOE KITCHEN	Kitchen	1592.6																	19	2			1,753	1,753	1.10	21	0.92
ACD EQUIP STOR	Storage	96.5																1					58	58	0.60	1	0.43
DRY FOOD STORAGE	Storage	91.8						1															86	86	0.94	1	0.43
STAIR B	Stair	256.3								3					1								196	196	0.77	5	0.5
LOBBY+ CORRIDOR	Corridor	1047.1					19																1,060	1,060	1.01	19	0.58
UNREADABLE AREA (INFANT UNIT CONTIUNED?)	Classroom	506.6			8																1		691	622	1.36	8	0.74
INFANT UNIT	Classroom	535.5			6		6														1		853	768	1.59	12	0.74
INFANT UNIT TOILET	Restroom	64.3									1												56	56	0.87	1	0.75
INFANT BATHROOM	Restroom	361.4			6																		518	518	1.43	6	0.75
INFANT UNIT	Classroom	447			6																1		518	467	1.16	6	0.74
INFANT UNIT TOILET	Restroom	60									1												56	56	0.93	1	0.75
CRIB STORAGE	Storage	68									1												56	56	0.82	1	0.43
FLP / B	Storage	97									2												112	112	1.15	2	0.43
ACD BOOKKEEPING ROOM	Storage	165					6																335	335	2.03	6	0.43
STORAGE	Storage	50									1												56	56	1.12	1	0.43
ACD DIRECTORS OFFICE	Office	204.9		1	2																	1	259	233	1.27	3	0.85
STORAGE ROOM?	Storage	64									1												56	56	0.87	1	0.43
STORAGE ROOM?	Storage	46									1												56	56	1.21	1	0.43
SERVICE	Lounge/Breakroom	270						4						1									369	369	1.37	5	0.44
ACD KITCHEN	Kitchen	581.7																	8				691	691	1.19	8	0.92
BOE TOILET	Restroom	119.9									1												56	56	0.47	1	0.75
ACD STORAGE	Storage	100							1														86	86	0.86	1	0.43
TOILET	Restroom	163									3												167	167	1.03	3	0.75
CUST OFFICE	Office	162			2																	1	173	156	1.07	2	0.85
VESTIBULE	Corridor	128.3									1												56	56	0.43	1	0.58
KINDERGARDEN	Classroom	871.88			14		3														1		1,377	1,239	1.58	17	0.74
SECOND FLOOR																										0	#N/A
211- KINDERGARDEN	Classroom	860			12		2														1		1,148	1,034	1.34	14	0.74
STAIR A	Stair	276.4								2													115	115	0.42	2	0.5
KIDENGARDEN TOILET	Restroom	165						2															173	173	1.05	2	0.75
JAN CLOSET	Storage	110.4					1	1															142	142	1.29	2	0.43
PUBLIC TOILET	Restroom	45.1					1																56	56	1.24	1	0.75
ACD STORAGE	Storage	329			1																		86	86	0.26	1	0.43
ACD ASSIST DIRECTORS OFFICE	Office	157.8					6															1	335	301	2.12	6	0.85
ACD PARENTS ROOM	Lounge/Breakroom	334.6			6																		518	518	1.55	6	0.44
GIRLS TOILET	Restroom	102									2												112	112	1.09	2	0.75
BOYS TOILET	Restroom	98.6									2												112	112	1.13	2	0.75
STAIR B	Stair	280								2													115	115	0.41	2	0.5
STAFF TOLIET	Restroom	47.7									1												56	56	1.17	1	0.75
TOILET	Restroom	72.7									2												112	112	1.54	2	0.75
COT STORAGE	Storage	92.7									2												112	112	1.20	2	0.43
PRESCHOOL PLAYROOM	Classroom	769.3		16			1														1		1,438	1,294	1.87	17	0.74
PRESCHOOL PLAYROOM - 202	Classroom	818.7		16			3														1		1,550	1,395	1.89	19	0.74
OCT STORAGE - 202B	Storage	70.78									2												112	112	1.58	2	0.43
TOILET - 202C	Restroom	54.5									1												56	56	1.02	1	0.75
TOILET -203	Restroom	51.4									1												56	56	1.09	1	0.75
STAFF ROOM - 204	Lounge/Breakroom	178.5			2																	1	173	156	0.97	2	0.44
COT STORAGE	Storage	73.7						1															86	86	1.17	1	0.43
AFTER SCHOOL ROOM	Classroom	789.8			12		3														1		1,204	1,084	1.52	15	0.74
AFTER SCHOOL ROOM 2	Classroom	776.5			12																1		1,037	933	1.34	12	0.74
COT STORAGE	Storage	93.5					1																56	56	0.60	1	0.43
BOE PARENT	Lounge/Breakroom	411.8			6																	1	518	467	1.26	6	0.44
WAITING ROOM - 208	Exam/Treatment Room	308.6			3		1																315	315	1.02	4	1.16
EXAM ROOM 1	Exam/Treatment Room	103.77			2																		173	173	1.67	2	1.16
EXAM ROOM 2	Exam/Treatment Room	110			2																		173	173	1.57	2	1.16
BOE STOR	Storage	103.5						2															173	173	1.67	2	0.43
KINDERGERDEN	Classroom	912			12		3														1		1,204	1,084	1.32	15	0.74

CORRIDOR	Corridor	933.8					17															949	949	1.02	17	0.58
THIRD FLOOR																										
309 - STAFF LOUNGE	Lounge/Breakroom	502.8					8														1	446	402	0.89	8	0.44
STAFF TOILET	Restroom	45									1											56	56	1.24	1	0.75
310 - ASSISTANT PRINCIPALS OFFICE	Office	243			4																1	346	311	1.42	4	0.85
STAIR A	Stair	265								2												115	115	0.43	2	0.5
311 - LIBRARY	Library (General)	710			8		3							4						1		952	857	1.34	15	0.94
LOBBY + CORRIDOR	Corridor	1170					18															1,004	1,004	0.86	18	0.58
JAN CLOSET	Storage	108						1			1											142	142	1.32	2	0.43
PUBLIC TOILET	Restroom	93									2											112	112	1.20	2	0.75
STAIR B	Stair	282								2												115	115	0.41	2	0.5
BOE STOR	Storage	217									4											223	223	1.03	4	0.43
301 - CLASS ROOM 1ST & 2ND GRADE 1	Classroom	761			6		9													1		1,021	919	1.34	15	0.74
CLASS ROOM TOILET 1	Restroom	42									1											56	56	1.33	1	0.75
302 - CLASSROOM 1ST & 2ND GRADE 2	Classroom	748			8		5													1		970	873	1.30	13	0.74
CLASSROOM TOILET 2	Restroom	40									1											56	56	1.40	1	0.75
303 - CLASSROOM 1ST & 2ND GRADE 3	Classroom	763			12															1		1,037	933	1.36	12	0.74
CLASSROOM TOULET 3	Restroom	40									1											56	56	1.40	1	0.75
304 -CLASSROOM 1ST & 2ND GRADE 4	Classroom	740			12															1		1,037	933	1.40	12	0.74
CLASSROOM TOILET 4	Restroom	40									1											56	56	1.40	1	0.75
305 - CLASSROOM 1ST AND 2ND GRADE 5	Classroom	741			12															1		1,037	933	1.40	12	0.74
CLASSROOM TOILET 5	Restroom	40									1											56	56	1.40	1	0.75
306 -CLASSROOM 1ST AND 2ND GRADE 6	Classroom	752			12															1		1,037	933	1.38	12	0.74
CLASSROOM TOILET 6	Restroom	40									1											56	56	1.40	1	0.75
307 - CLASSROOM 1ST AND 2ND GRADE 7	Classroom	776			12															1		1,037	933	1.34	12	0.74
CLASSROOM TOILET 7	Restroom	40									1											56	56	1.40	1	0.75
308 -CLASSROOM 1ST AND 2ND GRADE 8	Classroom	811			12															1		1,037	933	1.28	12	0.74
CLASSROOM TOILET 8	Restroom	40									1											56	56	1.40	1	0.75
Mechanical Penthouse																										
PENTHOUSE 1	Electrical/Mechanical	1079			10																	864	864	0.80	10	
PENTHOUSE 2	Electrical/Mechanical	505			5																	432	432	0.86	5	
PENTHOUSE 3	Electrical/Mechanical	566			4																	346	346	0.61	4	
	Total	**44,153**	**-**	**35**	**269**	**-**	**120**	**14**	**1**	**34**	**49**	**15**	**6**	**5**	**1**	**22**	**2**	**14**	**27**	**2**		44,282	41,918	1.00	620	

Appendix C:

SCA Lighting Design Requirements

7.2 Lighting Systems

7.2.1 Interior Lighting

Description/Design Approach:

A. Energy Efficient Lighting Luminaires

1. Luminaires shall be high efficiency LED.

2. In general, Lighting Systems shall conform to NYC Green Schools Guide Credit S6.1R - Light Pollution Reduction, Credit Q5.1R - Controllability of Systems, Lighting and Credit Q7.5 - Visual Performance, Artificial, Direct-Indirect Lighting and the **2020** NYC Energy Conservation Code (NYCECC), **which includes the NYC modifications to ASHRAE 90.1-2016**.

3. The number of different luminaires shall be limited as much as possible. Custom luminaires shall be avoided

B. Illumination Levels

1. The following are illumination levels for typical functional areas. This listing is intended to provide guidance in the design of lighting for the indicated areas as well as for other areas (unlisted) that have similar functions.

2. Listed illumination levels are average maintained values in foot-candles (FC) and are predicated on a thirty-inch (30") reference work plane, unless otherwise noted. Where multiple functions and multiple lighting levels are indicated for a particular area, it is intended that multiple switching be provided to achieve same. In all cases, compliance with IES minimum recommended illumination levels and the **2020** NYCECC watts per square foot limitations is intended. The maximum LPD per space is at or below ASHRAE 90.1-**2016** levels**, as modified by Appendix CA of the 2020 NYCECC**, though they will typically be much lower to meet the required overall building LPD. Total building lighting power density (LPD) using the **2020** NYCECC – ASHRAE 90.1-**2016** procedure shall be a maximum of: 0.5 w/ft² for new PS, IS, HS and Additions, Modernizations and new ECC. These are the values utilized in the SCA's prototypical energy modeling as a means to meet LL 31/16 goals. The total building LPD shall be determined utilizing ASHRAE Methodology. Trade-offs among spaces is permitted provided that the total LPD is not exceeded, **though based on LED technology trade-offs should not be required for most spaces to maintain the indicated foot-candle levels.**

Area	FC LEVEL	Maximum LPD*
Auditorium	*4	
Primary and Intermediate Schools		
General	40	**0.63** W/ft²
Aisles	2	
High School		
Theatrical/General Use/Study Room	15/30/40	**0.63** W/ft²
Stage – General	30	
Production	(As Required)	
Aisles	2	
Boiler Room	30	**0.39** W/ft² *6

Requirement Applies to: ✔ **New Construction** ✔ **Major Modernizations** ✔ **Capital Improvement Projects**

Cafeteria/Lunchroom	30*4	0.53 W/ft^2
Serving Area	40	**0.92** W/ft^2
Cafetorium	30*4	**0.63** W/ft^2
Classrooms	35*2	0.5 W/ft^2
Community Rooms	40	0.7 W/ft^2
Computer Rooms	30/**35**	0.5 W/ft^2
Corridors	20@ 18" AFF	0.55 W/ft^2*3
Dance Studios	40@18"AFF	**0.5** W/ft^2
Duplication Room	30	**0.5** W/ft^2
Electric Closets	30	**0.39** W/ft^2 *6
Elevator Machine/Control Room/Spaces	*5	**0.39** W/ft^2 *6
Exam Areas of Medical Suites/Clinics	50	1.1 W/ft^2
Exercise Room	30	**0.5** W/ft^2
Gymnasium	*4	
General	30	**0.75** W/ft^2
Bleacher	20	**0.43** W/ft^2
Gymatorium	30	**0.75** W/ft^2
Janitor Closets	20	**0.43** W/ft^2
Kitchen	50	**0.92** W/ft^2
Laboratories	50	1.0 W/ft^2
Library		
General	30	**0.77** W/ft^2
Reading	40	**0.77 W/ft^2**
Stacks	20 @ 18" AFF	**0.77 W/ft^2**
Lobby	30	0.90 W/ft^2
Locker Rooms	20 @ 18" AFF	**0.45** W/ft^2
Mechanical Areas – Service Areas	30	**0.42** W/ft^2
Media Centers/TV Studios	30/40	1.0 W/ft^2
Offices	35	0.5 W/ft^2
Pipe Chases/Crawl Spaces	10	
Playroom	30	**0.5** W/ft^2
Records Room	20 @ 18" AFF	0.6 W/ft^2
Shops & Areas with Critical Visual Tasks	50	1.0 W/ft^2
Shower Rooms	20	**0.75** W/ft^2
Staff – Lunchroom/Lounge	30	0.**44** W/ft^2
Resource Center/Workroom	30/50	**1.0** W/ft^2
Stairs	20	**0.5** W/ft^2
Storage Rooms	30	**0.43** W/ft^2
Swimming Pools		
Poolside	30	1.20 W/ft^2
Bleachers	20	0.4 W/ft^2
Switchboard Rooms	30	**0.39** W/ft^2 *6
Telecommunication Rooms	30	0.**39 W/ft^2** *6
Toilets	20	**0.75** W/ft^2

* Denotes total average power density for particular spaces and includes all power densities for all areas within the space. For auditoriums, this power density shall be calculated utilizing a 40 FC setting, excluding the theatrical stage lighting. Submit computer generated lighting calculations and Lighting Power density at 60% Design for the following (Sample of typical classroom, general office, corridors, libraries, cafeteria and gymnasium). Also submit total LPD for the entire school.

*2 Classroom foot-candle calculations shall exclude the levels in the area 3 feet around the perimeter of each classroom but shall include lighting over all teaching surfaces. Average maintained level at 30" AFF shall be a minimum of 35 FC with an average to minimum ratio not to exceed 2.5. For calculation purposes, use a light loss factor of 0.9 and room reflectance of 90/60/25 (Ceiling/walls/floors)

*3 Corridors with lockers can use the requirement for locker rooms.

*4 PA space foot-candle calculations shall exclude the levels in the area 3 feet around the perimeter of each space. Average maintained level at 30" AFF shall be the indicated FC with an average to minimum ratio not to exceed 2.5 to ensure even lighting. For calculation purposes, use a light loss factor of 0.9 and room reflectance of 80/50/20 (Ceiling/walls/floors). Locations where providing such maximum ratio may increase the LPD above the required maximums shall be discussed with A&E.

*5 Must be 19 fc minimum at floor level for entire room per ASME 17.1.

Requirement Applies to: ✔ **New Construction** ✔ **Major Modernizations** ✔ **Capital Improvement Projects**

***[6] Up to an additional .52 W/ft^2 is permitted if controlled separately from the base allowance of 0.43. Ensure minimum foot candle levels are met.**

C. Lighting Fixture Requirements by Space

1. General: Designers shall utilize those manufacturers and model numbers indicated in Section 16502 (LED Interior Lighting) of the Standard Specification as their Basis of Design.

2. Instructional Space and Library: Direct/indirect, ceiling pendant luminaires. For typical classrooms measuring approximately 29' X 26', lighting shall consist of two (2) rows of direct /indirect, ceiling pendant-mounted luminaires spaced approximately 12' on center to produce optimum lighting. The distance between the wall and the luminaires at the front of the run (the front wall with the marker boards) should be no more than 3'. Luminaires lighting distribution shall be 70-% up and 30% down. The total luminary efficiency of the luminaires shall be 90% or better. Mounting shall be such that the bottom of the luminaires shall not be lower than 8'-0" in Early Childhood Centers and Primary Schools and 8'-6" in Intermediate Schools and High Schools, with the optimum fixture to ceiling distance ranging from 14" to 24". For non-conventional shaped instructional spaces (spaces not measuring approximately 29' X 26'), the quantity of pendant luminaires, rows of pendant luminaires, and their spacing shall vary as required to provide the required foot-candle levels and minimize lighting power density.

3. District 75 Classrooms: Pendant mounted indirect, 100% up-light to be used

4. Office and Cafeteria: Recessed 2'x4' luminaires,

5. Corridor: Recessed 2'x4' or 2x2, luminaires (based on ceiling grid selected)

6. Gymnasium: High Bay, non-glare luminaires with impact resistance lens

7. Kitchen Areas, Kitchen Storerooms and Servery Areas: Recessed 2'x2' luminaires, for metal pan ceiling using a lay in system such as Armstrong "Metal Works-Flush Tegular" with, gasket, UL listed for wet location, NSF C-2 certification, with silicone sealant on all seams.

8. Stair: 4' luminaires, wrap around, with vandal resistant lens.

9. Storage/Mechanical Space: 1' x 4' or 1' x 8' luminaires

10. Shower Room: Recessed 1' x 4' luminaires, gasket, UL listed for wet location.

11. Toilet/Locker Room: Recessed 2'x4' luminaires

12. Auditorium, Main Lobby, Library and luminaires at the Main Entrance: The lighting designer may select luminaires suited to the aesthetic of the spaces.

D. Lighting Controls

1. All interior lighting shall automatically be controlled by a programmable Lighting Control Panel with integral clock except for the emergency lighting. The Lighting Control Panel shall be provided at the Electric Closet and shall control all spaces that do not have 100% automatic shut-off and/or Occupant sensors.

2. All stairs, locker/shower rooms and multi-user student toilet luminaires shall be set to 50% power levels in the unoccupied state using occupancy Sensors (Auto-ON) to bring it up to 100% when space is occupied.

3. Each area enclosed by walls or floor-to-ceiling partitions shall have at least one switch to control the lighting within. Due to the nature of schools and the need for safety and the potential for vandalism or horseplay, the code allowed exception to eliminate controls where safety is concerned has been utilized for some spaces. For (CIP) projects, window row (in a two or three luminaires row room) shall have the ability to be switched off manually.

4. Daylight Harvesting

   a. Provide for all spaces with windows where required per the **2020** NYC Energy Conservation Code. Daylight Harvesting per section C405.2.3 of **2020** NYCECC and Section 9.4.1.1.e of ASHRAE 90.1 201**6 as modified by Appendix CA** is required for New Construction in all areas with windows when total fenestration area in sidelighted daylight area is 24 SF per C405.2.3 or 20 SF per 9.4.1.1.e (whichever standard is used for the design) or greater and the general lighting in the primary sidelight area is **100**W or greater.

   b. Install daylight harvesting sensor to control both rows in each classrooms and offices (with windows) to maintain required foot-candle (closed loop and dual loop sensors to be used in skylight application).

   c. Place the closed loop sensor between 1 to 2 times the height of the window away from the window (typically 12-15 ft. from the window).

   d. Provide room controller to control both rows of light.

   e. Provide an over-ride **four** position push button switch set to off, **30**%, **70%** and 100%.

   f. For all gymnasiums with skylights **(as required by Section C402.4.2)**, provide daylight harvesting controls as required by Section C405.2.3.1 of the **2020** NYCECC and Section 9.4.1.1.f of ASHRAE 90.1-**2016 as modified by Appendix CA**. Auditorium type spaces are not required to have skylights.

   g. When daylight harvesting is not provided in spaces with windows, the designer to include in the GSG submission the following in support of justification that a daylight sensor is not required by code:
      - Area of window within the space
      - Daylight (sidelighted) area within the space
      - Wattage of lighting fixtures within the Daylight area

The following table provides guidelines for the individual controls for each space and is in keeping with the **2020** NYC Energy Code. Daylight harvesting controls are not indicated in the Local Automatic Control/Sensor column, as the requirements are described above and is dependent on several factors. 'Not Required' in this column applies to when either occupancy or vacancy sensors are not to be provided. Sensor locations described in the comment field do apply to the daylight harvesting sensors. The descriptions are typically for new construction and locations may need to be altered for CIP projects.

AREA	LOCAL MANUAL CONTROL/SWITCH	LOCAL AUTOMATIC CONTROL/SENSOR	COMMENTS
PUBLIC ASSEMBLY SPACES			
Auditorium			
General Lighting	Three-way dimming key pad	Vacancy sensor	Three-way dimming keypad to control house lighting to be located at the entrance and stage. Ceiling mounted sensors For existing auditorium projects, discuss with SCA.
Stage Area	Toggle switch	Not required	Switches to control non-theatrical stage lights to be located at the stage.
Gymnasium			
General Lighting, Emergency Circuit	Key-operated line voltage switch	Occupancy sensor	Switch at one entrance to turn on lights on emergency. **All fixtures Normally at 50% of power level; turns to 100% on motion – (C405.2.1.4)**
General Lighting, non-emergency circuit	Key-operated switch	Occupancy sensor	Switches for general lighting to be located at same entrance as emergency lighting switch. Ceiling/corner/fixture mounted sensors depending on fixture height and required coverage.
Gymatorium			
General Lighting	Three-way dimming key pad	Vacancy sensor	Three-way dimming keypad to control house lighting to be located at the entrance and stage. Ceiling mounted sensors Daylight harvesting sensors to be luminaire mounted for those fixtures in the daylight zone to avoid interference with the zoning provided for the theater function.
Stage Area	Toggle switch	Not required	Switches to control non-theatrical stage lights to be located at the stage
Cafeteria/Lunch room			
General Lighting, Emergency Circuit	Key-operated line voltage switch	Not required	Switch at one entrances to turn on emergency lights that will also provide minimal entry/circulation illumination. Circuiting for lights to allow them to turn on upon loss of power if they are turned off.
General Lighting, non-emergency circuit	Key-operated low voltage switch	Occupancy sensor	Switches for general lighting to be located at same entrance as emergency lighting switch. Ceiling/corner/fixture mounted sensors depending on fixture height and required coverage.
Kitchen	Toggle switch	Not required	

Cafetorium			
General lighting	Three-way dimming key pad	Vacancy sensor	Three-way dimming keypad to control house lighting to be located at the entrance and stage. Ceiling mounted sensors For existing auditorium projects, discuss with SCA
Stage Area	Toggle switch	Not required	Switches to control non-theatrical stage lights to be located at the stage
Library			
General	Three-way dimming pad	Vacancy sensor	Three-way switches at entrance and at Librarian desk. Ceiling mounted sensor.
Reading	Three-way low-voltage switch	Vacancy sensor	Three-way switches at entrance and at Librarian desk. Ceiling mounted sensor.
High Stacks	Three-way low-voltage switch	Luminaire-mounted occupancy and daylight harvesting sensor	Three-way switches at entrance and at Librarian desk. All luminaires in High Stack area shall be equipped with occupancy and daylight harvesting sensors
CLASSROOMS/OFFICES			
3K, Pre K	Low-voltage **4**- button dimmer switch	Vacancy	Ceiling mounted sensor (s)
K-12 including resource and CSD sp ed rooms	Low-voltage **4**- button dimmer switch	Vacancy	Ceiling mounted sensor (s)
D75 Instructional space	Low-voltage 5- button dimmer switch	Vacancy	Ceiling mounted sensor (s)
Community Rooms	Low-voltage **4**-Button Dimmer Switch	Vacancy	Ceiling mounted sensor(s)
Tech Laboratories (other than Science)	Low-voltage **4**-button dimmer switch	Vacancy	Ceiling mounted sensor(s)
Dance Studios	Low-voltage **4**- button dimmer switch	Vacancy	Ceiling mounted sensor(s)
Science labs and Prep Rooms- IS and High Schools	Low voltage Switch	Not required - **Safety**	Ceiling mounted sensor(s)
Media Centers/TV Studios	Low-voltage switch	Vacancy sensor	Ceiling mounted sensor(s)
Offices Large	Low-voltage **4**-button dimmer Switch	Vacancy sensor	Ceiling mounted sensor(s)
Individual offices	Low-voltage **2**-button dimmer switch	Vacancy sensor/	Ceiling mounted sensor(s)
Records Room	Low-voltage switch	Vacancy sensor/	Ceiling mounted sensor
Resource Center/Workroom	Low-voltage switch	Vacancy sensor/	Ceiling mounted sensor(s)
Staff – Lunchroom/Lounge	Low-voltage **2**-button dimmer switch	Vacancy sensor/	Ceiling mounted sensor(s)
School-based Health Clinic/Exam Areas of medical suites	Push-button switch (or toggle to match other spaces)	Not Required	Switch to match style of typical classroom
Waiting Areas	Low-voltage switch	Occupancy Sensors	Ceiling mounted sensor(s)
SERVICES/UTILITIES			
Electric Closets	Toggle switch	Not required	
Elevator Machine Room	Toggle switch	Not required	
Janitor Closets	Low-voltage switch	Vacancy sensor	Wall mounted sensor/switch
Mechanical Areas – Service Areas	Toggle switch	Not required	
Pipe Chases/Crawl Spaces	Toggle switch	Not required	
Shops & Areas with Machinery	**Low-voltage 2-Button Dimmer Switch**	Occupancy Sensors	

Requirement Applies to: ✔ **New Construction** ✔ **Major Modernizations** ✔ **Capital Improvement Projects**

Storage Rooms	Low-voltage **2**-Button Dimmer Switch switch	Vacancy sensor	Wall-mounted sensor/switch
Switchboard Rooms	Toggle switch	Not required	
Telecommunication Rooms/ Closets	Low voltage switch	Vacancy sensor	Wall-mounted sensor/switch
CIRCULATION AREAS			
Lobby	Key-operated switch (Emergency light only)	Occupancy sensor/Daylight harvesting sensor	Key operated switch located at main entrance for emergency lighting. Ceiling mounted sensor(s) for non-emergency lighting luminaires. **All fixtures Normally at 50% of power level; turns to 100% on motion – (C405.2.1.4)**
Corridors	Key-operated switch (Emergency light only)	Occupancy sensor/ Daylight harvesting sensor built-in luminaire(s) near window	Key operated switch located at main entrance for emergency lighting. Ceiling mounted sensor(s) for non-emergency lighting luminaires. **All fixtures Normally at 50% of power level; turns to 100% on motion – (C405.2.1.4)**
Stairs	Key-operated switch	Built-in Occupancy Sensor in each luminaire Daylight harvesting sensor built-in luminaire(s)	Key operated switch located at main entrance for emergency lighting in stairs (all luminaires in stairs are emergency). Normally at 50% of power level (if minimum fc are met); turns to 100% on motion - **Life safety/security per C405.2 exception**
PHYSICAL EDUCATION			
Locker Rooms(Students)	Key-operated switch	Built-in occupancy sensor in each luminaire	Normally at 50% of power level; turns to 100% on motion - **Life safety/security per C405.2 exception**
Locker Room (Adult)	Low voltage switch	Vacancy sensor	Wall-mounted sensor**/**switch – Ceiling mounted if partition
Shower Rooms	Key-operated switch	Built-in occupancy sensor in each luminaire	Normally at 50% of power level; turns to 100% on motion. Luminaire mounted sensor **- Life safety/security per C405.2 exceptions**
Swimming Pools	Key-operated switch	Not required	
Poolside	Key-operated switch	Not required	
Bleachers	Key-operated switch	Not required	
Exercise Room	Low-voltage switch	Vacancy sensor	Ceiling-mounted sensor(s)
TOILETS			
Staff Toilet (single user)	Line voltage switch	Occupancy sensor	Wall-mounted sensor/switch
Staff Toilet (Multi-user)	Low voltage switch	Occupancy sensor	Ceiling-mounted sensor(s)
Student Multi-user Toilets	Key-operated switch	Built-in occupancy sensor in each luminaire	Normally at 50% of power level; turns to 100% on motion **– Life safety/security per C405.2 exceptions**
Student Classroom Toilets	Line voltage switch	Occupancy sensor	Wall-mounted sensor/switch
Student Toilet (single user)	Line voltage switch	Occupancy sensor	Wall-mounted sensor/switch

a. Instructional space: For spaces 2,000 SF or less in area, lighting shall be controlled by one ceiling mounted vacancy sensor/daylight harvesting sensor and one **4**-button switch located by the classroom entrance door.

b. Track luminaires in Labs to have a dedicated single on/off switch by the teacher's desk.

Requirement Applies to: ✔ **New Construction** ✔ **Major Modernizations** ✔ **Capital Improvement Projects**

c. For CIP projects, required sensors in most spaces will likely need to be wall mounted, typically near the front corner. Designer is to submit all designs for review.

d. All sensors in corridors, student locker rooms, stairs and bathroom to be set for 5 minutes

e. Note that not all Room Planning Standards have been updated to incorporate all revisions to the controls. Follow the above table and modify the room requirements as appropriate.

7.2 Lighting Systems

7.2.2 Stage and Platform Lighting for Primary and Intermediate Schools

Description/Design Approach:

A. General

1. A dimming system shall be provided for auditorium/gymatorium stage area/platform lighting. The dimming system shall control spotlights and border lights via a stage control panel mounted on the stage area/platform and/or a remote portable control console that can be plugged into remote outlets. (Emergency lighting is not part of the dimming system and shall not be dimmed.)

2. Minimum requirements for a standard primary school and intermediate school configuration are indicated below. These may be augmented and modified to accommodate larger facilities (high schools), though a specialty consultant is typically to be utilized for those facility designs.

3. Coordinate exact location and mounting height of all fixtures with the Architect.

B. Requirements for Primary School Stages Less Than Thirty (30) Feet Wide and Fifteen (15) Feet Deep

1. Spotlights

a. Two (2) sets of spotlights shall be provided, ideally located 45 degrees up and 45 degrees to the left and right of the centerline of the stage. Each set shall consist of four (4) 6" zoom type ellipsoidal reflector spotlights. Spotlights shall have a knob-adjustable beam angle of 25-50 degrees to allow for adjustment to actual stage size. Fixtures shall be paired to light the Left, Center and Right portions of the stage, with the fourth fixture pair as a Front Special. **Fixtures shall use LED with five individually controllable LED colors as per Section 16502, capable of producing 75 fc with lens set for 30 degrees, 20 feet away.** In new construction, spotlight sets shall be housed inside ceiling pocket.

b. Mounting: Each spotlight shall be secured to a $1^{1}/_{2}$" iron pipe batten by means of a cast iron "C" clamp. One safety cable shall be provided for each spotlight.

c. Control: All spotlights shall be controlled by dimmers.

d. Electrical: Each spotlight shall be provided with a 3-foot, 3-wire flexible cable terminated in a 20 amp 3-wire stage pin plug. Four (4) 20 amp receptacles shall be set in an outlet box for each set of spotlights. Spotlight and stage pin receptacle outlet box shall be U.L. listed and grounded as per manufacturer's requirements.

2. Border Lights

a. Two (2) rows of border lights shall be provided above the platform. Each border light shall be **color mixed LED with DMX controls with a minimum of five individually controlled LEP colors per Section 16502.**

b. Mounting: Each border light shall be equipped with a heavy steel trunnion securely fastened to each of the cast steel end plates and equipped with iron "C" clamps for $1^{1}/_{2}$" pipe mounting. Each unit shall be provided with a tilt adjust knob and two safety cables.

c. Control: One dimmer per circuit, one control channel per color.

d**.** Electrical: Border light shall be U.L. listed and provided with #12 cable and grounding conductor. Cable shall be terminated in a terminal junction box. Terminal junction box shall also include (2) stage pin receptacle outlets for two Overhead Special dimming circuits. Two Overhead Special Circuits are parallel wired to each border light row.

3. Dimmer Racks

a. Dimmer racks shall be wall mounted dead front type. They shall accept plug-in electronic control modules and be designed to contain up to 24 plug-in dimmer modules each rated at 2.4 KW.

b. Dimmer racks shall be provided with a lockable door.

c. Dimmer racks shall be 120/208V, 3-phase, 4-wire, 60 Hz A.C. and U.L. listed.

4. Portable Control Console

a. Control console shall be microprocessor-based with 24 channels for two scene preset and manual operations, and switchable to 96 channels, 500 cues for advanced operation. Each dimmer shall be individually controllable with the control console. Console shall allow SubMaster grouping of control for multiple circuits such as border light colors. Console shall also have display and on-screen help menus.

b. Output of console shall be a digital multiplexed signal USITT Standard DMX-512

c. Two (2) 5-pin XLR type DMX input receptacles shall be provided for the control console. One shall be located at rear of room and another near stage control panel on platform. Provide one (1) fifty (50) foot extension DMX control cable. DMX control receptacles shall be located within two (2) feet of a 120 volt receptacle.

5. Stage Control Panel

a. Stage control panel shall be equipped with faders and master intensity control to provide easy playback and recording of a minimum of 8 lighting presets. Manual sliders shall be provided for Left, Center, Right and Front Special spotlights, Overhead Clear, Amber, Red and Blue Borderlights, two Overhead Specials and Two Stage Specials.

b. Stage control panel shall be wall mounted inside a lockable enclosure located on stage (Enclosure to be flush mounted in new construction and surface mounted in existing building).

6. Entry Stations

Provide additional single gang control stations at entry doors. Entry Stations shall have a key lockable cover and allow selection of the first preset and off.

7. Worklights

Worklights above the platform shall be building standard **LED** of the type used elsewhere in the room and shall be switched separately from the dimming system.

C. Requirements for Intermediate School Stages/Primary School Stages Greater Than Thirty (30) Feet Wide and Fifteen (15) Feet Deep, or any Stage with Front Curtain and Stage Apron Area

1. Spotlights

a. Two (2) sets of spotlights shall be provided, ideally located 45 degrees up and 45 degrees to the left and right of the centerline of the stage. Each set shall consist of eight (8) 6" zoom type ellipsoidal reflector spotlights. Spotlights shall have a knob-adjustable beam angle of 25-50 degrees to allow for adjustment to actual stage size. Fixtures shall be paired to light the Left, Center and Right portions of the stage in front of the curtain line, and Left, Center and Right behind the curtain, with the seventh and eighth fixture pair as Front Specials. Provide one additional non-dimmed circuit controlled by the dimmer rack at each location. **Fixtures shall use LED with five individually controllable LED colors as per Section 16502, capable of producing 75 fc with lens set for 30 degrees, 20 feet away.** In new construction, spotlight sets shall be housed inside ceiling pocket.

b. Mounting: Each spotlight shall be secured to a $1^{1}/_{2}$" iron pipe batten by means of a cast iron "C" clamp. One safety cable shall be provided for each spotlight.

c. Control: All spotlights shall be controlled by dimmers.

d. Electrical: Each spotlight shall be provided with a 3-foot, 3-wire flexible cable terminated in a 20 amp 3-wire stage pin plug. Nine (9) 20 amp receptacles shall be set in an outlet box or strip for each set of spotlights. Spotlight and stage pin receptacle outlet box shall be U.L. listed and grounded as per manufacturer's requirements.

2. Border Lights

a. Three (3) rows of border lights shall be provided above the platform. Each border light shall be **color mixed LED with DMX controls with a minimum of five individually controlled LEP colors per Section 16502.**

b. Mounting: Each border light shall be equipped with a heavy steel trunnion securely fastened to each of the cast steel end plates and equipped with iron "C" clamps for $1^{1}/_{2}$" pipe mounting. Each unit shall be provided with a tilt adjust knob and two safety cables.

c. Control: One dimmer per circuit.

d. Electrical: Border light shall be U.L. listed and provided with #12 cable and grounding conductor. Cable shall be terminated in a terminal junction box. Terminal junction box shall also include four (4) stage pin receptacle outlets for four (4) Overhead Special dimming circuits. The four Overhead Special Circuits are parallel wired to each border light row.

3. Dimmer Racks

a. Dimmer racks shall be wall mounted dead front type. They shall accept plug-in electronic control modules and be designed to contain up to 48 plug-in dimmer modules each rated at 2.4 KW.

b. Dimmer racks shall be provided with a lockable door.

c. Dimmer racks shall be 120/208V, 3-phase, 4-wire, 60 Hz A.C. and U.L. listed.

4. Portable Control Console

a. Control console shall be microprocessor-based with 48 channels for two scene preset and manual operations, and switchable to 250 channels, 10,000 cues for advanced operation. Each dimmer shall be individually controllable with the control console. Console shall allow SubMaster grouping of control for multiple circuits such as border light colors. Console shall also have display and on-screen help menus.

b. Output of console shall be a digital multiplexed signal USITT Standard DMX-512

c. Two (2) 5-pin XLR type DMX input receptacles shall be provided for the control console. One shall be located at rear of room and another near stage control panel on platform. Provide one (1) fifty (50) foot extension DMX control cable. DMX control receptacles shall be located within two (2) feet of a 120 volt receptacle.

5. Stage Control Panel

a. Stage control panel shall be equipped with faders and master intensity control to provide easy playback and recording of a minimum of 8 lighting presets. Manual sliders shall be provided for Left, Center, Right Front spotlights, Left, Center and Right Stage Spotlights, (2) two Front Special spotlights, Overhead Clear, Amber, Red and Blue Borderlights, (4) four Overhead Specials and (4) four Stage Specials.

b. Stage control panel shall be wall mounted inside a lockable enclosure located on stage (Enclosure to be flush mounted in new construction and surface mounted in existing building).

6. Entry Stations

Provide additional single gang control stations at entry doors. Entry Stations shall have a key lockable cover and allow selection of the first preset and off.

7. Worklights

Worklights above the platform shall be building standard **LED** of the type used elsewhere in the room and shall be switched separately from the dimming system.

7.2 Lighting Systems

7.2.3 Emergency Lighting

Description/Design Approach:

A. General

1. Emergency lighting shall be provided for all areas listed in Design Requirement 7.1.2.

2. Illumination levels required for emergency lighting shall be as follows:

Places of Assembly – **Auditorium, Cafeteria, Gymnasium, Gymatorium**	
General/ Aisle/Cross isles	1.0 1foot-candle measured at floor
General/Aisle/Cross isles	**0.5 foot-candles measured at the floor - During Performance only**
Places of Assembly – Auditorium, Gymatorium	
Exterior exit lights immediately adjacent to exit doorways **leading into yards and courts**	5 foot-candles measured at the floor **over the specified area per BC 1028.17.4.5**
Exit Doors	**1** foot-candles measured at the floor
Corridors**,** exits, exit discharges, Areas of Refuge and stairs	**1** foot-candles measured at the floor
Exits, in high-rise buildings with existing Photoluminescent markings	**2 foot-candles measured at the floor**
Fire Rescue Areas/ Areas of Rescue Assistance	1 foot-candle measured at the floor
Safe Areas, including all stairs, ramps, etc within the area	5 foot-candles measured at the floor
Corridor sign for Fire Rescue Area/ Area of Rescue Assistance	25 foot-candles measured at sign

B. Buildings with Generator

1. In new buildings, major modernizations, or major additions where an emergency generator is being provided, provide power for Emergency Lighting through the Emergency Systems automatic transfer switch as described in DR 7.1.2.

C. Buildings without Generator

1. In buildings not provided with an emergency generator, emergency **luminaire** shall be connected to a power source recognized by the NYC Electrical Code Section 700-12.

2. The emergency **luminaires** in the Places of Assembly and the paths of egress to the outside shall be controlled by a relay with sensing circuit off the local lighting panel. A key operated test switch shall be wired into the control circuit.

7.2 Lighting Systems

7.2.4 Exit Signs

Description/Design Approach:

Exit signs shall be in accordance with Section BC 1011 of the 2014 NYC Building Code. Locations of exit signs shall be designated on the Contract Drawings by the Architect of Record. Means of egress shall be clearly marked by illuminated exit signs with 8" letters so that exits and path of egress are easily recognized from any point in a corridor or Place of Assembly. Exit signs placement shall be such that no point in an exit access corridor is more than 100 feet or the UL[1] listed viewing distance for the sign, whichever is less, from the nearest visible exit sign**.** Wall mounted exit signs are preferred over pendant mounted exit signs. Pendant mounted exit signs should be strictly limited to meet visibility requirements, and only when additional wall mounted units may not suit the need.

Exit signs shall be coordinated with Fire Alarm Strobes so that a minimum separation of five feet is maintained.

For buildings with a generator, exit signs shall be connected to the emergency lighting panel through transfer switch.

For buildings without a generator, exit signs shall be provided with battery packs **and fed from the same source as the area lighting for the space.**

Note:

[1] Manufacturers may request UL to test their self-luminous or electroluminescent exit signs at lesser distances. UL requires those signs to be marked with the legible viewing distance. The NYC DOB recognizes other nationally listed labs that perform tests in accordance with the UL standard.

7.2 Lighting Systems

7.2.5 Exterior/Site/Security Lighting

Description/Design Approach:

1. General

   Exterior/site/security lighting shall be provided around the perimeter of the school and on playing fields for safe passage of students and staff and to deter theft and vandalism. Lighting design shall minimize light trespass from the building and site, reduce sky glow, improve nighttime visibility through glare reduction and reduce development impact on nocturnal environment.

   For capacity and major modernization projects, design shall comply with all the requirements of NYC Green Schools Guide Credit for Light Pollution Reduction.

2. Lighting Levels

   Provide computer generated lighting calculations for the entire school site. Provide calculations for building perimeter. Calculation results shall show horizontal illuminance on ground level. Where required, provide calculations in compliance with NYC Green Schools Guide Credit for Light Pollution Reduction.

   a. All entrances, exits and walkways, including exit discharge to public way: 1.0 FC min. as per BC1006.2 **of the 2014 NYC Building Code**. Exterior fixtures immediately adjacent to exit discharge doorways are required to be connected to emergency power. Refer to DR 7.2.3.

   b. All Auditorium, Cafeteria, **Gymnasium,** Gymatorium or Cafetorium exit doors that open into an exit discharge area in schoolyard: 5.0 FC min. **over the required area. Refer** to BC1028.17.4.5 **for** requirements.

   c. Building perimeter: 1.0 FC (average maintained) to a 20-foot depth from the building with 0.1 FC minimum and 5 FC maximum. These levels shall be reduced to comply with Light Pollution Reduction Credit if building perimeter is on the site boundary.

   d. Site (athletic fields security lighting): 0.5 FC (average maintained) with 0.01 FC minimum and 5 FC maximum. These levels shall be reduced to comply with Light Pollution Reduction Credit if building perimeter is on the site boundary.

3. Design Parameters

   Due to the aesthetics of exterior lighting, its impact on a school facade and the difficulty in describing multiple elevations on a plan, it is essential that the designer provide building elevations to clearly depict the location and mounting height of each fixture.

   The exterior lighting should not exceed 80% of the lighting power densities as defined by ANSI/ASHRAE/IESNA Standard 90.1-2013, Exterior Lighting Section, without amendment. All new building projects shall be classified under one of the following exterior Lighting Zones and shall follow the requirements for the specific zone. Determination of the Lighting Zones indicated below for the specific project shall be based on RCNY 5000-01 of the Rules of the City of New York, which assigns an exterior Lighting Zone to each zoning district in the New York City Zoning

Resolution. While it is the intent on each project to meet this credit, it may be difficult to achieve for buildings placed on the Street Line and fixtures should not be lowered to a height where they will be subject to vandalism to meet the credit. The design is to be discussed with the Authority once this condition is ascertained.

LZ1 – Dark (Park Land and Rural Settings)

Design exterior lighting so that all site and building mounted luminaries produce a maximum initial illuminance value no greater than 0.01 horizontal and vertical foot-candles at the site boundary and beyond. Document that 0% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher than nadir. As per RCNY 5000-01: Parkland.

LZ2 – Low (Residential Area)

Design exterior lighting so that all site and building mounted luminaries produce a maximum initial illuminance value no greater than 0.10 horizontal and vertical foot-candles at the site boundary and no greater than 0.01 horizontal foot-candles 10 feet beyond the site boundary. Document that no more than 2% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site. As per RCNY 5000-01; All R districts, R districts with C overlays, and MX districts.

LZ3 – Medium (Commercial/Industrial, High-Density Residential)

Design exterior lighting so that all site and building mounted luminaries produce a maximum initial illuminance value no greater than 0.20 horizontal and vertical foot-candles 15 feet beyond the site. Document that no more than 5% of the total fixture lumens are emitted at an angle of 90 degrees of higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary. As per RCNY 5000-01: M districts, except MX; C districts, except C5, C6 and C overlays on R districts.

LZ4 – High (Major City Centers, Entertainment Districts)

Design exterior lighting so that all site and building mounted luminaries produce a maximum initial illuminance value no greater than 0.60 horizontal and vertical foot-candles at the site boundary and no greater than 0.01 horizontal foot-candles 15 feet beyond the site. Document that no more than 10% of the total initial designed site lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary. As per RCNY 5000-01: C5 and C6 districts.

4. Lighting Equipment

Lighting levels shall be achieved utilizing the following equipment:

a. Light Source: The light source for all exterior lighting shall be High Efficiency LED Luminaires and shall have a minimum of 50,000 hours of operation and comply with the IESNA LM-80 test method. All Luminaries shall be DLC certified (Design Lights Consortium)

b. Luminaires: Luminaire selection shall be coordinated with the architect so as to complement and accent architectural features. Luminaires for perimeter lighting shall be wall surface

mounted at a maximum of 15 feet above grade for ease of service**.** Roof parapet mounted luminaires may be used only in special circumstances with the written approval from the Authority

- Luminaires shall have cutoff optical system in compliance with N.Y.C. Green Schools Guide Light Pollution Reduction Credit. Use of non-cutoff luminaires shall not be utilized and may be only permitted for the following applications: sports lighting, construction lighting, historic restoration lighting, lighting for architectural features and sculptures.

- Luminaires shall have high reflectivity segmented optical system with minimum efficiency of (66%). Lighting distribution NEMA Type III and Type IV shall be used.

- Luminaires shall have a minimum IP 65 rating, a minimum 2G vibration tested and shall be UL 1598 listed for 25 degrees Celsius ambient temperature application.

c. Poles: The usage and quantities of poles shall be limited and may be used only with the written approval of the SCA Design Manager. When parapet mounted luminaires can not achieve the intended site lighting criteria, pole mounted fixtures may be provided. Site lighting poles shall be anodized aluminum (tapered or square) with an overall maximum mounting height of forty (40) feet. Higher mounting heights may be considered only when heavy-duty poles are justified by unusual site conditions such as athletic field lighting. Mounting heights 25 feet and lower should be avoided to limit the number of poles and luminaires and to minimize light trespass. Spill light optical shields shall be used to minimize light behind pole to a 2% of the total lamp lumens.

   In general, pole foundations shall be designed by a structural engineer and shown on the structural contract drawings with all conduit entries and exits. Poles shall be provided with a suitable lockable hand-hole and grounding lug. Plug fusing shall be provided on each circuit phase leg within the hand-hole.

d. Lighting Control: In new construction and major modernization, all site security lighting shall be master controlled by the building lighting management system. For Capital Improvement Projects, the security lighting shall be controlled by time clock, photocell and multi-pole lighting contactor. In all cases, the photocell shall be circuited in parallel to time clock such that either one will activate the site security lighting.

e. Raceways: In general, raceway shall be run on the inside face of the parapet and/or concealed in the building interior. Exposed raceway on building facades is not permissible.

7.2 Lighting Systems

7.2.6 Athletic Field/Sports Lighting

Description/Design Approach:

Athletic field lighting shall be provided only when requested specifically by the Department of Education Program of Requirements. The engineer must verify that the request is not intended for Security/Site Lighting.

In the event that Sports Lighting is confirmed, the designer shall follow the IES recommendations for the application.

When poles are required, provide aluminum or steel poles, mounted around the perimeter of the site to facilitate maintenance without driving onto the field. Any poles not located on the perimeter must be accessible by roadway suitable for a bucket truck with 75' boom **to avoid driving on the synthetic turf or natural grass field.**

Fixtures shall be selected for superior photometry minimizing the number of required fixtures and ease of maintenance/lamp replacement**, while avoiding light pollution trespass to adjoining properties.**

Appendix D:

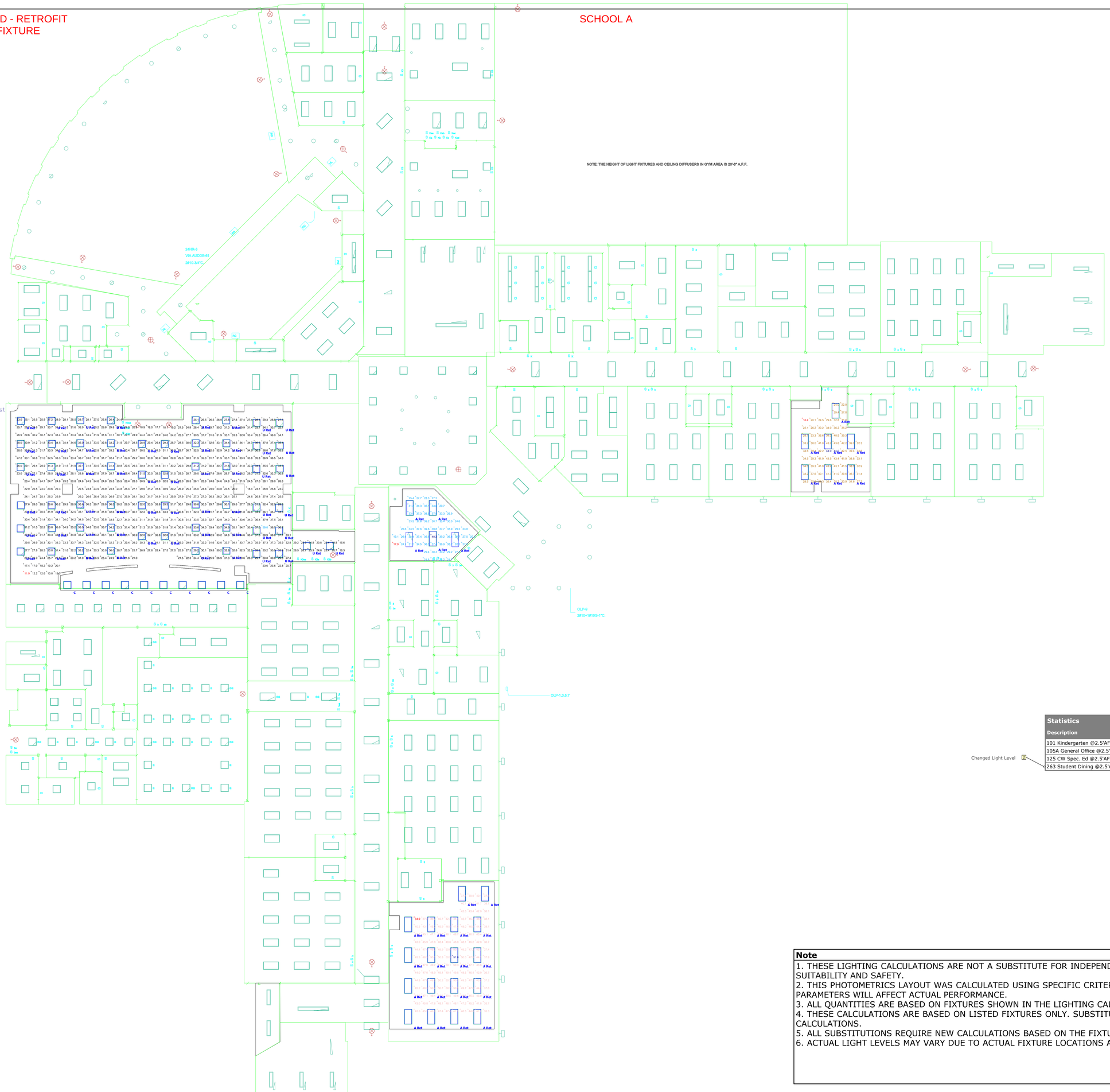
Retrofit Lighting Fixture Designs

APPENDIX D - RETROFIT
LIGHTING FIXTURE
DESIGN

SCHOOL A

NOTE: THE HEIGHT OF LIGHT FIXTURES AND CEILING DIFFUSERS IN GYM AREA IS 20'-6" A.F.F.

Retrofit for Type U
Not Available - Closest
Match Used



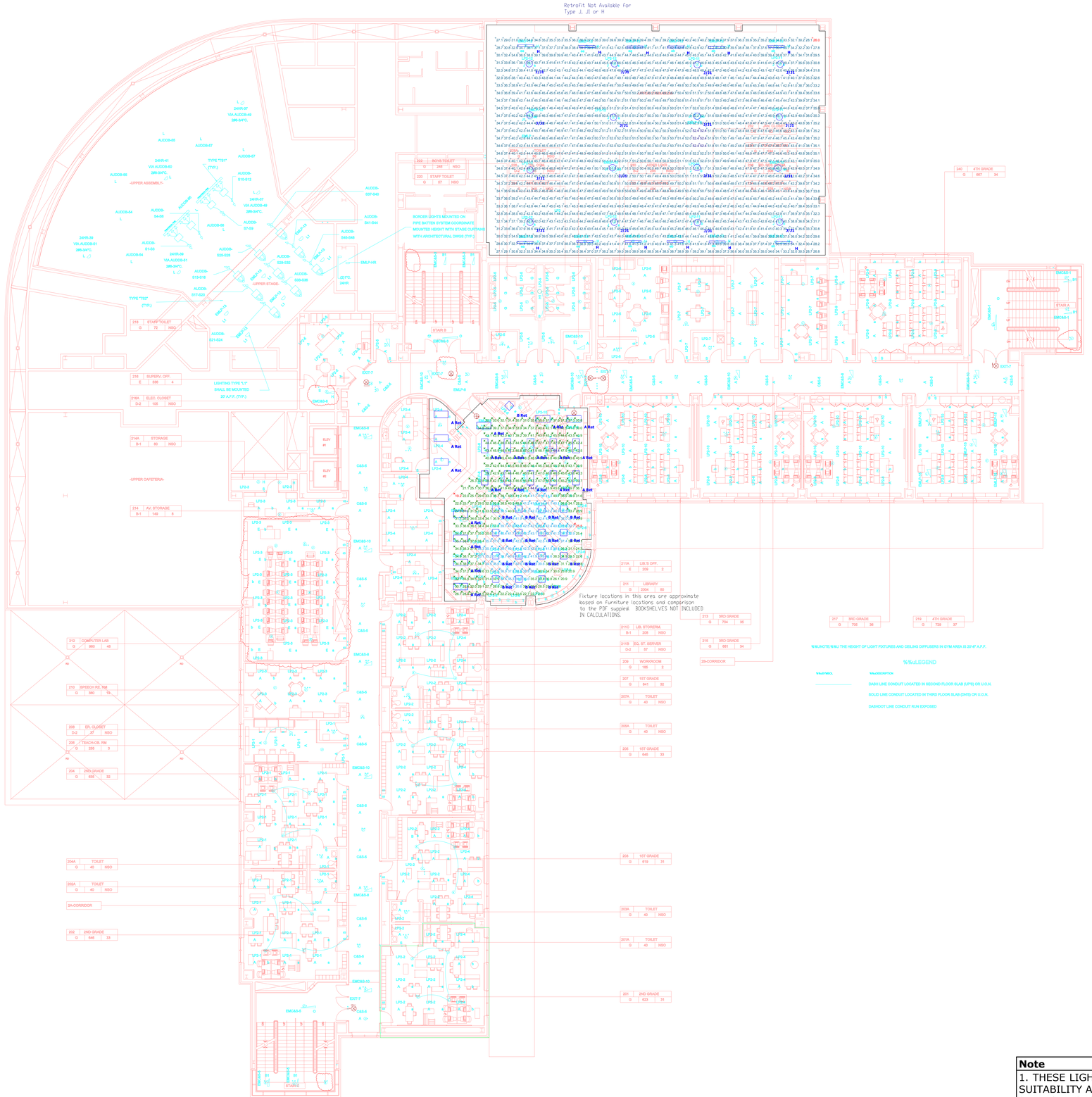
Changed Light Level

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
101 Kindergarten @2.5'AFF	+	45.3 fc	51.0 fc	34.9 fc	1.5:1	1.3:1
105A General Office @2.5'AFF	+	31.5 fc	40.2 fc	17.9 fc	2.2:1	1.8:1
125 CW Spec. Ed @2.5'AFF	+	35.5 fc	44.0 fc	16.4 fc	2.7:1	2.2:1
263 Student Dining @2.5'AFF	+	29.9 fc	39.0 fc	11.9 fc	3.3:1	2.5:1

Note

1. THESE LIGHTING CALCULATIONS ARE NOT A SUBSTITUTE FOR INDEPENDENT ENGINEERING ANALYSIS OF LIGHTING SUITABILITY AND SAFETY.
2. THIS PHOTOMETRICS LAYOUT WAS CALCULATED USING SPECIFIC CRITERIA, ANY DEVIATION FROM STATED PARAMETERS WILL AFFECT ACTUAL PERFORMANCE.
3. ALL QUANTITIES ARE BASED ON FIXTURES SHOWN IN THE LIGHTING CALCULATIONS ONLY.
4. THESE CALCULATIONS ARE BASED ON LISTED FIXTURES ONLY. SUBSTITUTION OF THESE FIXTURES VOIDS ALL CALCULATIONS.
5. ALL SUBSTITUTIONS REQUIRE NEW CALCULATIONS BASED ON THE FIXTURES SUPPLIED.
6. ACTUAL LIGHT LEVELS MAY VARY DUE TO ACTUAL FIXTURE LOCATIONS AND FIELD CONDITIONS.

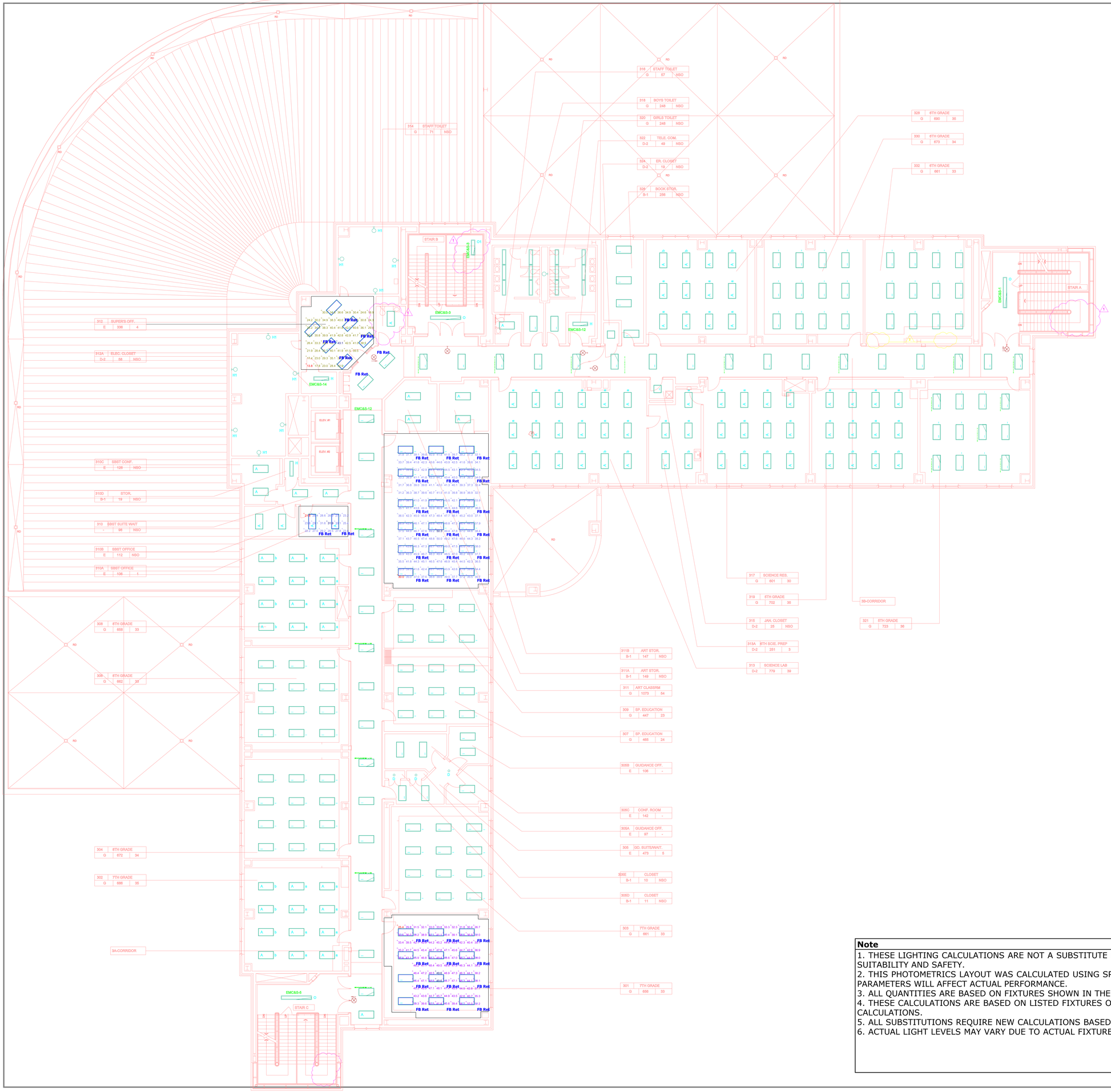
Plan View



Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
113 Gymnasium @Floor	+	44.2 fc	52.4 fc	26.0 fc	2.0:1	1.7:1
211 Library @2.5'AFF	+	37.9 fc	48.4 fc	19.2 fc	2.5:1	2.0:1
Reading Area	X	38.7 fc	48.4 fc	19.2 fc	2.5:1	2.0:1
Stacks	X	39.7 fc	44.6 fc	25.5 fc	1.7:1	1.6:1

Note

1. THESE LIGHTING CALCULATIONS ARE NOT A SUBSTITUTE FOR INDEPENDENT ENGINEERING ANALYSIS OF LIGHTING SUITABILITY AND SAFETY.
2. THIS PHOTOMETRICS LAYOUT WAS CALCULATED USING SPECIFIC CRITERIA, ANY DEVIATION FROM STATED PARAMETERS WILL AFFECT ACTUAL PERFORMANCE.
3. ALL QUANTITIES ARE BASED ON FIXTURES SHOWN IN THE LIGHTING CALCULATIONS ONLY.
4. THESE CALCULATIONS ARE BASED ON LISTED FIXTURES ONLY. SUBSTITUTION OF THESE FIXTURES VOIDS ALL CALCULATIONS.
5. ALL SUBSTITUTIONS REQUIRE NEW CALCULATIONS BASED ON THE FIXTURES SUPPLIED.
6. ACTUAL LIGHT LEVELS MAY VARY DUE TO ACTUAL FIXTURE LOCATIONS AND FIELD CONDITIONS.



Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
301 7th Grade Typical @2.5'AFF	+	41.9 fc	49.6 fc	25.4 fc	2.0:1	1.6:1
310A SBST Office @2.5'AFF	+	27.1 fc	31.9 fc	21.8 fc	1.5:1	1.2:1
311 Art Classroom @2.5'AFF	+	41.8 fc	50.3 fc	30.0 fc	1.7:1	1.4:1
312 Super's Office @2.5'AFF	+	34.0 fc	43.1 fc	13.8 fc	3.1:1	2.5:1

Note

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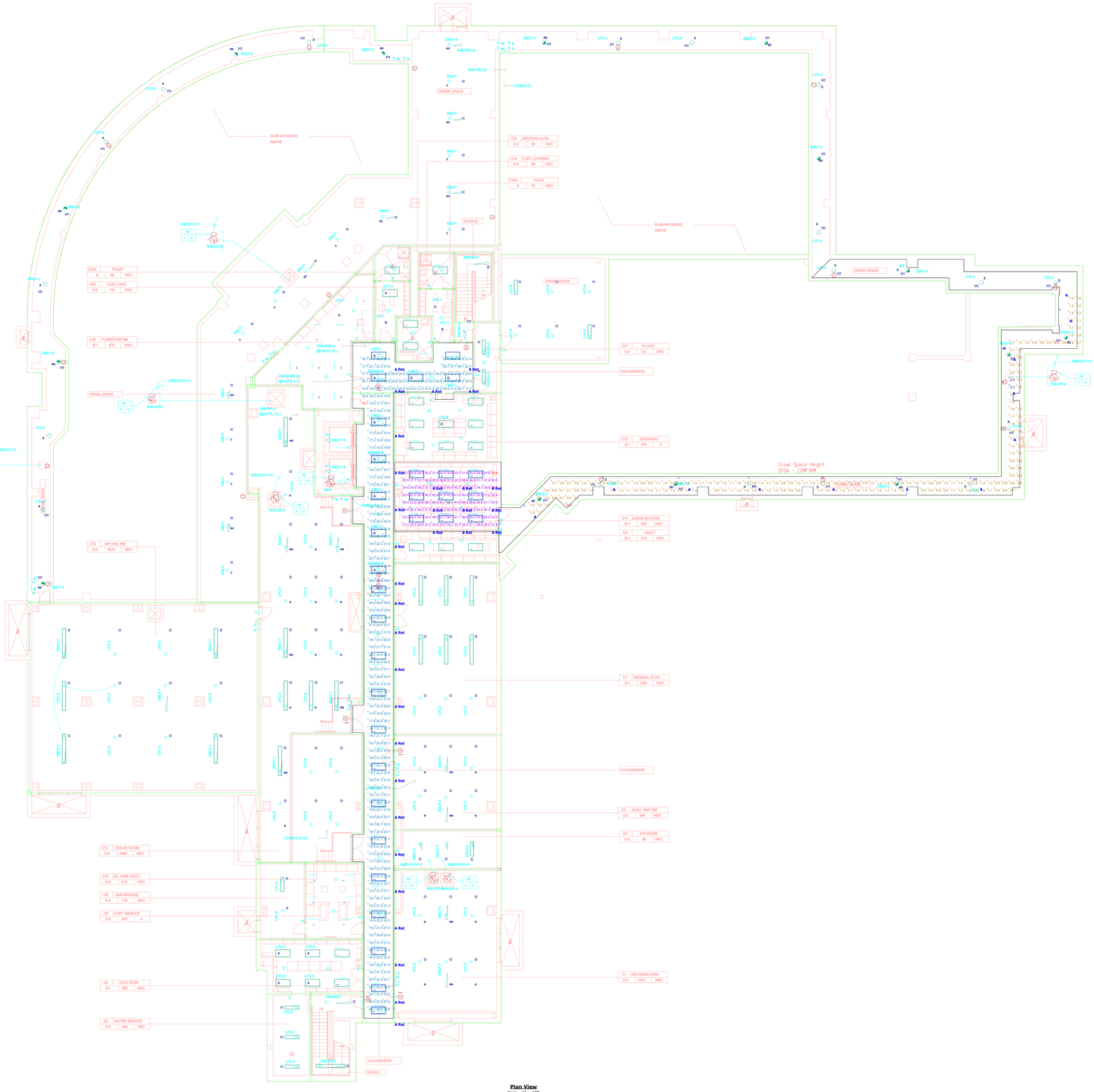
6. ACTUAL LIGHT LEVELS MAY VARY DUE TO ACTUAL FIXTURE LOCATIONS AND FIELD CONDITIONS.

Plan View



Plan View
Scale - 1" = 10ft

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
C11 Large BK Storage @Floor	+	33.0 fc	42.1 fc	20.6 fc	2.0:1	1.6:1
Corridor Typical @1.5'AFF	+	21.6 fc	29.9 fc	12.1 fc	2.5:1	1.8:1
Crawl Space Typical @Floor	+	1.2 fc	2.3 fc	0.3 fc	7.7:1	4.0:1

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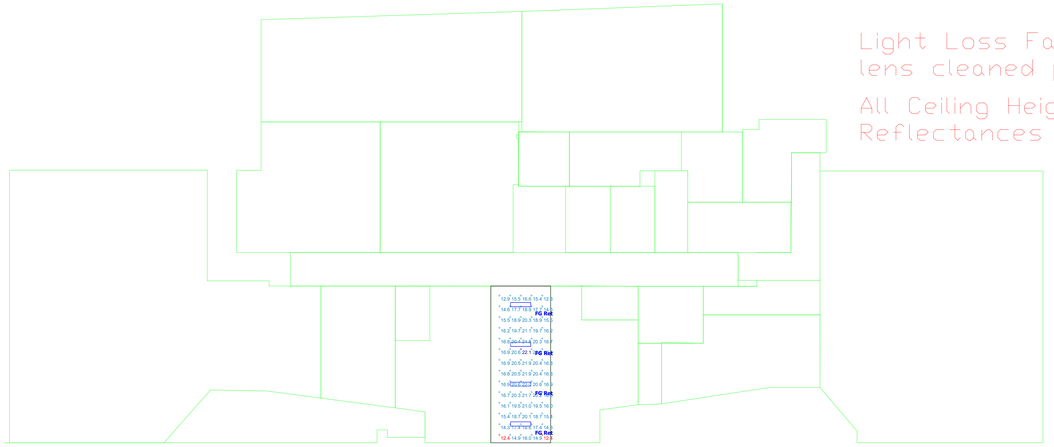
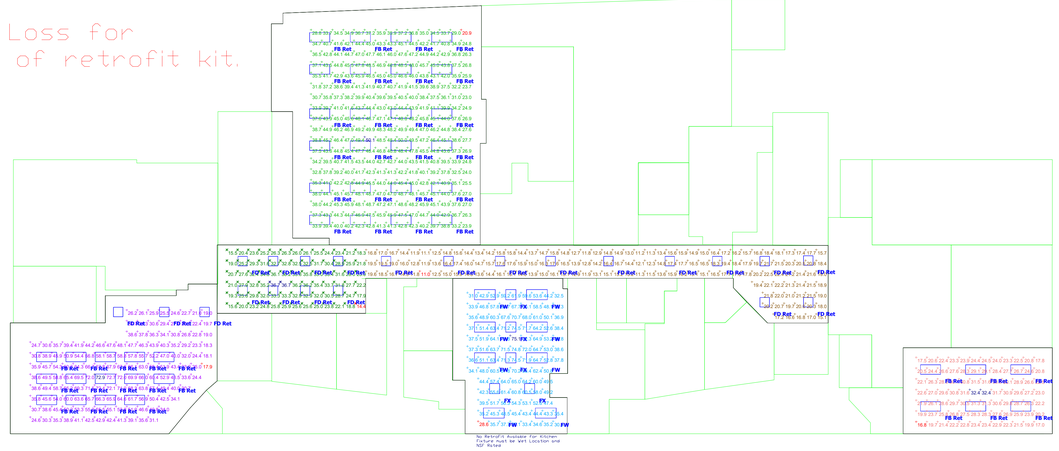
SCHOOL B

Light Loss Factor of .8 includes Loss for lens cleaned prior to installation of retrofit kit.

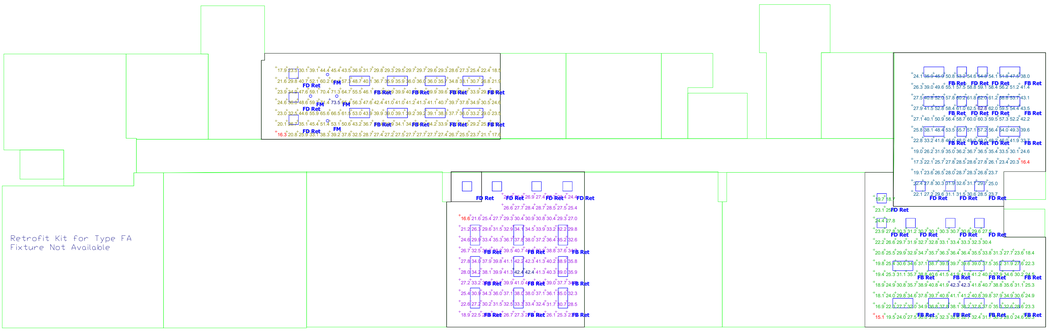
All Ceiling Heights 9'0A
Reflectances 70/40/20



Cellar

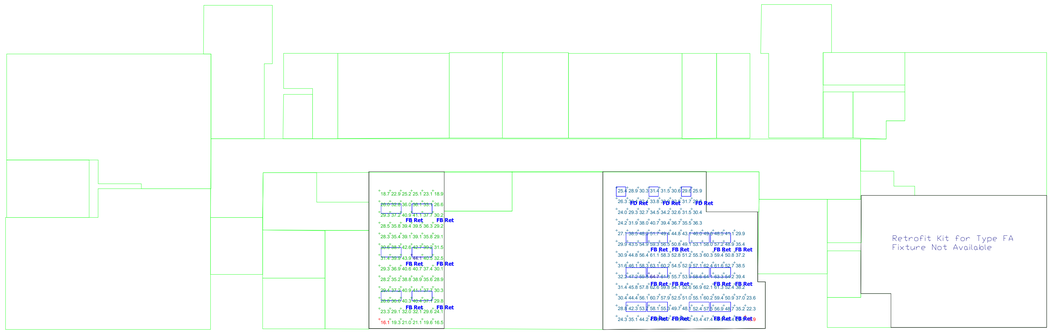


1st Floor



3rd Floor

Plan View
Scale - 1" = 10ft



2nd Floor

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
ACD Kitchen 108 @2.5'AFF	+	53.2 fc	75.1 fc	28.6 fc	2.6:1	1.9:1
Classroom 301 @2.5'AFF	+	41.1 fc	62.8 fc	16.4 fc	3.8:1	2.5:1
Classroom 302 @2.5'AFF	+	31.7 fc	42.3 fc	15.1 fc	2.8:1	2.1:1
Classroom 305 @2.5'AFF	+	32.6 fc	42.4 fc	16.6 fc	2.6:1	2.0:1
Corridor 124 @1.5'AFF	+	20.3 fc	36.7 fc	11.0 fc	3.3:1	1.8:1
Infant Unit 104 @Floor	+	25.7 fc	32.4 fc	16.8 fc	1.9:1	1.5:1
Kindergarten 105 @2.5'AFF	+	45.5 fc	72.9 fc	17.9 fc	4.1:1	2.5:1
Library @2.5'AFF	+	37.5 fc	73.5 fc	16.3 fc	4.5:1	2.3:1
Non-Capacity Instructional Space 205 @2.5'AFF	+	45.0 fc	64.7 fc	18.9 fc	3.4:1	2.4:1
Parent Activity @2.5'AFF	+	32.7 fc	44.1 fc	16.1 fc	2.7:1	2.0:1
Stor C09 @Floor	+	17.9 fc	22.1 fc	12.4 fc	1.8:1	1.4:1
Student Dining/Multipurpose Room @2.5'AFF	+	41.3 fc	50.1 fc	20.9 fc	2.4:1	2.0:1
Stat Zone # 1	X	27.7 fc	36.7 fc	14.4 fc	2.5:1	1.9:1

Note

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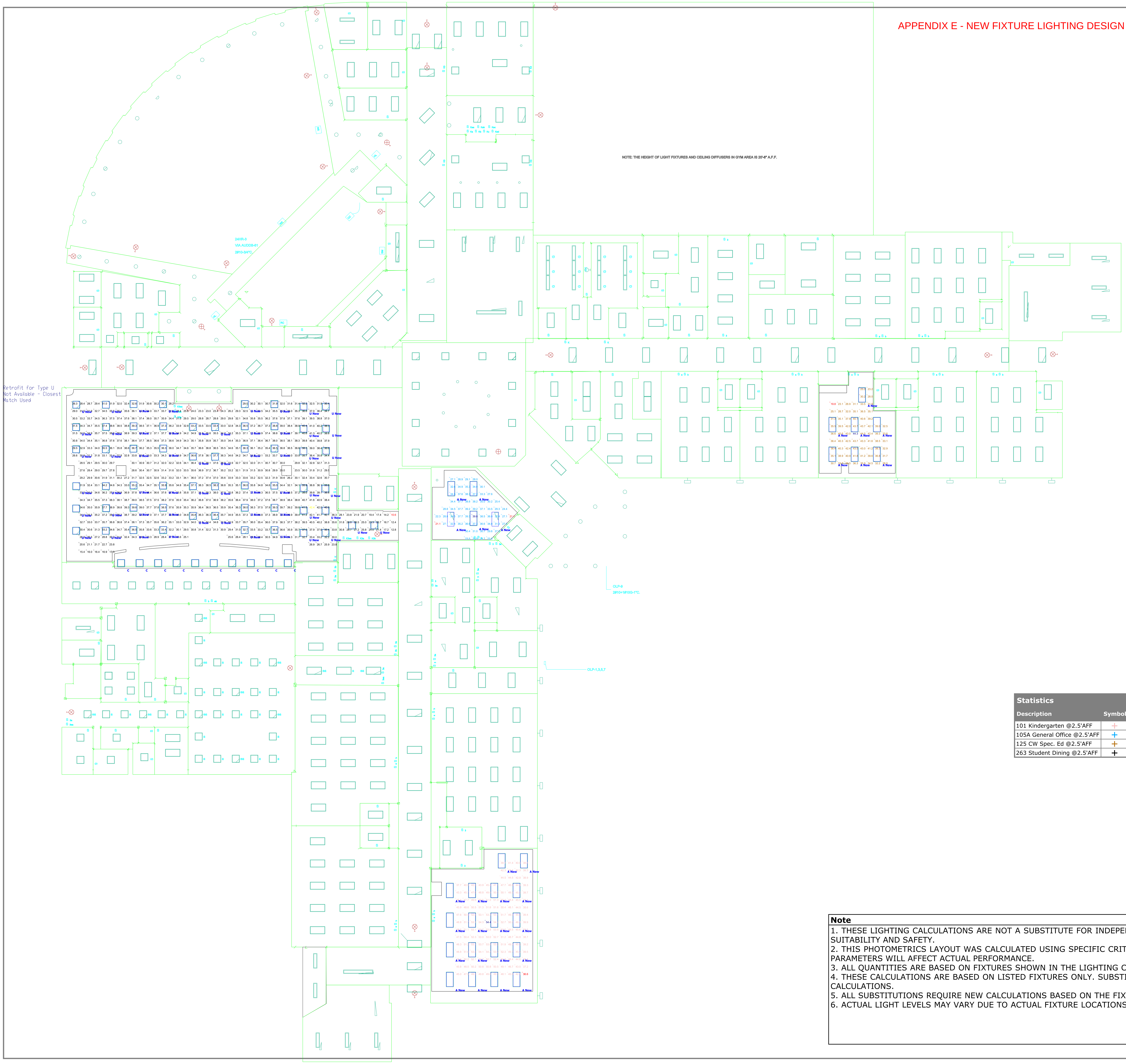
Appendix E:

New Lighting Fixture Designs

APPENDIX E - NEW FIXTURE LIGHTING DESIGN



Plan View

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
101 Kindergarten @2.5'AFF	+	47.8 fc	54.4 fc	36.6 fc	1.5:1	1.3:1
105A General Office @2.5'AFF	+	32.0 fc	39.8 fc	21.1 fc	1.9:1	1.5:1
125 CW Spec. Ed @2.5'AFF	+	36.3 fc	44.3 fc	19.8 fc	2.2:1	1.8:1
263 Student Dining @2.5'AFF	+	34.0 fc	42.4 fc	10.6 fc	4.0:1	3.2:1

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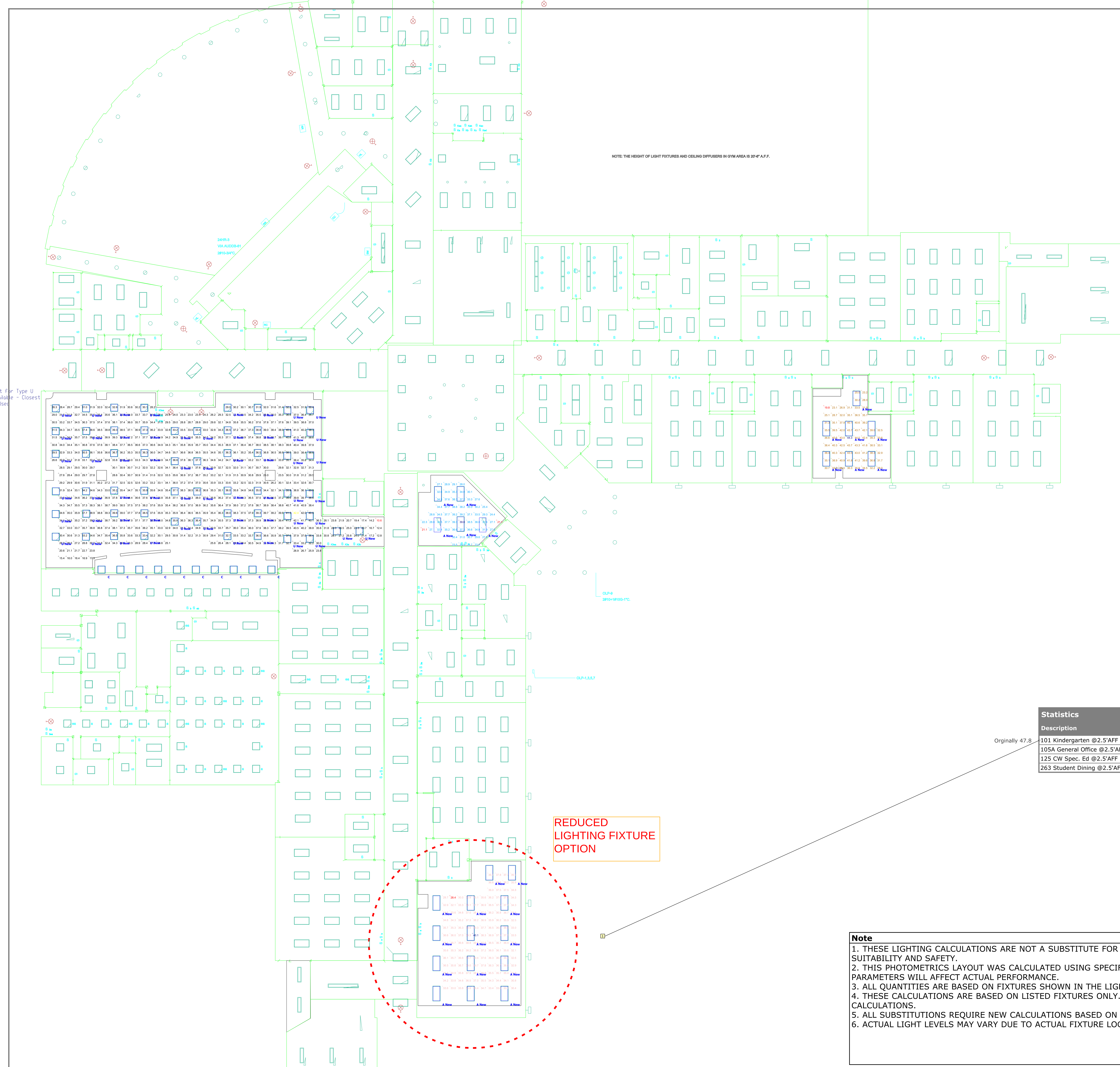

Plan View
Scale - 1" = 8ft

Statistics						
Description	**Symbol**	**Avg**	**Max**	**Min**	**Max/Min**	**Avg/Min**
101 Kindergarten @2.5'AFF	+	35.8 fc	40.1 fc	28.4 fc	1.4:1	1.3:1
105A General Office @2.5'AFF	+	32.0 fc	39.8 fc	21.1 fc	1.9:1	1.5:1
125 CW Spec. Ed @2.5'AFF	+	36.3 fc	44.3 fc	19.8 fc	2.2:1	1.8:1
263 Student Dining @2.5'AFF	+	34.0 fc	42.4 fc	10.6 fc	4.0:1	3.2:1

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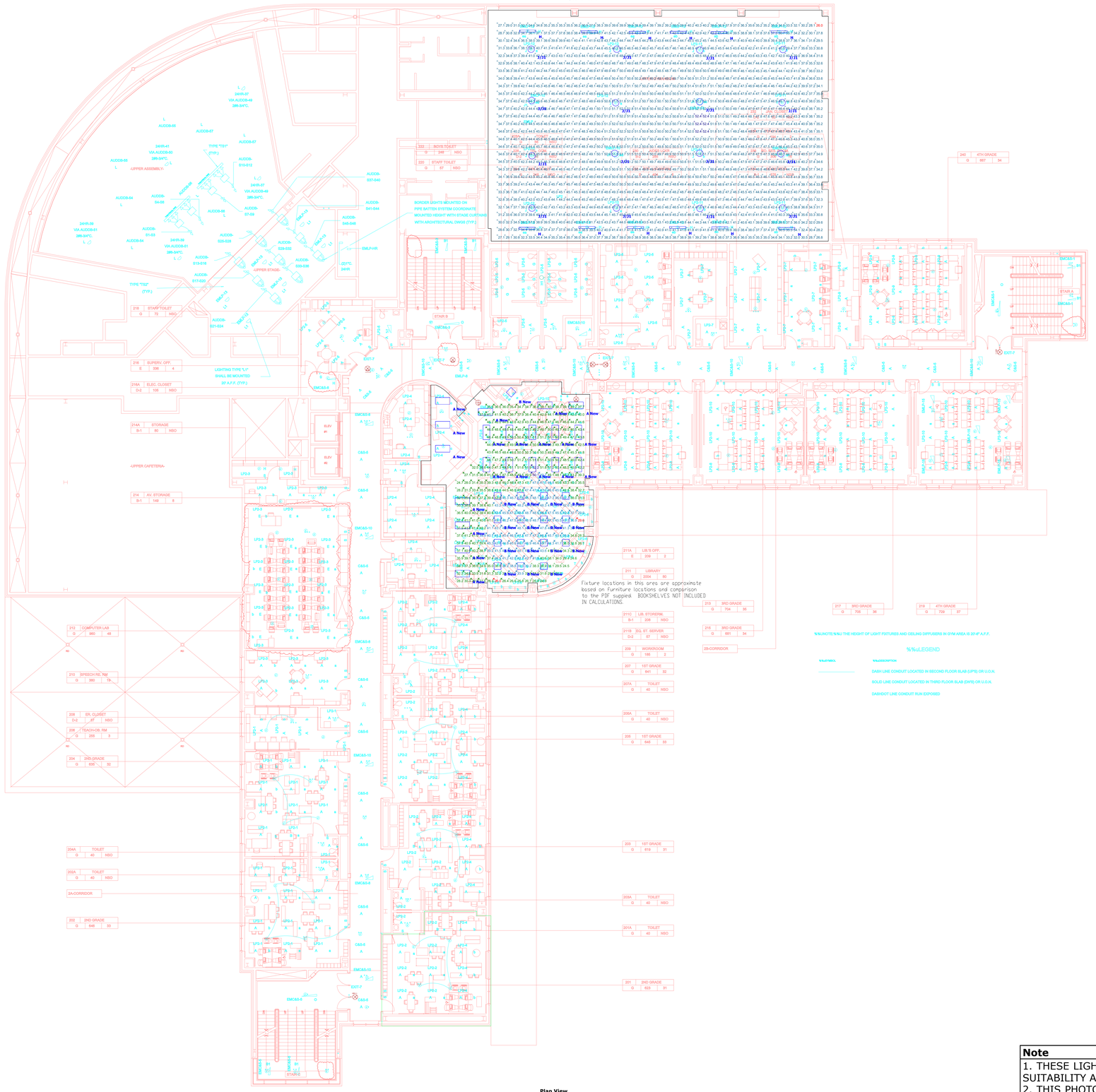

Plan View
Scale - 1" = 10ft

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
113 Gymnasium @Floor	+	44.2 fc	52.4 fc	26.0 fc	2.0:1	1.7:1
211 Library General @2.5'AFF	+	41.9 fc	52.2 fc	23.2 fc	2.3:1	1.8:1
Reading Area	X	42.8 fc	52.2 fc	26.0 fc	2.0:1	1.6:1
Stacks	X	44.5 fc	50.1 fc	29.6 fc	1.7:1	1.5:1

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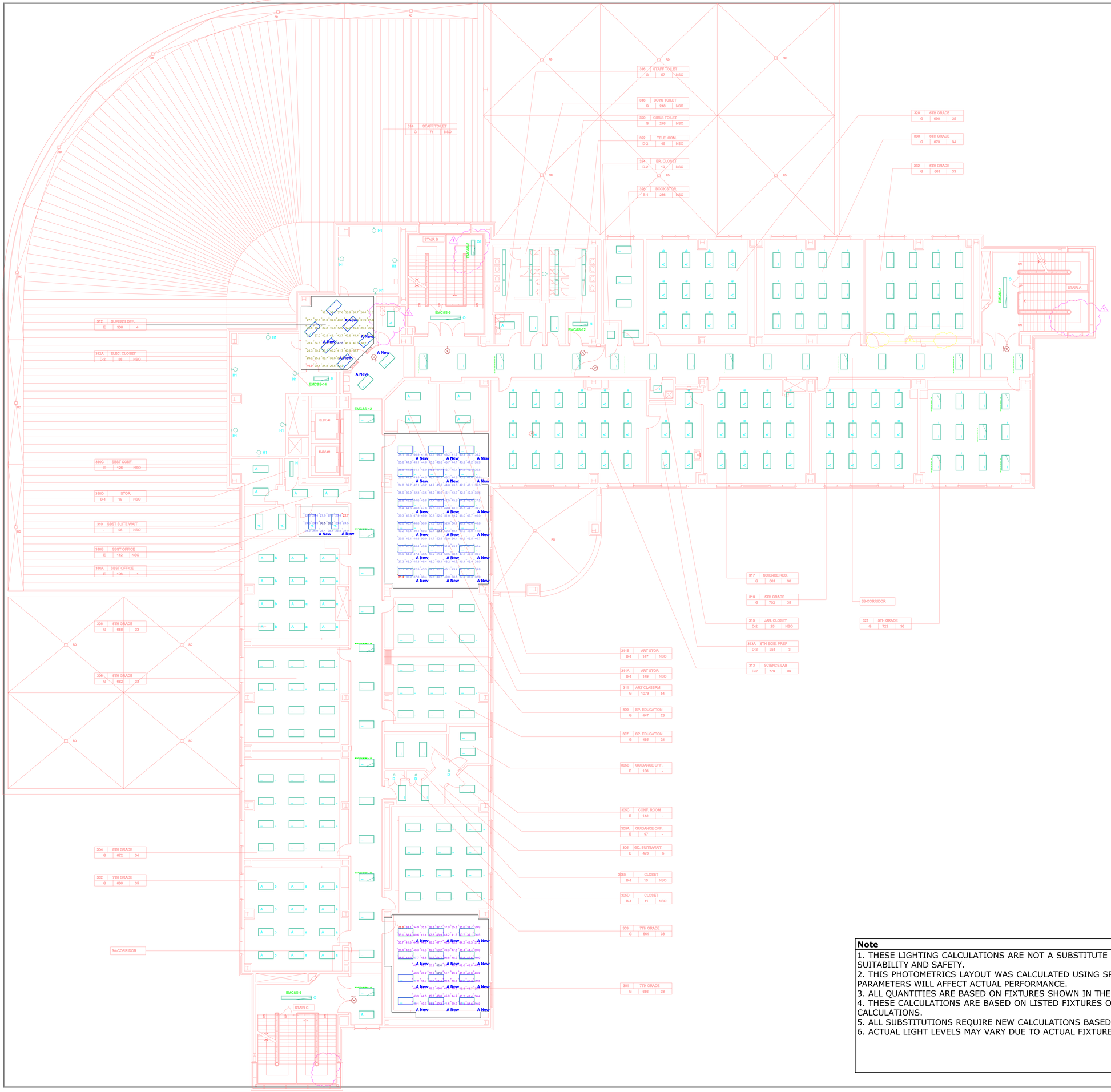

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
301 7th Grade Typical @2.5'AFF	+	43.8 fc	52.0 fc	28.8 fc	1.8:1	1.5:1
310A SBST Office @2.5'AFF	+	26.6 fc	30.5 fc	22.7 fc	1.3:1	1.2:1
311 Art Classroom @2.5'AFF	+	44.2 fc	53.3 fc	31.4 fc	1.7:1	1.4:1
312 Super's Office @2.5'AFF	+	34.9 fc	42.8 fc	16.9 fc	2.5:1	2.1:1

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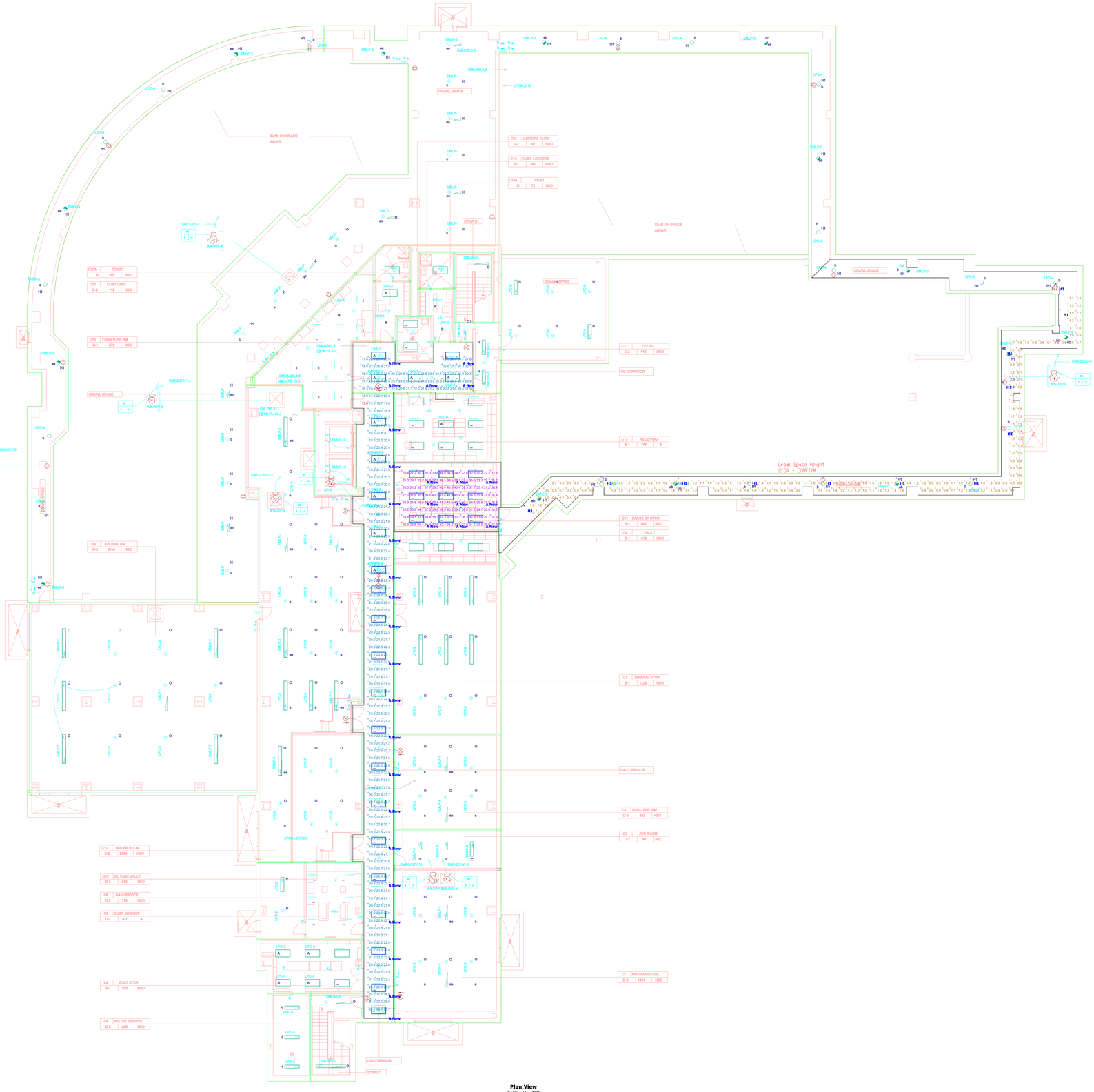
Plan View



Plan View
Scale - 1" = 10ft

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
C11 Large BK Storage @Floor	+	33.7 fc	41.8 fc	22.9 fc	1.8:1	1.5:1
Corridor Typical @1.5'AFF	+	22.1 fc	29.8 fc	13.6 fc	2.2:1	1.6:1
Crawl Space Typical @Floor	+	1.2 fc	2.3 fc	0.3 fc	7.7:1	4.0:1

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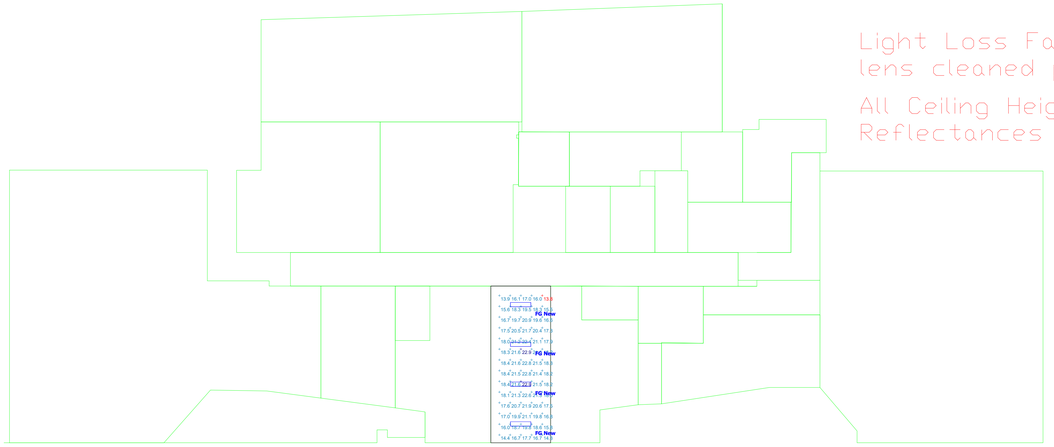
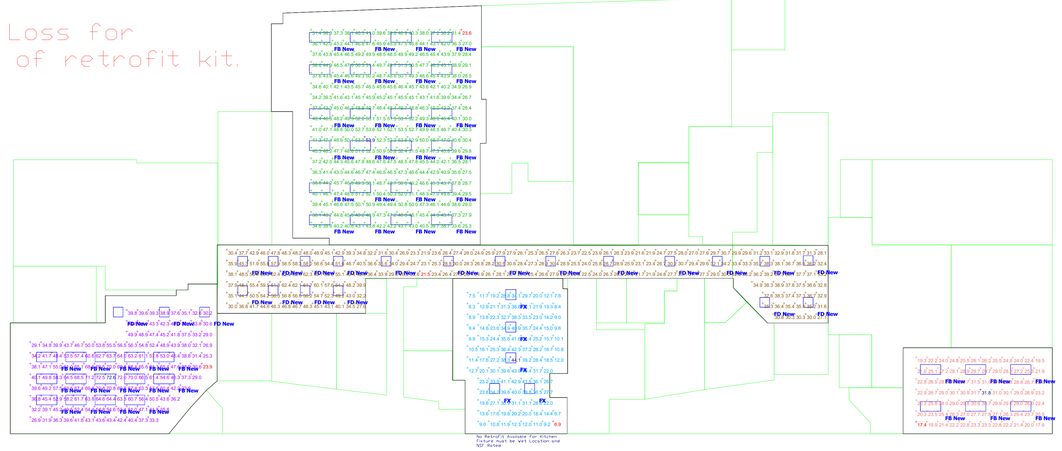
Light Loss Factor of .8 includes Loss for lens cleaned prior to installation of retrofit kit.

All Ceiling Heights 9'0A
Reflectances 70/40/20

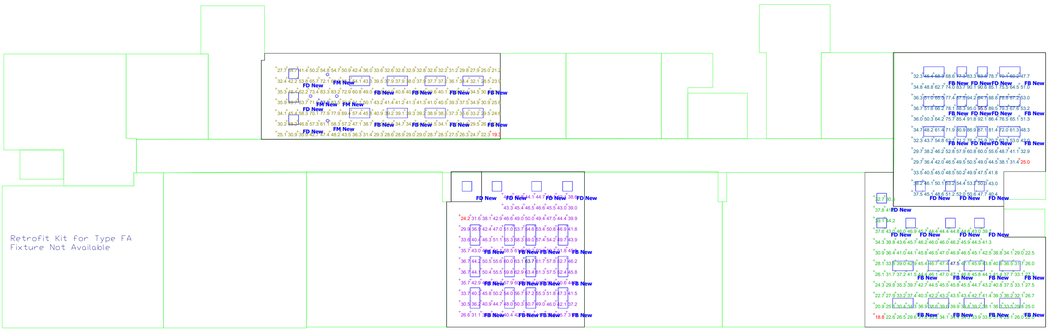
Cellar



1st Floor

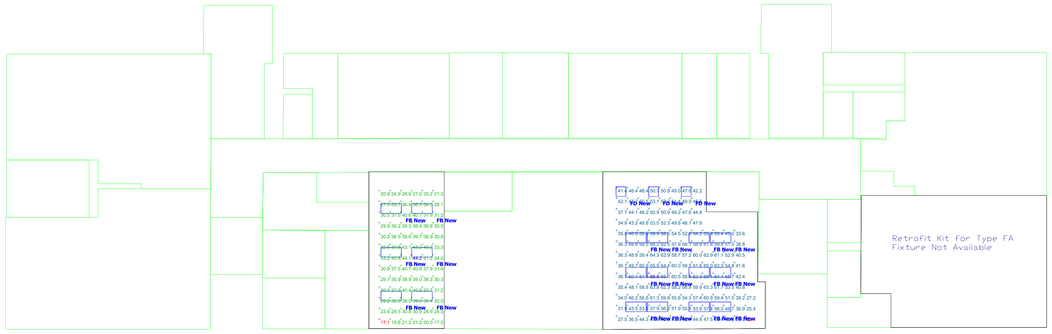


3rd Floor



Plan View
Scale - 1" = 10ft

2nd Floor



Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
ACD Kitchen 108 @2.5'AFF	+	23.8 fc	44.1 fc	6.9 fc	6.4:1	3.4:1
Classroom 301 @2.5'AFF	+	59.4 fc	95.5 fc	25.0 fc	3.8:1	2.4:1
Classroom 302 @2.5'AFF	+	38.1 fc	47.5 fc	18.8 fc	2.5:1	2.0:1
Classroom 305 @2.5'AFF	+	47.4 fc	63.7 fc	24.2 fc	2.6:1	2.0:1
Corridor 124 @1.5'AFF	+	36.2 fc	62.9 fc	21.5 fc	2.9:1	1.7:1
Infant Unit 104 @Floor	+	25.9 fc	31.8 fc	17.4 fc	1.8:1	1.5:1
Kindergarten 105 @2.5'AFF	+	49.2 fc	72.6 fc	23.9 fc	3.0:1	2.1:1
Library @2.5'AFF	+	42.1 fc	83.9 fc	19.3 fc	4.3:1	2.2:1
Non-Capacity Instructional Space 205 @2.5'AFF	+	51.0 fc	66.8 fc	22.1 fc	3.0:1	2.3:1
Parent Activity @2.5'AFF	+	33.3 fc	44.2 fc	17.1 fc	2.6:1	1.9:1
Stor C09 @Floor	+	19.0 fc	22.9 fc	13.8 fc	1.7:1	1.4:1
Student Dining/Multipurpose Room @2.5'AFF	+	44.1 fc	53.9 fc	23.6 fc	2.3:1	1.9:1

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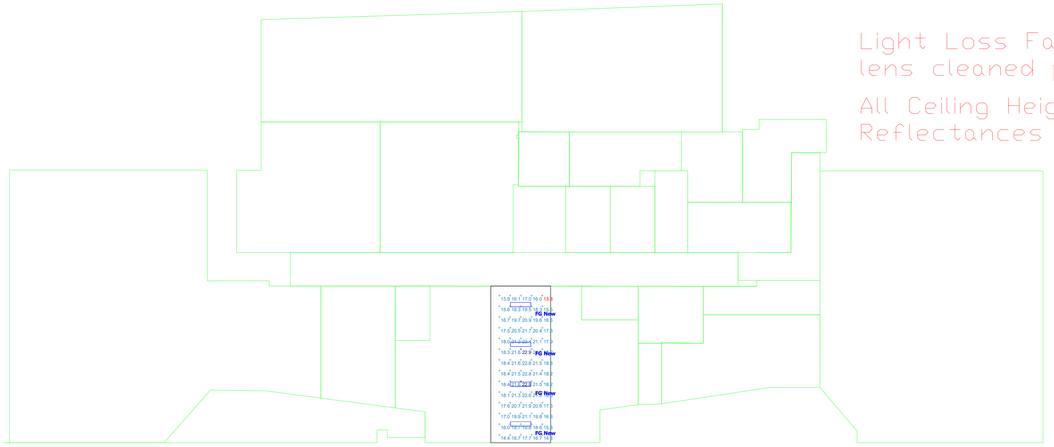
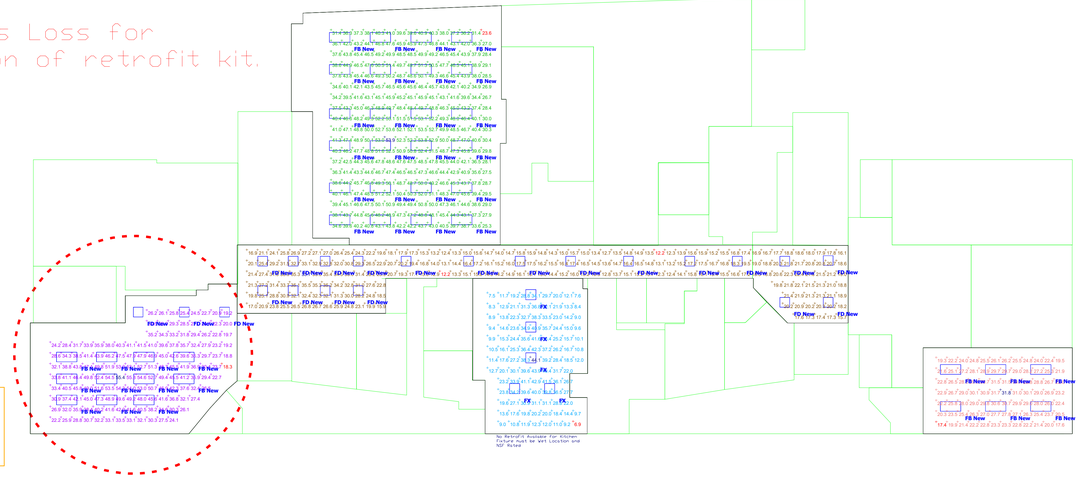
All Ceiling Heights 9'0A
Reflectances 70/40/20

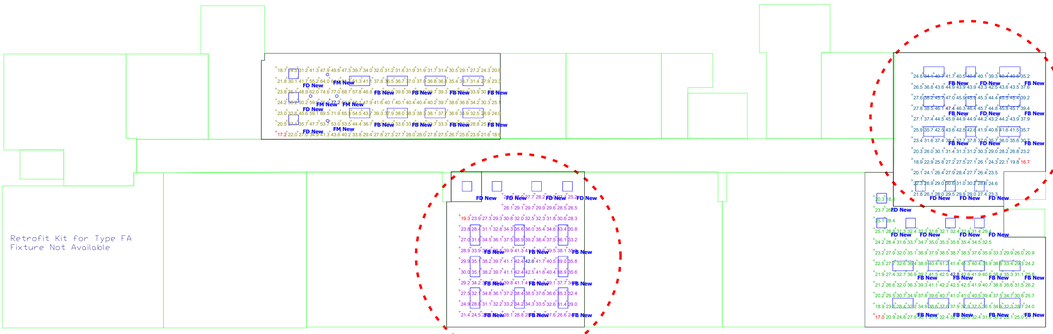


Cellar



REDUCED LIGHTING FIXTURE OPTION

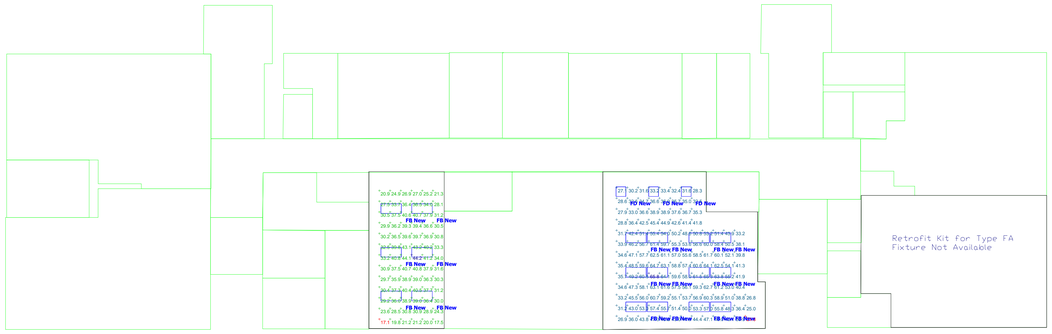
1st Floor



REDUCED LIGHTING FIXTURE OPTION

Retrofit Kit For Type FA Fixture Not Available

3rd Floor



Retrofit Kit For Type FA Fixture Not Available

2nd Floor

Plan View
Scale - 1" = 10ft

Statistics

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ACD Kitchen 108 @2.5'AFF	+	23.8 fc	44.1 fc	6.9 fc	6.4:1	3.4:1
Classroom 301 @2.5'AFF	+	34.9 fc	47.4 fc	16.7 fc	2.8:1	2.1:1
Classroom 302 @2.5'AFF	+	32.8 fc	42.8 fc	17.0 fc	2.5:1	1.9:1
Classroom 305 @2.5'AFF	+	33.5 fc	42.6 fc	19.3 fc	2.2:1	1.7:1
Corridor 124 @1.5'AFF	+	20.6 fc	35.7 fc	12.2 fc	2.9:1	1.7:1
Infant Unit 104 @Floor	+	25.9 fc	31.8 fc	17.4 fc	1.8:1	1.5:1
Kindergarten 105 @2.5'AFF	+	37.1 fc	55.4 fc	18.3 fc	3.0:1	2.0:1
Library @2.5'AFF	+	38.4 fc	77.2 fc	17.2 fc	4.5:1	2.2:1
Non-Capacity Instructional Space 205 @2.5'AFF	+	47.3 fc	65.8 fc	21.8 fc	3.0:1	2.2:1
Parent Activity @2.5'AFF	+	33.3 fc	44.2 fc	17.1 fc	2.6:1	1.9:1
Stor C09 @Floor	+	19.0 fc	22.9 fc	13.8 fc	1.7:1	1.4:1
Student Dining/Multipurpose Room @2.5'AFF	+	44.1 fc	53.9 fc	23.6 fc	2.3:1	1.9:1

Original 59.4 [1]
Original 47.4 [2]
Original 49.2 [3]

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Appendix F:

Proposed Lighting Fixture Cutsheets

LITHONIA LIGHTING®

Catalog Number	
Notes	
Type	

FEATURES & SPECIFICATIONS

INTENDED USE —The BLTR Best-Value Low Profile LED Relight Assembly is a cost effective solution for renovating existing fluorescent troffer and parabolic fixtures while providing upgraded aesthetics and outstanding performance. The BLTR's popular center basket design offers a clean, versatile style, and volumetric distribution. The wide range of lumen packages and control and driver options make the BLTR a great choice for many applications including offices, schools, hospitals, retail spaces and other general lighting applications.

CONSTRUCTION — Universal end brackets are constructed of 22-gauge powder-painted steel and are secured to the host fixture with provided TEKS™ screws. The driver and light engine assembly is integrated in the BTLR door assembly making this an extremely "simple", time saving, relight solution. The door frame and reflector assembly is a made of cold-rolled steel and is painted after fabrication with a matte white powder paint for improved aesthetics and increased light diffusion. Diffuser trim rings provide an attractive mounting for integral sensors as well as adding a decorative element to the luminaire aesthetics.

LED boards and driver are accessible from below.

OPTICS — Volumetric illumination is achieved by creating an optimal mix of light to walls, partitions and vertical and horizontal work surfaces – rendering the interior space, objects and occupants in a more balanced, complimentary luminous environment. High performance extruded acrylic diffusers conceal LEDs and efficiently deliver light in a volumetric distribution. Four diffuser choices available - curved and square designs with linear prisms or a smooth frosted finish.

ELECTRICAL — Long-life LEDs, coupled with high-efficiency drivers, provide superior quantity and quality of illumination for extended service life. 80% LED lumen maintenance at 60,000 hours (L80/60,000).

Non-Configurable BLTR Relight: Generic 0-10 volt dimming driver. Dims to 10%

Configurable BLTR Relight: available in High Efficiency (HE) versions for applications where a lower wattage (over the standard product) is required. High Efficiency versions deliver >130 LPW and can be specified via the Lumen Package designations in the Ordering Information below.

eldoLED driver options deliver choice of dimming range, and choices for control, while assuring flicker-free, low-current inrush, 89% efficiency and low EMI.

Step-level dimming option allows system to be switched to 50% power for complaince with common energy codes while maintaining fixture appearance.

Optional integrated nLight®controls make each luminaire addressable - allowing it to digitally communicate with other nLight enabled controls such as dimmers, switches, nLight AIR RIO, RES7 occupancy sensors and photo controls. Simply connect all the nLight enabled control devices and the BLTR Relight assembly using standard Cat-5 cabling. Unique plug-and-play convenience as devices and luminaires automatically discover each other and self-commission. Lumen Management: Unique lumen management system (option N80) provides on board intelligence that actively manages the LED light source so that constant lumen output is maintained over the system life, preventing the energy waste created by the traditional practice of over-lighting. Driver disconnect provided where required to comply with US and Canadian codes.

SENSOR— Integrated sensor (individual control): Sensor Switch MSD7ADCX ((Passive infrared (PIR)) or MSDPDT7ADCX ((PIR/Microphonics Dual Tech (PDT)) integrated occupancy sensor/automatic dimming photocell allows the luminaire to power off when the space is unoccupied or enough ambient light is entering the space. See page 4 for more details on the integrated sensor.

Integrated Sensor (nLight Wired Networking): This sensor is nLight-enabled, meaning it has the ability to communicate over an nLight network. When wired, using CAT-5 cabling, with other nLight-enabled sensors, power packs, or WallPods, an nLight control zone is created. Once linked to a Gateway, directly or via a Bridge, the zone becomes capable of remote status monitoring and control via SensorView software. See page 4 for the nLight sensor options.

Integrated Smart Sensor (nLight Air Wireless Platform): The rES7 sensor is nLight AIR enabled, meaning it has the ability to communicate over the wireless nLight control platform. It is available with an automatic dimming photocell, and either a digital PIR or microphonics (PDT) dual technology occupancy sensor. It pairs to other luminaires and wall switches through our mobile app, CLAIRITY™, which allows for simple sensor adjustment. See page 4 for more details on the Integrated Smart Sensor.

INSTALLATION — After existing fluorescent components are removed from the host housing, universal end brackets are secured in place with TEKS™ screws. The BLTR's integrated driver and light engine door assembly can then be hinged to the universal end brackets and will hang in place for completion of assembly plug-in wiring. Rotate the doorframe assembly closed and pivot the cam latches to secure the doorframe in place. LED boards include plug-in connectors for easy replacement or servicing. Suitable for damp location installations. Damp location not available with sensor versions.

LISTINGS — UL/cUL Listed for use in fluorescent light fixtures. Installing Relight assemblies per instructions will not impact existing fixture UL listing. Tested to LM80 standards. DesignLights Consortium® (DLC) Premium qualified product. Not all versions of this product may be DLC Premium qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

WARRANTY — 5-year limited warranty. Complete warranty terms located at: www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

NOTE: Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C.

Specifications subject to change without notice.

2BLTR Series LED Relight

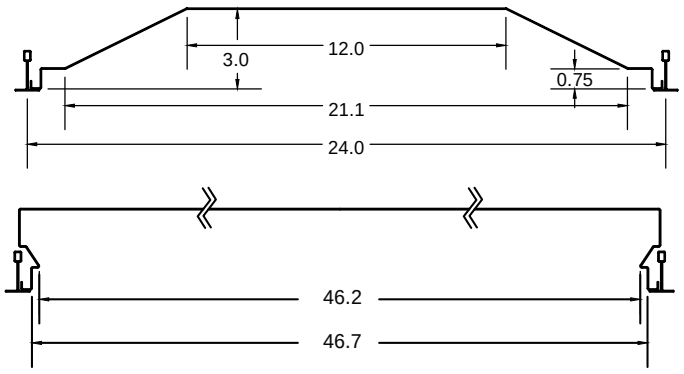
2BLTR

2' x 4' Relight
LED

ATRIUS™ eldoLED nLIGHT

Fit Compatibility:

The 2BLT4R Relight Assembly was designed to upgrade recessed 2x4 fixtures, including most parabolic and lensed troffers from all major manufacturers. Dimensional requirements are below, but Lithonia Lighting recommends a trial installation prior to purchasing project quantities.



SIDE SECTION

A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks when ordered with drivers marked by a shaded background*
- This luminaire is part of an A+ Certified solution for nLight control networks, providing advanced control functionality at the luminaire level, when selection includes driver and control options marked by a shaded background*

To learn more about A+, visit www.acuitybrands.com/aplus.

*See ordering tree for details

2BLT4R Volumetric Recessed Lighting 2'x4' Relight

A+ Capable options indicated by this color background.

ORDERING INFORMATION Lead times will vary depending on options selected. Consult with your sales representative.

Example: 2BLT4R 40L ADP EZ1 LP840

2BLT4R

Series		Air Function		Lumens[2]				Diffuser		Voltage		Driver		Color temperature	
2BLT4R	2X4 BLTR	(blank)	Static (white end brackets for troffers)	**Standard efficiency (>100 LPW)**		**High efficiency[3] (>130 LPW)**		ADP	Curved, linear prisms	(blank)	MVOLT	EZ1	eldoLED dims to 1% (0-10 volt dimming)	LP830	82CRI, 3000 K
		A	Air supply/ return or to maintain black reveal (black end brackets for parabolics)[1]	30L	3000	30LHE	3000	ADSM	Curved, smooth	120	120V	GZ1	Dims to 1% (0-10V dimming)[5]	LP835	82CRI, 3500 K
		F	Flanged Brackets	40L	4000	40LHE	4000	SDP	Square, linear prisms	277	277V	GZ10	Dims to 10% (0-10V dimming)[5]	LP840	82CRI, 4000 K
				48L	4800	48LHE	4800	SDSM	Square, smooth	347	347V[4]	SLD	Step-level dimming[6]	LP850	82CRI, 5000 K
				60L	6000	60LHE	6000	**Diffusers w/ trim rings**				EOHN	On/Off (non-dim)	LP930	90CRI, 3000K
				72L	7200	72LHE	7200	ADPT	Curved, linear prisms					LP935	90CRI, 3500K
						85LHE	8500	ADSMT	Curved, smooth					LP940	90CRI, 4000K
								SDPT	Square, linear prisms					LP950	90CRI, 5000K
								SDSMT	Square, smooth						

nLight Interface

nLight Wired

(blank)	no nLight ® interface
N80	nLight with 80% lumen management
N80EMG	nLight with 80% lumen management For use with generator supply EM power[7]
N100	nLight without lumen management
N100EMG	nLight without lumen management For use with generator supply EM power[7]

nLight Wireless

(blank)	no nLight ® interface
NLTAIR2	nLight AIR Generation 2 enabled[8]

Control[9]

nLight Wired

(blank)	No sensor control
NES7	nLight™ nES 7 PIR integral occupancy sensor[10]
NESPDT7	nLight™ nES PDT 7 dual technology integral occupancy control[10]
NES7ADCX	nLight™ nES 7 ADCX PIR integral occupancy sensor with automatic dimming photocell[10]
NESPDT7ADCX	nLight™ nES PDT 7 dual technology integral occupancy sensor with automatic dimming photocell[10]

nLight Wireless

RES7	nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control
RES7PDT	nLight AIR microphonics dual technology occupancy sensor with automatic dimming photocell for Zone Control
RIO	nLight AIR radio module without sensor

Individual Control

MSD7ADCX	PIR integral occupancy sensor with automatic dimming control photocell[11]
MSDPDT7ADCX	PDT integral occupancy sensor with automatic dimming control photocell[11]

Options

EL7L	700 lumen battery pack (Noncompliant with CA T20)[14]
EL14L	1400 lumen battery pack (Noncompliant with CA T20)[14]
E10WLCP	EM Self-Diagnostic battery pack, 10W Constant Power, (Certified in CA Title 20 MAEDBS)[14]
BGTD	Bodine Generator Transfer Device[12]
GLR	Fast-blowing fuse[13]
GMF	Slow-blowing fuse[13]
NPLT	Narrow pallet
FAO	Field adjustable output[15]
USPOM	US Point of Manufacture
JP16	Job Pack

Accessories next page

Non-Configurable BLT

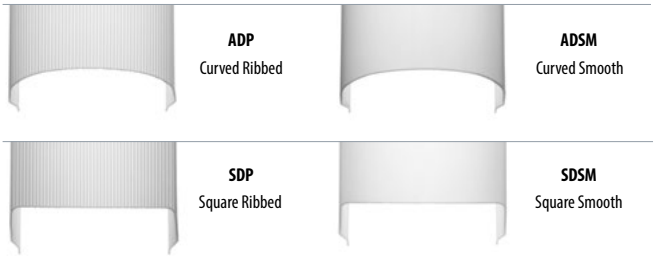
Stock	Catalog Description*	UPC	Lumens	Wattage	LPW	Color Temperature	Voltage	Pallet Qty
Stock	2BLT4R 40L ADP LP835	190887550948	3960	32	124	3500K/80 CRI	120-277	26
	2BLT4R 40L ADP LP840	190887550979	4023	32	127	4000K/80 CRI	120-277	26
	2BLT4R 46L ADP LP835	190887550993	4520	38	118	3500K/82 CRI	120-277	26
	2BLT4R 46L ADP LP840	190887551006	4620	38	121	4000K/82 CRI	120-277	26

* Dims to 10%

Notes

1 Consult factory for airflow data.
2 Approximate lumen output.
3 All versions may not achieve 130+ LPW. Refer to photometry on www.acuitybrands.com.
4 Not available with EL7L or EL14L battery packs.
5 GZ1, GZ10 not available with any Control or Sensor options.
6 Not available with N80, N80EMG, N100, N100EMG, NLTAIR2, or occupancy control.
7 nLight EMG option requires a connection to existing nLight network. Power is provided from a separate N80 or N100 enabled fixture.
8 Must order with RES7, RES7PDT, or RIO sensor. Only available with EZ1 driver. Not available with 72L, 72LHE, or 85LHE options.
9 Must specify diffuser with trims rings. See sensor options on page 4.
10 Requires N80, N80EMG, N100, or N100EMG.
11 Only available with EZ1 driver option. 0-10v dimming wires not accessible via access plate. Not available with Controls options.
12 Requires BSE labeling. Consult factory for options.
13 Must specify voltage, 120 or 277 with GLR & GMF fusing.
14 GZ1 driver not available with battery pack when specifying 72LHE or 85LHE lumen options. Must use EZ1 driver.
15 Consult factory.

Multiple Diffuser Options



2BLT4R Volumetric Recessed Lighting 2'x4' Relight

nLight® AIR Control Accessories:
Order as separate catalog number. Visit www.acuitybrands.com/products/controls/nlightair.

Wall switches	Model number
On/Off single pole	rPODB [color] G2
On/Off two pole	rPODB 2P [color] G2
On/Off & raise/lower single pole	rPODB DX [color] G2
On/Off & raise/lower two pole	rPODB 2P DX [color] G2
On/Off & raise/lower single pole	rPODBZ DX WH G2

Application Guide

2BLT4R — Typically used for lensed troffer installations. Assembly contains white end brackets and is supplied with white trim strips for use in closing gaps down fixture sides (installer's choice - not required).

**Note: This kit will fit in Lithonia's Avante non-air fixture.*

2BLT4R A — Typically used for parabolic installations with black reveal. Assembly contains black end brackets to match black reveal around host housing. Does not interfere with host housing air supply/return if present (along fixture sides).

rCMS[1] — **Example: RCMS PDT 10 AR G2**

Series / Detection	Power Supply[1]	Occupancy Detection	Lens (Required)	Operating Mode	Generation
RCMS nLight AIR occupancy and daylight sensor	[blank] Power Supply ordered separately PS 150 Standard 150 mA Power Supply	[blank] PIR Detection PDT[2] Dual Tech PIR/ Microphonics	10 Large Motion/ Extended Range 360° 9 Small Motion/ Extended Range 360° 6 High Bay 360° Lens	[BLANK] None AR Auxiliary Relay	G2 Generation 2 compatibility

Notes

1 RCMS requires low voltage power from either RPP20 DS 24V G2 or PS150.

LITHONIA LIGHTING®

Catalog Number
Notes
Type

BLT Series LED

2BLT

2' x 2'
LED

FEATURES & SPECIFICATIONS

INTENDED USE — The BLT Best-in-Value Low Profile LED luminaire features a popular center basket design that offers a clean, versatile style and volumetric distribution. High efficacy LED light engines deliver energy savings and low maintenance compared to traditional sources. An extensive selection of configurations and options make the BLT the perfect choice for many lighting applications including schools, offices and other commercial spaces, retail, hospitals and healthcare facilities. The low profile BLT design (2-3/8") also makes it an excellent choice for renovation projects.

CONSTRUCTION — BLT enclosure components are die-formed for dimensional consistency and painted after fabrication with a polyester powder paint for improved performance and protection.

The reflector is finished with a high reflective matte white powder paint for improved aesthetics and increased light diffusion.

End plates contain easy-to-position integral T-bar clips for securely attaching the luminaire to the T-grid. For additional T-grid security, optional screw on T-bar clips are available.

Diffusers are extruded from impact modified acrylic for increased durability.

LED boards and drivers are accessible from the plenum.

OPTICS — Volumetric illumination is achieved by creating an optimal mix of light to walls, partitions and vertical and horizontal work surfaces – rendering the interior space, objects and occupants in a more balanced, complimentary luminous environment. High performance extruded acrylic diffusers conceal LEDs and efficiently deliver light in a volumetric distribution. Four diffuser choices available - curved and square designs with linear prisms or a smooth frosted finish.

ELECTRICAL — Long-life LEDs, coupled with high-efficiency drivers, provide superior quantity and quality of illumination for extended service life. 80% LED lumen maintenance at 60,000 hours (L80/60,000). Color Variation within 3-step MacAdam ellipse (3SDCM).

Non-Configurable BLT: Generic 0-10 volt dimming driver. Dims to 10%

Configurable BLT: available in High Efficiency (HE) versions for applications where a lower wattage (over the standard product) is required. The High Efficiency versions deliver >130 LPW and can be specified via the Lumen Package designations in the Ordering Information below.

eldoLED driver options deliver choice of dimming range, and choices for control, while assuring flicker-free, low-current inrush, 89% efficiency and low EMI.

Optional integrated nLight®controls make each luminaire addressable - allowing them to digitally communicate with other nLight enabled controls such as dimmers, switches, occupancy sensors and photocontrols. Connection to nLight is simple. It can be accomplished with integrated nLight AIR wireless RIO, RES7 sensors, or through standard Cat-5 cabling. nLight offers unique plug-and-play convenience as devices and luminaires automatically discover each other and self-commission. nLight AIR is commissioned easily through an intuitive model app.

Lumen Management: Unique lumen management system (option N80) provides on board intelligence that actively manages the LED light source so that constant lumen output is maintained over the system life, preventing the energy waste created by the traditional practice of over-lighting.

Step-level dimming option allows system to be switched to 50% power for compliance with common energy codes while maintaining fixture appearance.

Driver disconnect provided where required to comply with US and Canadian codes.

SENSOR— Integrated sensor (individual control): Sensor Switch MSD7ADCX ((Passive infrared (PIR)) or MSDPDT7ADCX ((PIR/Microphonics Dual Tech (PDT)) integrated occupancy sensor/automatic dimming photocell allows the luminaire to power off when the space is unoccupied or enough ambient light is entering the space. See page 4 for more details on the integrated sensor.

Integrated Sensor (nLight Wired Networking): This sensor is nLight-enabled, meaning it has the ability to communicate over an nLight network. When wired, using CAT-5 cabling, with other nLight-enabled sensors, power packs, or WallPods, an nLight control zone is created. Once linked to a Gateway, directly or via a Bridge, the zone becomes capable of remote status monitoring and control via SensorView software. See page 4 for the nLight sensor options.

Integrated Smart Sensor (nLight Air Wireless Platform): The RES7 sensor is nLight AIR enabled, meaning it has the ability to communicate over the wireless nLight control platform. It is available with an automatic dimming photocell, and either a digital PIR or a microphonics (PDT) dual technology occupancy sensor. It pairs to other luminaires and wall switches through our mobile app, CL***AIR***ITY, which allows for simple sensor adjustment. See page 4 for more details on the Integrated Smart Sensor.

INSTALLATION — The BLT's low profile design of only 2-3/8" provides increased installation flexibility especially in restrictive plenum applications. The BLT fits into standard 15/16" and narrow 9/16" T-grid ceiling systems.

Suitable for damp location.

For recessed mounting in hard ceiling applications, Drywall Grid Adapters (DGA) are available as an accessory. See Accessories section.

LISTINGS — CSA Certified to meet U.S. and Canadian standards. IC rated.

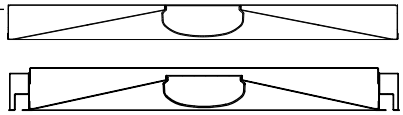
DesignLights Consortium® (DLC) Premium qualified product. Not all versions of this product may be DLC Premium qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

WARRANTY — 5-year limited warranty. Complete warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

NOTE: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C.
Specifications subject to change without notice.

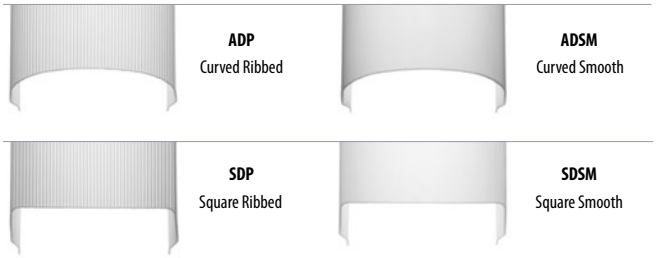
Specifications

Length: 23-3/4 (60.3)
Width: 23-3/4 (60.3)
Depth: 2-3/8 (6.0)
Depth with Air supply/return: 2-3/4 (6.9)



All dimensions are inches (centimeters) unless otherwise specified.

Multiple Diffuser Options



ADP Curved Ribbed
ADSM Curved Smooth
SDP Square Ribbed
SDSM Square Smooth

A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks when ordered with drivers marked by a shaded background*
- This luminaire is part of an A+ Certified solution for nLight control networks, providing advanced control functionality at the luminaire level, when selection includes driver and control options marked by a shaded background*

To learn more about A+, visit www.acuitybrands.com/aplus.

*See ordering tree for details

2BLT Volumetric Recessed Lighting 2'x2'

A+ Capable options indicated by this color background.

ORDERING INFORMATION Lead times will vary depending on options selected. Consult with your sales representative.

Example: 2BLT2 33L ADP EZ1 LP835

2BLT2

Series	Air function	Lumens[2]		Diffuser	Voltage	Driver	Color temperature
2BLT2 2X2 BLT	(blank) Static A Air supply/ return[1]	**Standard efficiency (>100 LPW)** 20L 2000 33L 3300 40L 4000 48L 4800	**High efficiency[3,4] (>130 LPW)** 20LHE 2000 33LHE 3300 40LHE 4000 48LHE 4800	ADP Curved, linear prisms ADSM Curved, smooth SDP Square, linear prisms SDSM Square, smooth **Includes trim rings to match sensored version** ADPT Curved, linear prisms ADSMT Curved, smooth SDPT Square, linear prisms SDSMT Square, smooth	(blank) MVOLT 120 120V 277 277V 347 347V[5]	EZ1 eldoLED dims to 1% (0-10 volt dimming) GZ1 Dims to 1% (0-10V dimming)[6] GZ10 Dims to 10% (0-10V dimming)[6] SLD Step-level dimming[7]	LP830 82CRI, 3000 K LP835 82CRI, 3500 K LP840 82CRI, 4000 K LP850 82CRI, 5000 K LP930 90CRI, 3000K LP935 90CRI, 3500K LP940 90CRI, 4000K LP950 90CRI, 5000K

nLight Interface

nLight Wired

(blank)	no nLight® interface
N80	nLight with 80% lumen management
N80EMG	nLight with 80% lumen management For use with generator supply EM power[9]
N100	nLight without lumen management
N100EMG	nLight without lumen management For use with generator supply EM power[9]

nLight Wireless

(blank)	no nLight® interface
NLTAIR2	nLight AIR Generation 2 enabled[10]

Control[11]

nLight Wired

(blank)	No sensor control
NES7	nLight™ nES 7 PIR integral occupancy sensor[12]
NESPDT7	nLight™ nES PDT 7 dual technology integral occupancy control[12]
NES7ADCX	nLight™ nES 7 ADCX PIR integral occupancy sensor with automatic dimming photocell[12]
NESPDT7ADCX	nLight™ nES PDT 7 dual technology integral occupancy sensor with automatic dimming photocell[12]

nLight Wireless

RES7	nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities[13]
RES7PDT	nLight AIR microphonics dual technology occupancy sensor with automatic dimming photocell[13]
RIO	nLight AIR radio module without sensor

Individual Control

MSD7ADCX	PIR integral occupancy sensor with automatic dimming control photocell[7,13]
MSDPDT7ADCX	PDT integral occupancy sensor with automatic dimming control photocell[7,13]

Options

EL7L	700 lumen battery pack (non-CEC compliant)[14]
EL14L	1400 lumen battery pack (non-CEC compliant)[14]
EL14LSD	1400 lumen battery pack with self-diagnostic testing feature (non-CEC compliant)[14,15]
E10WLCP	EM Self-Diagnostic battery pack, 10W Constant Power, CEC compliant[14]
CP	Chicago plenum[16]
BGTD	Bodine Generator Transfer Device[17]
PWS1836	6' pre-wire, 3/8" diameter, 18 gauge, 1 circuit
PWS1846	6' pre-wire, 3/8" diameter, 18 gauge, 2 circuit
PWS1846 PWSLV	Two cables: one 6' pre-wire, 3/8" diameter, 18 gauge, 2 circuits; one 6' pre-wire, 3/8" diameter, 18 gauge, purple and gray[18]
PWS1856LV	6' pre-wire, 3/8" diameter, 18 gauge, 1 circuit w/low voltage purple and grey wires[18]
GLR	Fast-blowing fuse[19]
GMF	Slow-blowing fuse[19]
NPLT	Narrow pallet
RRL_	RELOC®-ready luminaire[20]
LATC	Earthquake clip
DWAM	Anti-Microbial paint
JP32	Job packaging
IP5X	Gasketed diffuser compartment to meet IP5X rating[21]

Non-Configurable BLT

Stock/MTO	Catalog Description *	UPC	Lumens	Wattage	LPW	Color Temperature	Voltage	Pallet Qty
Stock	2BLT2 33L ADP LP835	00190887529708	3332	26	128	3500K/82 CRI	120-277	52
	2BLT2 33L ADP LP840	00190887529739	3385	26	130	4000K/82CRI	120-277	52
	2BLT2 33L ADP EL14L LP835	00190887529890	3332	26	128	3500K/82CRI	120-277	52
	2BLT2 33L ADP EL14L LP840	00190887529937	3385	26	130	4000K/82CRI	120-277	52
MTO	2BLT2 33L ADP 347 LP835		3332	26	128	3500K/82 CRI	347	52
	2BLT2 33L ADP 347 LP840		3385	26	130	4000K/82CRI	347	52

*Generic 0-10V Dimming to 10%.

Notes and Accessories next page

LED: One Lithonia Way Conyers, GA 30012 Phone: 800-858-7763 www.lithonia.com

2BLT Volumetric Recessed Lighting 2'x2'

Notes
1 Consult factory for airflow data.
2 Approximate lumen output.
3 All versions may not achieve 130+ LPW. Refer to photometry on www.acuitybrands.com.
4 Air supply/return option, 90 CRI, and versions with integral sensor trim rings may not achieve 130 LPW.
5 Not available with SLD EL7L, or EL14L options.
6 GZ1 and GZ10 not available with any Control or Sensor options
7 Not available with N80, N80EMG, N100, N100EMG, NLTAIR, or occupancy control.
8 Not available with controls, occupancy controls, or PWS options. Consult factory for Hi-Lume dimming.
9 nLight EMG option requires a connection to existing nLight network. Power is provided from a separate N80 or N100 enabled fixture.
10 Must order with RES7, RES7PDT or Rio module. Must order with EZ1 driver.
11 Must specify diffuser with trim rings. See sensor options on page 4.
12 Requires N80, N80EMG, N100, or N100EMG.
13 Only available with EZ1 driver option. 0-10v dimming wires not accessible via access plate.
14 When using pre-wire option, use PWS1846 or PWS1846 PWSLV.
15 For more information, please see the PSSD2 specification sheet.
16 Not available with N80, N80EMG, N100, or N100EMG.
17 Must specify voltage. Requires BSE labeling, voltage specific. Consult factory for options.
18 Not available with nLight wired/wireless network or individual controls.
19 Must specify voltage, 120 or 277, with GLR and GFM fusing.
20 For ordering logic consult RRL_2013.
21 Not available with air supply/return or Wired Networking (NES_) and Individual Control (MSD_) sensors.

Accessories: *Order as separate catalog number.*

DGA22	Drywall grid adapter for 2x2 recessed fixture
2X2SMK	Surface Mount Troffer Kit

nLight® Wired Control Accessories:
Order as separate catalog number. Visit www.acuitybrands.com/products/controls/nlight.

WallPod stations	**Model number**	**Occupancy sensors**	**Model number**
On/Off	nPODM [color]	Small motion 360°, ceiling (PIR / dual tech)	nCM 9 RJB / nCM PDT 9 RJB
On/Off & raise/lower	nPODM DX [color]	Large motion 360°, ceiling (PIR / dual tech)	nCM10 RJB / nCM PDT 10 RJB
Graphic touchscreen	nPOD GFX [color]	Wall switch with raise/lower	nWSX PDT LV DX [color]
Photocell controls	**Model number**	**Cat-5 cable (plenum rated)**	**Model number**
Full range dimming	nCM ADCX RJB	10' cable	CAT5 10FT J1
		30' cable	CAT5 30FT J1

nLight® AIR Control Accessories:
Order as separate catalog number. Visit www.acuitybrands.com/products/controls/nlightair.

Wall switches	**Model number**
On/Off single pole	rPODB [color] G2
On/Off two pole	rPODB 2P [color] G2
On/Off & raise/lower single pole	rPODB DX [color] G2
On/Off & raise/lower two pole	rPODB 2P DX [color] G2
On/Off & raise/lower single pole	rPODBZ DX WH G2

rCMS[1] **Example: RCMS PDT 10 AR G2**

Series / Detection	**Power Supply[1]**	**Occupancy Detection**	**Lens (Required)**	**Operating Mode**	**Generation**
RCMS nLight AIR occupancy and daylight sensor	[blank] Power Supply ordered separately PS 150 Standard 150 mA Power Supply	[blank] PIR Detection PDT Dual Tech PIR/ Microphonics	10 Large Motion/ Extended Range 360° 9 Small Motion/ Extended Range 360° 6 High Bay 360° Lens	[BLANK] None AR Auxiliary Relay	G2 Generation 2 compatibility

Replacement Parts: *Order as separate catalog number.*

*247WJV	2DBLT24 ADP LENS ASSEMBLY	2 ft. replacement lens
*249P2P	2DBLT24 SDP LENS ASSEMBLY	2 ft. replacement lens
*249P2W	2DBLT24 ADSM LENS ASSEMBLY	2 ft. replacement lens
*249P32	2DBLT24 SDSM LENS ASSEMBLY	2 ft. replacement lens
*237LT1	2DBLT24 ADPT LENS ASSEMBLY	2 ft. replacement lens
*237LT3	2DBLT24 SDPT LENS ASSEMBLY	2 ft. replacement lens
*237LT5	2DBLT24 ADSMT LENS ASSEMBLY	2 ft. replacement lens
*237LT7	2DBLT24 SDSMT LENS ASSEMBLY	2 ft. replacement lens
*237LT9	2DBLT24 ADPT SENSOR LENS ASSEMBLY	2 ft. replacement lens
*237M4Y	2DBLT24 SDPT SENSOR LENS ASSEMBLY	2 ft. replacement lens
*237M57	2DBLT24 ADSMT SENSOR LENS ASSEMBLY	2 ft. replacement lens
*237M5H	2DBLT24 SDSMT SENSOR LENS ASSEMBLY	2 ft. replacement lens

Notes
1 RCMS requires low voltage power from either RPP20 DS 24V G2 or PS150.

Performance Data					
Material	**Lumens**	**LPW**	**Watts**	**DLC Listing**	**DLC ID**
2BLT2 20L ADP EZ1 (GZ10) LP835 (ALL OPTIONS)	2033.0	126.6	16.1	Premium	P6445UVD
2BLT2 20L ADPT EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	2016.0	124.8	16.2	Premium	PWKF5HGQ
2BLT2 20L ADP EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	2065	124.1	16.6	Premium	PM92196A
2BLT2 20L ADPT EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	2038.0	126.9	16.1	Premium	PYX15QEQ
2BLT2 33L ADP LP835	3332.0	124.9	26.7	Premium	PQXU3PWX
2BLT2 33L ADP EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	3332.0	124.9	26.7	Premium	PHSXHE8F
2BLT2 33L ADPT EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	3287.0	125.1	26.3	Premium	PTKZR9WQ
2BLT2 33L ADP LP840	3385.2	126.9	26.7	Premium	PPWS1PPC
2BLT2 33L ADP EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	3385.0	126.9	26.7	Premium	PD18CKQ8
2BLT2 33L ADPT EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	3340.0	125.2	26.7	Premium	PF98CZ2H
2BLT2 40L ADP EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	4041.0	127.4	31.7	Premium	P1XWW9GV
2BLT2 40L ADPT EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	3987.0	125.7	31.7	Premium	P1XWW9GV
2BLT2 40L ADP EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	4105.0	129.4	31.7	Premium	PHCQ2CQF
2BLT2 40L ADPT EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	4050	127.65	31.7	Premium	P5YYDAA8

DLC information is subject to change, for the most up-to-date information please refer to www.dlc.org. Above listings do not cover 347v or SLD.

HE Performance Data					
Material	**Lumens**	**LPW**	**Watts**	**DLC Listing**	**DLC ID**
2BLT2 20LHE ADP EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	1948.0	130.6	14.9	Premium	PUQCZNQI
2BLT2 20LHE ADPT EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	1901.0	130.0	14.6	Premium	PQXK6498
2BLT2 20LHE ADP EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	1979	132.7	14.9	Premium	PJCZRW21
2BLT2 20LHE ADPT EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	1952.0	130.9	14.9	Premium	PLC4RF4L
2BLT2 33LHE ADP EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	3392.0	137.3	24.7	Premium	PXXZN9PH
2BLT2 33LHE ADPT EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	3346.0	135.5	24.7	Premium	PZC8BZSS
2BLT2 33LHE ADP EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	3446.0	139.5	24.7	Premium	PKPJYYRF
2BLT2 33LHE ADPT EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	3400.0	137.6	24.7	Premium	PM5G8AFU
2BLT2 40LHE ADP EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	4118.0	133.7	30.8	Premium	PJ55XFFP
2BLT2 40LHE ADPT EZ1 (GZ1, GZ10) LP835 (ALL OPTIONS)	4063.0	131.9	30.8	Premium	P8E16E9B
2BLT2 40LHE ADP EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	4183.0	135.9	30.8	Premium	PEGFHPZD
2BLT2 40LHE ADPT EZ1 (GZ1, GZ10) LP840 (ALL OPTIONS)	4128	134.04	30.8	Premium	PFRSSSVG

DLC information is subject to change, for the most up-to-date information please refer to www.dlc.org. Above listings do not cover 347v or SLD.

LED: One Lithonia Way Conyers, GA 30012 Phone: 800-858-7763 www.lithonia.com

LITHONIA LIGHTING®

Catalog Number	
Notes	
Type	

FEATURES & SPECIFICATIONS

INTENDED USE — The BLTR Best-Value Low Profile LED Relight Assembly is a cost effective solution for renovating existing fluorescent troffer and parabolic fixtures while providing upgraded aesthetics and outstanding performance. The BLTR's popular center basket design offers a clean, versatile style, and volumetric distribution. The wide range of lumen packages and control and driver options make the BLTR a great choice for many applications including offices, schools, hospitals, retail spaces and other general lighting applications.

CONSTRUCTION — Universal end brackets are constructed of 22-gauge powder-painted steel and are secured to the host fixture with provided TEKS™ screws. The driver and light engine assembly is integrated in the BTLR door assembly making this an extremely "simple", time saving, relight solution. The door frame and reflector assembly is a made of cold-rolled steel and is painted after fabrication with a matte white powder paint for improved aesthetics and increased light diffusion. Diffuser trim rings provide an attractive mounting for integral sensors as well as adding a decorative element to the luminaire aesthetics.

LED boards and driver are accessible from below.

OPTICS — Volumetric illumination is achieved by creating an optimal mix of light to walls, partitions and vertical and horizontal work surfaces – rendering the interior space, objects and occupants in a more balanced, complimentary luminous environment. High performance extruded acrylic diffusers conceal LEDs and efficiently deliver light in a volumetric distribution. Four diffuser choices available - curved and square designs with linear prisms or a smooth frosted finish.

ELECTRICAL — Long-life LEDs, coupled with high-efficiency drivers, provide superior quantity and quality of illumination for extended service life. 80% LED lumen maintenance at 60,000 hours (L80/60,000).

Non-Configurable BLTR Relight: Generic 0-10 volt dimming driver. Dims to 10%

Configurable BLTR Relight: available in High Efficiency (HE) versions for applications where a lower wattage (over the standard product) is required. High Efficiency versions deliver >130 LPW and can be specified via the Lumen Package designations in the Ordering Information below.

eldoLED driver options deliver choice of dimming range, and choices for control, while assuring flicker-free, low-current inrush, 89% efficiency and low EMI.

Step-level dimming option allows system to be switched to 50% power for complaince with common energy codes while maintaining fixture appearance.

Optional integrated nLight®controls make each luminaire addressable - allowing it to digitally communicate with other nLight enabled controls such as dimmers, switches, nLight AIR RIO, RES7 occupancy sensors and photo controls. Simply connect all the nLight enabled control devices and the BLTR Relight assembly using standard Cat-5 cabling. Unique plug-and-play convenience as devices and luminaires automatically discover each other and self-commission. Lumen Management: Unique lumen management system (option N80) provides on board intelligence that actively manages the LED light source so that constant lumen output is maintained over the system life, preventing the energy waste created by the traditional practice of over-lighting. Driver disconnect provided where required to comply with US and Canadian codes.

Driver disconnect provided where required to comply with US and Canadian codes.

SENSOR— Integrated sensor (individual control): Sensor Switch MSD7ADCX ((Passive infrared (PIR)) or MSDPDT7ADCX ((PIR/Microphonics Dual Tech (PDT)) integrated occupancy sensor/automatic dimming photocell allows the luminaire to power off when the space is unoccupied or enough ambient light is entering the space. See page 4 for more details on the integrated sensor.

Integrated Sensor (nLight Wired Networking): This sensor is nLight-enabled, meaning it has the ability to communicate over an nLight network. When wired, using CAT-5 cabling, with other nLight-enabled sensors, power packs, or WallPods, an nLight control zone is created. Once linked to a Gateway, directly or via a Bridge, the zone becomes capable of remote status monitoring and control via SensorView software. See page 4 for the nLight sensor options.

Integrated Smart Sensor (nLight Air Wireless Platform): The rES7 sensor is nLight AIR enabled, meaning it has the ability to communicate over the wireless nLight control platform. It is available with an automatic dimming photocell, and either a digital PIR or microphonics (PDT) dual technology occupancy sensor. It pairs to other luminaires and wall switches through our mobile app, CLAIRITY™, which allows for simple sensor adjustment. See page 4 fore more details on the Integrated Smart Sensor.

INSTALLATION — After existing fluorescent components are removed from the host housing, universal end brackets are secured in place with TEKS™ screws. The BLTR's integrated driver and light engine door assembly can then be hinged to the universal end brackets and will hang in place for completion of assembly plug-in wiring. Rotate the doorframe assembly closed and pivot the cam latches to secure the doorframe in place. LED boards include plug-in connectors for easy replacement or servicing. Suitable for damp location installations. Damp location not available with sensor versions.

LISTINGS — UL/cUL Listed for use in fluorescent light fixtures. Installing Relight assemblies per instructions will not impact existing fixture UL listing. Tested to LM80 standards. DesignLights Consortium® (DLC) Premium qualified product. Not all versions of this product may be DLC Premium qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

WARRANTY — 5-year limited warranty. Complete warranty terms located at: www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

NOTE: Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C.

Specifications subject to change without notice.

2BLTR Series LED Relight

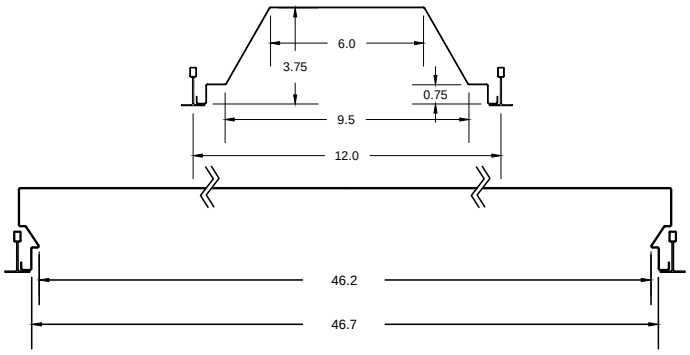
BLTR

1' x 4' Relight
LED

ATRIUS · eldoLED · nLIGHT

Fit Compatibility:

The BLT4R Relight Assembly was designed to upgrade recessed 1x4 fixtures, including most parabolic and lensed troffers from all major manufacturers. Dimensional requirements are below, but Lithonia Lighting recommends a trial installation prior to purchasing project quantities.



SIDE SECTION

A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks when ordered with drivers marked by a shaded background*
- This luminaire is part of an A+ Certified solution for nLight control networks, providing advanced control functionality at the luminaire level, when selection includes driver and control options marked by a shaded background*

To learn more about A+, visit www.acuitybrands.com/aplus.

*See ordering tree for details

BLT4R Volumetric Recessed Lighting 1'x4' Relight

A+ Capable options indicated by this color background.

ORDERING INFORMATION Lead times will vary depending on options selected. Consult with your sales representative.

Example: BLT4R 30L ADP EZ1 LP835

BLT4R

Series		Air Function		Lumens[2]				Diffuser		Voltage		Driver		Color temperature	
				Standard efficiency (>100 LPW)		**High efficiency[3] (>130 LPW)**									
BLT4R	1X4 BLTR	(blank)	Static (white end brackets for troffers)	20L	2000	20LHE	2000	ADP	Curved, linear prisms	(blank)	MVOLT	EZ1	eldoLED dims to 1% (0-10 volt dimming)	LP830	82CRI, 3000 K
		A	Air supply/ return or to maintain black reveal (black end brackets for parabolics)[1]	30L	3000	30LHE	3000	ADSM	Curved, smooth	120	120V	GZ1	Dims to 1% (0-10V dimming)[5]	LP835	82CRI, 3500 K
				40L	4000	40LHE	4000	SDP	Square, linear prisms	277	277V	GZ10	Dims to 10% (0-10V dimming)[5]	LP840	82CRI, 4000 K
				48L	4800	48LHE	4800	SDSM	Square, smooth	347	347V[4]	SLD	Step-level dimming[6]	LP850	82CRI, 5000 K
				60L	6000	60LHE	6000	**Diffusers w/ trim rings**				EOHN	On/Off (Non-dim)	LP930	90CRI, 3000K
								ADPT	Curved, linear prisms					LP935	90CRI, 3500K
								ADSMT	Curved, smooth					LP940	90CRI, 4000K
								SDPT	Square, linear prisms					LP950	90CRI, 5000K
								SDSMT	Square, smooth						

nLight Interface		Control[9]				Options	
nLight Wired		**nLight Wired**		**Individual Control**		EL7L	700 lumen battery pack[12]
(blank)	no nLight ® interface	(blank)	No sensor control	MSD7ADCX	PIR integral occupancy sensor with automatic dimming control photocell[11]	EL14L	1400 lumen battery pack[13]
N80	nLight with 80% lumen management	NES7	nLight™ nES 7 PIR integral occupancy sensor[10]	MSDPDT7ADCX	PDT integral occupancy sensor with automatic dimming control photocell[11]	E10WLCP	EM Self-Diagnostic battery pack, 10W Constant Power, CEC compliant
N80EMG	nLight with 80% lumen management For use with generator supply EM power[7]	NESPDT7	nLight™ nES PDT 7 dual technology integral occupancy control[10]			BGTD	Bodine Generator Transfer Device[14]
N100	nLight without lumen management	NES7ADCX	nLight™ nES 7 ADCX PIR integral occupancy sensor with automatic dimming photocell[10]			GLR	Fast-blowing fuse[15]
N100EMG	nLight without lumen management For use with generator supply EM power[7]	NESPDT7ADCX	nLight™ nES PDT 7 dual technology integral occupancy sensor with automatic dimming photocell[10]			GMF	Slow-blowing fuse[15]
nLight Wireless		**nLight Wireless**				NPLT	Narrow pallet
(blank)	no nLight ® interface	RES7	nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control			FAO	Field adjustable output[16]
NLTAIR2	nLight AIR Generation 2 enabled[8]	RES7PDT	nLight AIR microphonics dual technology occupancy sensor with automatic dimming photocell for Zone Control			USPOM	US Point of Manufacture
		RIO	nLight AIR radio module without sensor				

Accessories next page

Non-Configurable BLT

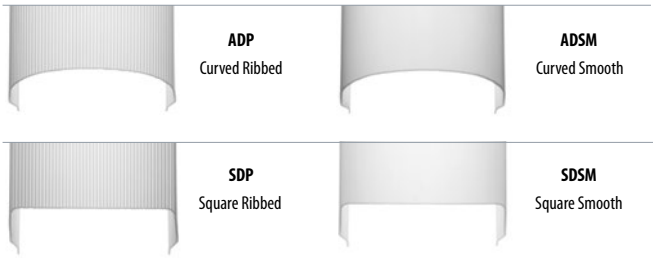
Stock	Catalog Description*	UPC	Lumens	Wattage	LPW	Color Temperature	Voltage	Pallet Qty
Stock	BLT4R 40L ADP LP835	190887551013	3975	34	116	3500K/82 CRI	120-277	30
	BLT4R 40L ADP LP840	190887551082	4062	34	119	4000K/82 CRI	120-277	30

* Dims to 10%

Notes

1 Consult factory for airflow data.
2 Approximate lumen output.
3 All versions may not achieve 130+ LPW. Refer to photometry on www.acuitybrands.com.
4 Not available with EL7L or EL14L battery packs.
5 GZ1, GZ10 not available with any Control or Sensor options.
6 Not available with N80, N80EMG, N100, N100EMG, NLTAIR2, or occupancy control.
7 nLight EMG option requires a connection to existing nLight network. Power is provided from a separate N80 or N100 enabled fixture.
8 Must order with RES7, RES7PDT, or RIO sensor. Only available with EZ1 driver.
9 Must specify diffuser with trim rings. See sensor options on page 4.
10 Requires N80, N80EMG, N100, or N100EMG.
11 Only available with EZ1 driver option. 0-10v dimming wires not accessible via access plate. Not available with Controls options.
12 Not available in 60L or 60LHE.
13 Not available in 48L, 60L, 48LHE, or 60LHE.
14 Requires BSE labeling. Consult factory for options.
15 Must specify voltage, 120 or 277 with GLR & GMF fusing.
16 Must specify EZ1 driver. FAO restricts use of external dimming controls. See chart on page 3 for additional details.

Multiple Diffuser Options



LED: One Lithonia Way Conyers, GA 30012 Phone: 800-858-7763 www.lithonia.com Rev. 05/22/18

BLT4R Volumetric Recessed Lighting 1'x4' Relight

nLight® AIR Control Accessories:
Order as separate catalog number. Visit www.acuitybrands.com/products/controls/nlightair.

Wall switches	Model number
On/Off single pole	rPODB [color] G2
On/Off two pole	rPODB 2P [color] G2
On/Off & raise/lower single pole	rPODB DX [color] G2
On/Off & raise/lower two pole	rPODB 2P DX [color] G2
On/Off & raise/lower single pole	rPODBZ DX WH G2

Application Guide

BLT4R — Typically used for lensed troffer installations. Assembly contains white end brackets and is supplied with white trim strips for use in closing gaps down fixture sides (installer's choice - not required).

**Note: This kit will fit in Lithonia's Avante non-air fixture.*

BLT4R A — Typically used for parabolic installations with black reveal. Assembly contains black end brackets to match black reveal around host housing. Does not interfere with host housing air supply/return if present (along fixture sides)..

rCMS[1] **Example: RCMS PDT 10 AR G2**

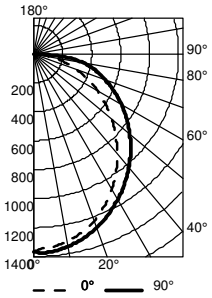
Series / Detection	Power Supply[1]	Occupancy Detection	Lens (Required)	Operating Mode	Generation
RCMS nLight AIR occupancy and daylight sensor	[blank] Power Supply ordered separately PS 150 Standard 150 mA Power Supply	[blank] PIR Detection PDT[2] Dual Tech PIR/ Microphonics	10 Large Motion/ Extended Range 360° 9 Small Motion/ Extended Range 360° 6 High Bay 360° Lens	[BLANK] None AR Auxiliary Relay	G2 Generation 2 compatibility

Notes
1 RCMS requires low voltage power from either RPP20 DS 24V G2 or PS150.

BLT4R Volumetric Recessed Lighting 1'x4' Relight

PHOTOMETRICS

BLT4R 40L ADP LP835, 3975 delivered lumens, test no. LTL28918P441, tested in accordance to IESNA LM-79



CP Summary

	0°	90
0°	1366	1366
5°	1340	1371
15°	1278	1318
25°	1156	1222
35°	991	1093
45°	801	945
55°	604	783
65°	410	614
75°	218	440
85°	54	180
90	6	3

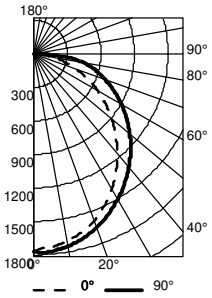
Coefficients of Utilization

	pf	20%								
	pc	80%			70%			50%		
RCR	pw	70%	50%	30%	50%	30%	10%	50%	30%	10%
	0	119	119	119	116	116	116	111	111	111
	1	108	103	98	100	96	92	96	92	89
	2	98	89	82	87	80	75	83	78	73
	3	89	78	69	76	68	62	73	66	61
	4	81	69	60	67	59	52	65	57	52
	5	75	61	52	60	52	45	58	50	44
	6	69	55	46	54	46	39	52	45	39
	7	64	50	41	49	41	35	48	40	34
	8	59	46	37	45	37	31	44	36	31
	9	56	42	34	41	33	28	40	33	28
	10	52	39	31	38	30	25	37	30	25

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Fixture
0° - 30°	1045	26.3	26.3
0° - 40°	1698	42.7	42.7
0° - 60°	2993	75.3	75.3
0° - 90°	3977	100.0	100.0
90° - 180°	0	0.0	0.0
0° - 180°	3977	100.0	100.0

BLT4R 48L ADP LP835, 5148 delivered lumens, test no. LTL28918P445, tested in accordance to IESNA LM-79



CP Summary

	0°	90
0°	1769	1769
5°	1735	1776
15°	1655	1707
25°	1497	1582
35°	1284	1416
45°	1038	1224
55°	782	1013
65°	531	795
75°	282	570
85°	70	233
90	8	3

Coefficients of Utilization

	pf	20%								
	pc	80%			70%			50%		
RCR	pw	70%	50%	30%	50%	30%	10%	50%	30%	10%
	0	119	119	119	116	116	116	111	111	111
	1	108	103	98	100	96	92	96	92	89
	2	98	89	82	87	80	75	83	78	73
	3	89	78	69	76	68	62	73	66	61
	4	81	69	60	67	59	52	65	57	52
	5	75	61	52	60	52	45	58	50	44
	6	69	55	46	54	46	39	52	45	39
	7	64	50	41	49	41	35	48	40	34
	8	59	46	37	45	37	31	44	36	31
	9	56	42	34	41	33	28	40	33	28
	10	52	39	31	38	30	25	37	30	25

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Fixture
0° - 30°	1353	26.3	26.3
0° - 40°	2200	42.7	42.7
0° - 60°	3875	75.3	75.3
0° - 90°	5150	100.0	100.0
90° - 180°	0	0.0	0.0
0° - 180°	5150	100.0	100.0

Performance Data

Lumen Package	Lumens	Input Watts	LPW
20L ADP LP830	2231	19	120
20L ADP LP835	2289	19	123
20L ADP LP840	2339	19	126
20L ADP LP850	2454	19	132
30L ADP LP830	3311	29	113
30L ADP LP835	3397	29	116
30L ADP LP840	3471	29	119
30L ADP LP850	3642	29	124
40L ADP LP830	3875	34	113
40L ADP LP835	3975	34	116
40L ADP LP840	4062	34	119
40L ADP LP850	4262	34	125
48L ADP LP830	5018	46	110
48L ADP LP835	5148	46	112
48L ADP LP840	5261	46	115
48L ADP LP850	5520	46	121
60L ADP LP830	5969	53	112
60L ADP LP835	6124	53	115
60L ADP LP840	6258	53	117
60L ADP LP850	6566	53	123

HE Performance Data

Lumen Package	Lumens	Input Watts	LPW
20LHE ADP LP835	1920	15	132
30LHE ADP LP835	3577	26	137
40LHE ADPT LP835	4195	32	132
48LHE ADP LP830	4701	36	131
48LHE ADP LP835	4822	36	134
48LHE ADP LP840	4929	36	137
48LHE ADP LP850	5171	36	144
60LHE ADP LP830	5400	42	129
60LHE ADP LP835	5540	42	132
60LHE ADP LP840	5662	42	135
60LHE ADP LP850	5941	42	141
30LHE ADP LP830	3286	25	131
30LHE ADP LP835	3371	25	135
30LHE ADP LP840	3445	25	138
30LHE ADP LP850	3614	25	145
40LHE ADP LP830	4062	32	127
40LHE ADP LP835	4167	32	130
40LHE ADP LP840	4259	32	133
40LHE ADP LP850	4469	32	140

LITHONIA LIGHTING®

Catalog Number	
Notes	
Type	

LDNRV

FEATURES & SPECIFICATIONS

INTENDED USE — LED downlight for retrofit of installed commercial mounting frames with incandescent, compact fluorescent (CFL), or high intensity discharge (HID) sources.

CONSTRUCTION — Innovative housing design that simultaneously retains and centers the fixture in the existing mounting frame.

See table for compatible ceiling opening and thickness ranges.

All installation can be performed from the room side without removing the existing mounting frame.

OPTICS — LEDs are binned to a 3-step SDCM; 80 CRI minimum. 90 CRI optional.

LED light source concealed with diffusing optical lens.

General illumination lighting with 1.0 S/MH and 55° cutoff to source and source image.

Multiple lumen packages to replace the installed base of CFL or HID sources with energy savings of 50%-80%. See Lumen Equivalency Chart.

Self-flanged anodized reflectors in specular, semi-specular, or matte diffuse finishes. Also available in white and black painted reflectors.

ELECTRICAL — Multi-volt (120-277V, 50/60Hz) eldoLED 0-10V dimming drivers available in 10% or 1% minimum dimming levels.

70% lumen maintenance at 60,000 hours.

LISTINGS — Certified to US and Canadian safety standards. Wet location standard (covered ceiling). IP55 rated. Some configurations are Energy Star certified, please visit www.energystar.gov for specific products

WARRANTY — 5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at:
www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C.
Specifications subject to change without notice.

Open and Wallwash LED RETROFIT

A+ Capable options indicated by this color background.

ORDERING INFORMATION

Lead times will vary depending on options selected. Consult with your sales representative.

Example: LDN6RV 35/30 LR6AR LSS MVOLT EZ10

Series		Color temperature		Lumens[1]				Aperture/Trim Color					
LDN4RV	4-5" retrofit	27/	2700K	05	500 lumens	40	4000 lumens	LR	Downlight	4	4-5" aperture	AR	Clear
LDN6RV	6" retrofit	30/	3000K	10	1000 lumens	50	5000 lumens	LRW	Wallwash	6	6" aperture	WR[2]	White
LDN7RV	7" retrofit	35/	3500K	15	1500 lumens	60	6000 lumens			7	7" aperture	BR[2]	Black
LDN8RV	8" retrofit	40/	4000K	20	2000 lumens	80	8000 lumens			8	8" aperture		
LDN9RV	9" retrofit	50/	5000K	25	2500 lumens	100	10000 lumens			9	9" aperture		
LDN10RV	10" retrofit			30	3000 lumens	120	12000 lumens			10	10" aperture		

Finish		Voltage		Driver		Options			
LSS	Semi-specular	MVOLT	Multi-volt	GZ10	0-10V driver dims to 10%	SF[3]	Single Fuse	LH[5]	Lower overall height
LD	Matte diffuse	120	120V	GZ1	0-10V driver dims to 1%	TRW[4]	White painted flange	NLTAIR2[6,7,8,9]	nLight® Air enabled
LS	Specular	277	277V	EZ10	eldoLED 10% 0-10V	TRBL[4]	Black painted flange	NLTAIRER2[6,7,8]	nLight® AIR Dimming Pack Wireless Controls. Controls fixtures on emergency circuit
				EZ1	eldoLED 1% 0-10V			NLTAIREM2[6,7,8]	nLight® AIR Dimming Pack Wireless Controls. Controls fixtures on emergency circuit with battery pack options.
								90CRI	High CRI (90+) available with 5000lm and below

Accessories: *Order as separate catalog number.*

EAC ISSM 375	Compact interruptible emergency AC power system
EAC ISSM 125	Compact interruptible emergency AC power system
RK2 SDT 347/120 75VA U	347V step-down transformer mounted in box installed by others up to 5000lm
RK2 SDT 347277120 395VA AD U	347V step down transformer mounted in box installed by others 6000-12,000lm
LDN_RVRGIN	Rough-in frame. Fill in blank with appropriate aperture size (Example: LDN6RVRGIN). Refer to pg. 6
nPP16 D EFP[3]	nLight network power/relay pack with 0-10V dimming for non-eldoLED drivers (GZ10, GZ1).
nPP16 D ER EFP[3]	nLight network power/relay pack with 0-10V dimming for non-eldoLED drivers (GZ10, GZ1). ER controls fixtures on emergency circuit.
NPS80EZ	nLight® dimming pack controls 0-10V eldoLED drivers (EZ10, EZ10).
NPS80EZER	nLight® dimming pack controls 0-10V eldoLED drivers (EZ10, EZ1). ER controls fixtures on emergency

Notes

1. Refer to Available Lumen Package Table for lumen range available per aperture size. 8"-10" trims utilize different trims based on lumen package selected. 5000lm and below supplied with low lumen ("LL") trim; 6000lm and above with high lumen ("HL") trim.
2. Not available with finishes.
3. Must specify voltage 120V or 277V.
4. Available with clear (AR) trim color only.
5. Select LH option for lower overall height. Consult table on Page 2 and dimensional drawings.
6. Not available with ELV, CP, NPS80EZ, NPS80EZER, NPP16D, NPP16DER or N80 options.
7. NLTAIR2, NLTAIRER2 and NLTAIREM2 not recommended for metal ceiling installations.
8. NLTAIR2, NLTAIRER2 and NLTAIREM2 refer to nLight AIR Max Lumens Table.
9. When combined with EZ1 or EZ10 drivers, can be used as a normal power sensing device for nLight AIR devices and luminaires with EM options

Available Lumen Package Table												
Series	500	1000	1500	2000	2500	3000	4000	5000	6000	8000	10000	12000
LDN4RV												
LDN6RV												
LDN7RV												
LDN8RV												
LDN9RV												
LDN10RV												
Approx. LED Wattage	8.5W	13W	20W	23W	30W	35W	44W	55W	68W	98W	117W	146W
Comparable Fluorescent	18W	26W	32W	1/42W 2/26W	2/32W 1/57W	>2/32W	2/42W	2/57W				
Comparable HID					50W	70W			100W	150W	>175W	250W
Comparable Incandescent	65W BR30	120W BR40	150W A21	200W A21		300W BR40						
Comparable Halogen PAR	50W	75W	90W	100W								

Dimensions*										
Series	Standard Height Max Lumens	Standard Height	LH Height Max Lumens	LH Height	Min Ceiling Opening	Ceiling Thickness at Min Opening	Max Ceiling Opening	Ceiling Thickness at Max Opening	Reflector Aperture	Reflector Flange Diameter
LDN4RV	2000LM	7-1/4"	N/A	N/A	4-7/8"	1/2"-1-1/2"	5-1/8"	1/2"-1-1/2"	4-5/8"	5-3/8"
LDN6RV	3000LM	8-1/4"	1500LM	6-1/2"	6"	1/2" - 2"	6-7/8"	1"-2"	5-1/4"	7-3/16"
LDN7RV	5000LM	8-7/8"	N/A	N/A	6-7/8"	1/2" - 2"	7-3/4"	1"-2"	6-1/4"	8-1/16"
LDN8RV	12,000LM	13 11/16"	5000LM	8-5/8" +	7-7/8"	1/2" - 2"	8-3/4"	3/4"-2"	7"	9-3/16"
LDN9RV	12,000LM	13 11/16"	4000LM	9-1/2"	8-7/8"	1/2" - 2"	9-7/8"	3/4"-2"	8-1/4"	11-7/16"
LDN10RV	12,000LM	13 11/16"	4000LM	9-1/2"	9-3/4"	3/4"-2"	10-3/4"	1"-2"	8-1/4"	11-7/16"

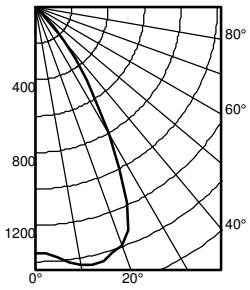
* All dimensions are inches + LH height 9-7/8" for 5000LM +Max ceiling thickness with NLTAIR2 option is 1.5"

NLIGHT AIR MAX LUMENS TABLE		
	Without LH Option	With LH Option
LDN4RV	2000lm	N/A
LDN6RV	3000lm	1500lm
LDN7RV	5000lm	N/A
LDN8RV	5000lm	5000lm
LDN9RV	5000lm	4000lm
LDN10RV	5000lm	4000lm

PHOTOMETRY

Distribution Curve	Distribution Data	Output Data	Coefficient of Utilization	Illuminance Data at 30" Above Floor for a Single Luminaire

LDN4RV 35/10 LR4AR LS, input watts: 10.58, delivered lumens: 1085.2, LM/W=102.57, Spacing criterion at 0=1.04. ISF 30712P544



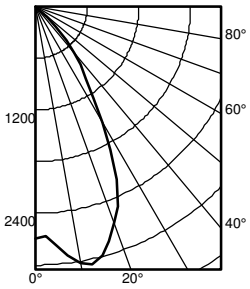
	Ave	Lumens
0	1353	
5	1382	134
15	1442	405
25	1191	525
35	491	308
45	69	68
55	1	2
65	1	1
75	0	0
85	0	0
90	0	

Zone	Lumens	% Lamp
0° - 30°	1064.0	73.7
0° - 40°	1372.4	95.1
0° - 60°	1443.1	100.0
0° - 90°	1443.8	100.0
90° - 120°	0.0	0.0
90° - 130°	0.0	0.0
90° - 150°	0.0	0.0
90° - 180°	0.0	0.0
0° - 180°	1443.8	*100.0
*Efficiency		

pf	80%			70%			50%		
pc									
pw	50%	30%	10%	50%	30%	10%	50%	30%	10%
0	119	119	119	116	116	116	111	111	111
1	111	108	106	109	107	105	105	103	101
2	103	99	96	102	98	95	98	95	93
3	96	92	88	95	91	87	92	89	86
4	90	85	81	89	84	80	87	83	79
5	85	79	75	84	78	74	82	77	74
6	79	73	69	79	73	69	77	72	68
7	75	69	64	74	68	64	73	68	64
8	70	64	60	70	64	60	69	63	60
9	66	60	56	66	60	56	65	60	56
10	63	57	53	62	57	53	61	56	53

Mounting Height	Inital FC Center Beam	50% beam - 55.6° Diameter	50% beam - 55.6° FC	10% beam - 78.0° Diameter	10% beam - 78.0° FC
8.0	44.7	5.8	22.4	8.9	4.5
10.0	24.1	7.9	12.0	12.2	2.4
12.0	15.0	10.0	7.5	15.4	1.5
14.0	10.2	12.1	5.1	18.6	1.0
16.0	7.4	14.2	3.7	21.9	0.7

LDN7RV 35/15 LR7AR LS, input watts: 17.52, delivered lumens: 1521.9, LM/W=86.86, Spacing criterion at 0=0.96. ISF 33918P308



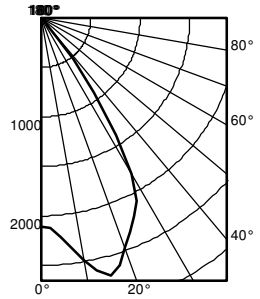
	Ave	Lumens
0	2693	
5	2782	274
15	2984	827
25	2212	991
35	1014	659
45	339	268
55	4	12
65	2	2
75	1	1
85	0	0
90	0	

Zone	Lumens	% Lamp
0° - 30°	2092.2	69.0
0° - 40°	2751.0	90.7
0° - 60°	3030.8	99.9
0° - 90°	3033.9	100.0
90° - 120°	0.0	0.0
90° - 130°	0.0	0.0
90° - 150°	0.0	0.0
90° - 180°	0.0	0.0
0° - 180°	3033.9	*100.0
*Efficiency		

pf	80%			70%			50%		
pc									
pw	50%	30%	10%	50%	30%	10%	50%	30%	10%
0	119	119	119	116	116	116	111	111	111
1	111	108	106	109	106	104	104	103	101
2	103	99	95	101	97	94	98	95	92
3	96	91	87	94	90	86	92	88	85
4	89	84	79	88	83	79	86	81	78
5	83	77	73	82	77	73	81	76	72
6	78	72	68	77	72	67	76	71	67
7	73	67	63	73	67	63	71	66	62
8	69	63	59	68	62	58	67	62	58
9	65	59	55	64	59	55	63	58	54
10	61	55	51	61	55	51	60	55	51

Mounting Height	Inital FC Center Beam	50% beam - 54.5° Diameter	50% beam - 54.5° FC	10% beam - 82.2° Diameter	10% beam - 82.2° FC
8.0	89.0	5.7	44.5	9.6	8.9
10.0	47.9	7.7	23.9	13.1	4.8
12.0	29.8	9.8	14.9	16.6	3.0
14.0	20.4	11.8	10.2	20.1	2.0
16.0	14.8	13.9	7.4	23.6	1.5

LDN8RV 35/30 LR8AR LS, input watts: 34.75, delivered lumens: 2641, LM/W=67.36, Spacing criterion at 0=1.18. ISF 192189P104



	Ave	Lumens
0	2111	
5	2223	221
15	2701	738
25	2208	1006
35	927	590
45	58	67
55	17	15
65	2	2
75	1	1
85	0	0
90	0	

Zone	Lumens	% Lamp
0° - 30°	1965.5	74.4
0° - 40°	2555.6	96.8
0° - 60°	2637.1	99.9
0° - 90°	2640.7	100.0
90° - 120°	0.0	0.0
90° - 130°	0.0	0.0
90° - 150°	0.0	0.0
90° - 180°	0.3	0.0
0° - 180°	2641.0	*100.0
*Efficiency		

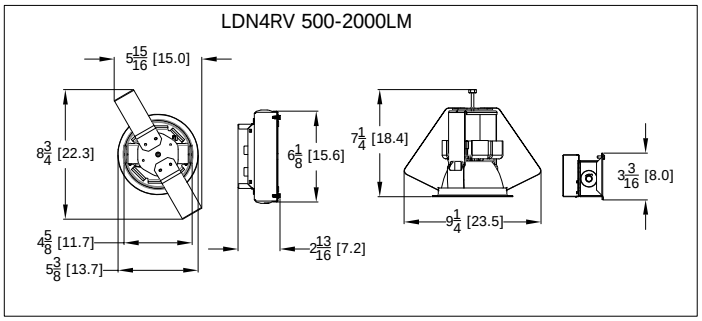
pf	80%			70%			50%		
pc									
pw	50%	30%	10%	50%	30%	10%	50%	30%	10%
0	119	119	119	116	116	116	111	111	111
1	111	108	106	109	107	105	105	103	101
2	103	99	96	102	98	95	98	95	93
3	96	92	88	95	91	87	92	89	86
4	90	85	81	89	84	80	87	83	79
5	84	79	74	84	78	74	82	77	73
6	79	73	69	78	73	69	77	72	68
7	74	69	64	74	68	64	73	68	64
8	70	64	60	70	64	60	68	63	60
9	66	60	56	66	60	56	65	60	56
10	62	57	53	62	56	53	61	56	53

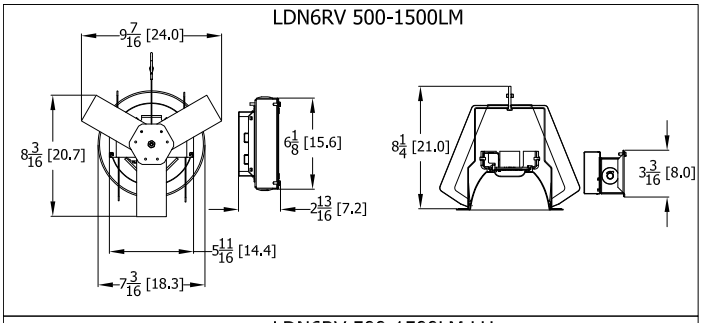
Mounting Height	Inital FC Center Beam	50% beam - 61.8° Diameter	50% beam - 61.8° FC	10% beam - 76.6° Diameter	10% beam - 76.6° FC
8.0	69.8	6.6	34.9	8.7	7.0
10.0	37.5	9.0	18.8	11.8	3.8
12.0	23.4	11.4	11.7	15.0	2.3
14.0	16.0	13.8	8.0	18.2	1.6
16.0	11.6	16.2	5.8	21.3	1.2

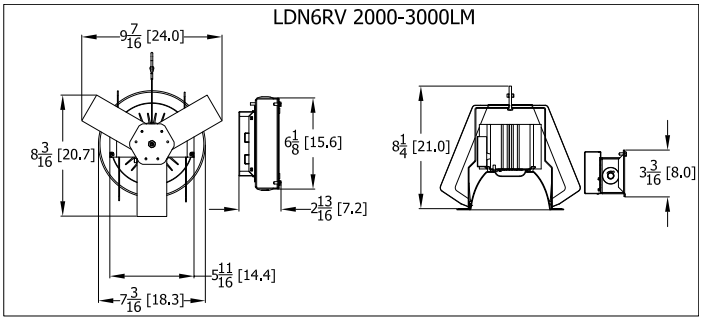
LUMEN OUTPUT MULTIPLIERS - FINISH			
	Clear (AR)	White (WR)	Black (BR)
Specular (LS)	1.0	N/A	N/A
Semi-specular (LSS)	0.950	N/A	N/A
Matte diffuse (LD)	0.85	N/A	N/A
Painted	N/A	0.87	0.73

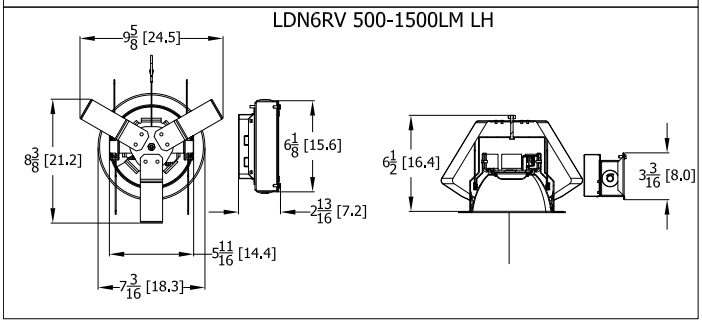
LUMEN OUTPUT MULTIPLIERS - CCT				
	2700K	3000K	3500K	4000K
80CRI	0.950	0.966	1.000	1.025

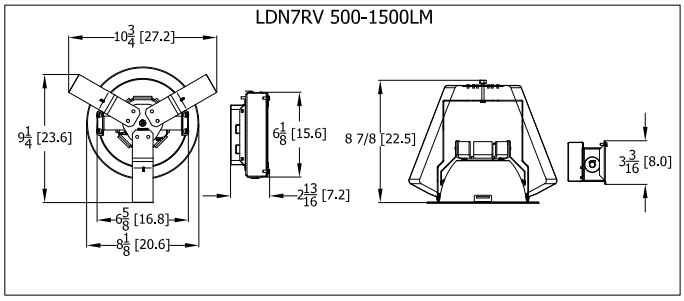
LDN4RV

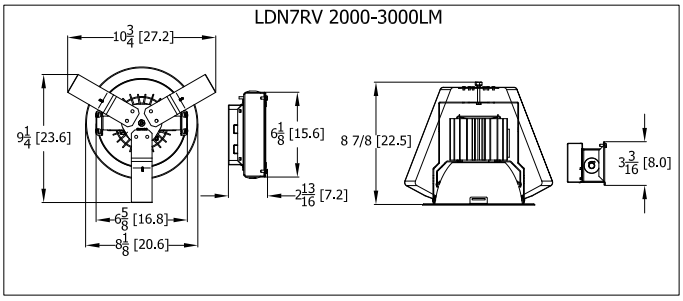


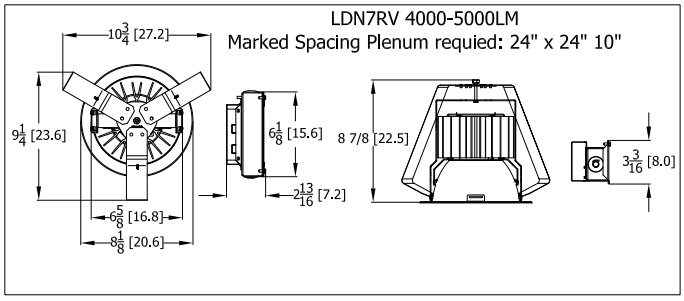












LITHONIA LIGHTING®

Catalog Number	
Notes	
Type	

DIGITAL NAVIGATION

Ordering Tree nLight Platform Sensor Switch JOT Photometrics Performance Data Drawings

EPANL LED

1'x4', 2'x2', and 2'x4'

FEATURES & SPECIFICATIONS

INTENDED USE — The EPANL Series LED Edge-Lit Flat Panel provides a fully luminous appearance across the face of the lens. This provides a soft, glare-free solution that is visually comfortable within the space. Suitable for many lighting applications including schools, offices and other commercial spaces, retail, convenience stores, hospitals and healthcare facilities. **Certain airborne contaminants can diminish the integrity of acrylic and/or polycarbonate.** **Click here for Acrylic-Polycarbonate Compatibility table for suitable uses.**

CONSTRUCTION — Built to last with an aluminum frame for strength and durability, the seamless frame prevents light leak in the corners. The PMMA light guide plate and lens resists yellowing and transmits light with superior efficacy. The satin white lens provides excellent shielding and fully luminous appearance. EPANL's low-profile design provides increased installation flexibility especially in restricted plenum spaces. The back plate includes integral T-bar clips for installation into 15/16" or 9/16" T-grid ceilings. Fixture may be recessed, suspended, surface box mounted or mounted in a hard-ceiling see accessories section for more information. Fixture may be mounted and wired in continuous rows.

Integrated Sensor (nLight Wired Networking): This sensor is nLight-enabled, meaning it has the ability to communicate over an nLight network. When wired, using CAT-5 cabling, with other nLight-enabled sensors, power packs, or WallPods, an nLight control zone is created. Once linked to a Gateway, directly or via a Bridge, the zone becomes capable of remote status monitoring and control via SensorView software.

Integrated Smart Sensor (nLight Air Wireless Platform): The RES7 sensor is nLight AIR enabled, meaning it has the ability to communicate over the wireless nLight control platform. It is available with an automatic dimming photocell, and either a digital PIR or a microphonics (PDT) dual technology occupancy sensor. It pairs to other luminaires and wall switches through our mobile app, CL**AIR**ITY+, which allows for simple sensor adjustment.

Integrated Wireless Sensor (single room control): Sensor Switch VERTEX JOT or JOTVTX15 luminaire-embedded occupancy and ambient light sensor allows the luminaire to power off when the space is unoccupied or when enough ambient light is entering the space. See page 7 for more details on the integrated wireless sensor.

ELECTRICAL — Long-life LEDs, coupled with a high-efficiency driver, provide superior illumination for extended service life. See page 3 for detailed lumen maintenance information. 0-10V dimming driver, dims to 1% or 10% and contains non-isolated dimming leads.

LISTINGS — CSA Certified to meet US and Canadian standards. Tested to meet UL1958. Intended for indoor use only. Product is not to be stored in non-climate controlled spaces. DesignLights Consortium® (DLC) Premium qualified product and DLC qualified product. Not all versions of this product may be DLC Premium qualified or DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified. Damp location listed. IC rated. IP5X rated. Long nomenclature, configurable product is rated for NSF/ANSI Standard 2 - Light Fixture for Splash Zone and Non Food Zone. Tested in accordance with ISO 14644-1; suitable for ISO Class 5–9 positive and negative pressure clean rooms. Suitable for ambient temperatures from 32°F (0°C) to 77°F (25°C).

WARRANTY — 5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C.
Specifications subject to change without notice.

Dimensions

	1x4	2x2	2x4
Length	47.72"	23.70"	47.72"
Width	11.85"	23.70"	23.70"
Depth	2.19"	2.19"	2.19"
Weight	13.9 lbs	7.4 lbs	15.1 lbs

* Base configurations; options may add weight

Embed nLight controls today. Prepare for tomorrow.

Now	Tomorrow
User-friendly install	Scalability
Enhanced energy savings	Space configuration
Code compliance	Future-ready

A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks when ordered with drivers marked by a shaded background*
- This luminaire is part of an A+ Certified solution for nLight control networks, providing advanced control functionality at the luminaire level, when selection includes driver and control options marked by a shaded background*

To learn more about A+, visit www.acuitybrands.com/aplus.

*See ordering tree for details

EPANL LED Flat Panel

A+ Capable options indicated by this color background.

ORDERING INFORMATION

Example: EPANL 2X4 4000LM 80CRI 35K MIN1 MVOLT E10WCP NLTAIR2 RIO

Series	Width and Length	Lumens		CRI	Color Temperature	Minimum Dimming Level ‡
		Standard Lumens:	High Efficiency Lumens:			
EPANL LED Flat Panel	1x4 1'x4'	1500LM 1500 Lumens	1500LMHE 1500 Lumens	80CRI 80 CRI	30K 3000K	MIN10 Dims to 10% ‡
		3000LM 3000 Lumens	3000LMHE 3000 Lumens		35K 3500K	MIN1 Dims to 1%
		4000LM 4000 Lumens	4000LMHE 4000 Lumens		40K 4000K	
		4800LM 4800 Lumens	4800LMHE 4800 Lumens		50K 5000K	
		6000LM 6000 Lumens	6000LMHE 6000 Lumens			
	2x2 2'x2'	2000LM 2000 Lumens	2000LMHE 2000 Lumens			
		3400LM 3400 Lumens	3400LMHE 3400 Lumens			
		4000LM 4000 Lumens	4000LMHE 4000 Lumens			
		4800LM 4800 Lumens	4800LMHE 4800 Lumens			
	2x4 2'x4'	3000LM 3000 Lumens	3000LMHE 3000 Lumens			
		4000LM 4000 Lumens	4000LMHE 4000 Lumens			
		4800LM 4800 Lumens	4800LMHE 4800 Lumens			
		5400LM 5400 Lumens	5400LMHE 5400 Lumens			
		6000LM 6000 Lumens	6000LMHE 6000 Lumens			
		6800LM 6800 Lumens	6800LMHE 6800 Lumens			
		7200LM 7200 Lumens	7200LMHE 7200 Lumens			

Dimming ‡		Voltage		Step Level Dimming		Emergency Option	
ZT	Generic 0-10V Dimming	MVOLT	120-277V	(Blank)	None	E10WCP	EM Self-Diagnostic battery pack, 10W Constant Power, Certified in CA Title 20 MAEDBS ‡
EZT	eldoLED 0-10V Dimming	120	120V	SLD	Step Level Dimming ‡	GTD	Generator Transfer Device ‡
DALI	eldoLED DALI	277	277V			EMG	for use with NLIGHT or NLTAIR2 on generator supply EM power ‡
		347	347V ‡				

Control Options

Control Input

nLight Wired:

NLIGHT	nLight enabled, no constant lumen management
CL80 NLIGHT	nLight enabled, constant lumen output 80%

nLight Wireless:

NLTAIR2	nLight AIR Generation 2 enabled ‡

Control

nLight Wired: ‡

(blank)	no control

nLight Wireless:

RIO	nLight AIR Radio module without sensor ‡
RES7	nLight AIR control with PIR integral occupancy sensor and automatic dimming photocell ‡
RES7PDT	nLight AIR control with PDT dual technology integral occupancy sensor and automatic dimming photocell ‡

Individual Control

JOT	Wireless room control with "Just One Touch" pairing ‡
JOTVTX15	Wireless occupancy sensor with "Just One Touch" pairing ‡

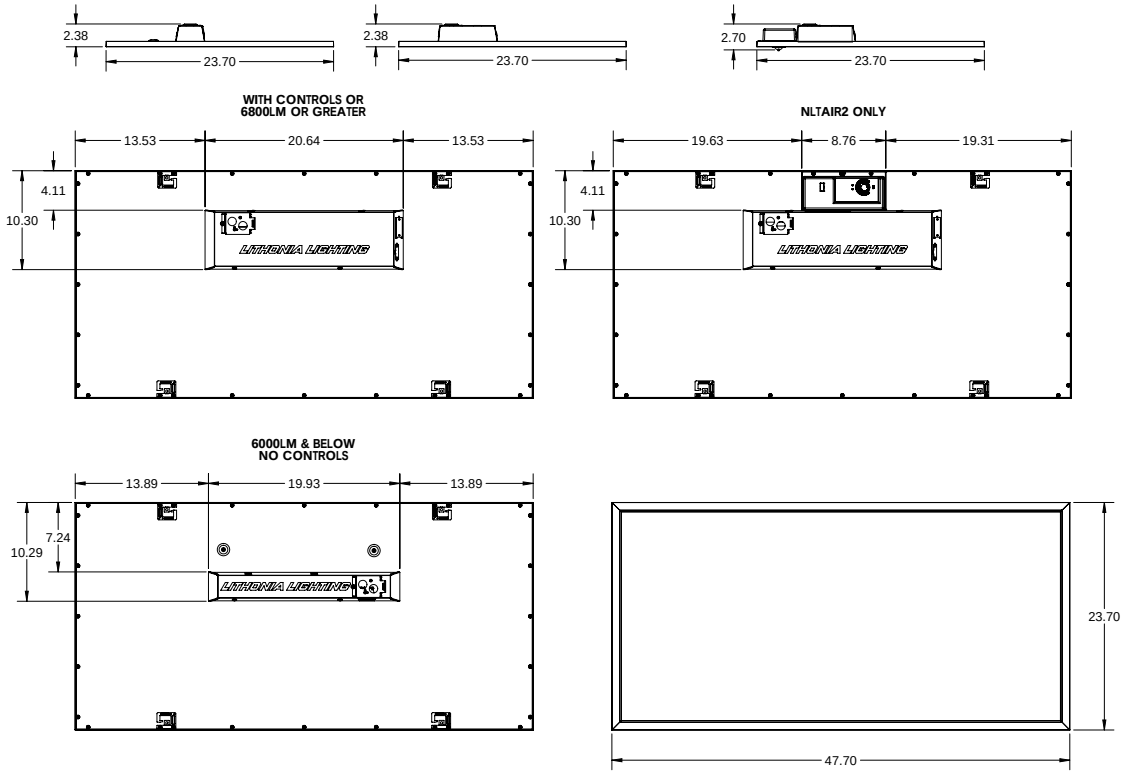
Options

GLR	Fast-blowing fuse ‡	PWS1856LV	6' pre-wire, 3/8" diameter, 18 gauge, 1 circuit w/low voltage wires ‡
GMF	Slow-blowing fuse ‡	CP	Chicago plenum ‡
PWS1836	6' pre-wire, 3/8" diameter, 18 gauge, 1 circuit	NPLT	Narrow Pallet
PWS1846	6' pre-wire, 3/8" diameter, 18 gauge, 2 circuit	BDP	Factory Installed Ballast Disconnect Plug
PWS1846 PWSLV	Two cables: one 6' pre-wire, 3/8" diameter, 18 gauge, 2 circuits; one 6' pre-wire, 3/8" diameter, 18 gauge ‡	RRL_	RELOC®-ready luminaire ‡

NOTE: ‡ indicates option value has ordering restrictions. Please reference the Option Value Ordering Restictions chart on the next page. Options are sorted alphanumerically.

DIMENSIONS (continued)

2X4 Configurations



LITHONIA LIGHTING®

Catalog Number
Notes
Type

FEATURES & SPECIFICATIONS

INTENDED USE — Wet location, recessed LED troffer for general illumination of demanding environments subject to dust and moisture. Typical applications include shower areas, bathrooms, recreational facilities and canopies.

Certain airborne contaminants may adversely affect the functioning of LEDs and other electronic components, depending on various factors such as concentrations of the contaminants, ventilation, and temperature at the end-user location. Click here for a list of substances that may not be suitable for interaction with LEDs and other electronic components.

CONSTRUCTION — Housing is made from 20-gauge cold rolled steel. Door frame is .060 painted aluminum and lens is diffused acrylic. Gasket is closed cell neoprene.

Finish: All CRS (cold rolled steel) and aluminum parts are finished with electrostatically deposited, thermally set, polyester powder paint after fabrication. Door frame finish available in black, white and silver colors. Enclosure finish available in white, Antimicrobial white and super-durable white.

OPTICS — Long-life LEDs, coupled with high-efficiency drivers, provide extended service life. Lumen maintenance of L80/60,000 hours, L70>100,000 hours.

ELECTRICAL — Thermally protected, resetting, Class P, HPF, non-PCB, UL listed, CSA certified driver is standard.

LED driver delivers dimming from a 0-10V control signal. Dims to 1% standard.

Luminaire Surge Protection Level: Designed to withstand up to 6kV/3kA per ANSI C82.77-5-2015.

INSTALLATION — Lay-in grid or in-ceiling sheet rock installation using swing-arms with range from 1" to 2" grid height. See drawings for other critical dimensions. Swing-arms are not intended to secure fixture without additional support. Line voltage supply wiring entrance opening is 7/8".

LISTINGS — CSA certified to meet U.S. and Canadian standards (UL1598 and UL8750) or NOM Certified. IC rated. Wet location listed. FPA option: NSF Splash Zone 2 (overlap door only).

BUY AMERICAN — Product with the BAA option is assembled in the USA and meets the BuyAmerica(n) government procurement requirements under FAR, DFARS and DOT. Please refer to www.acuitybrands.com/buy-american for additional information.

For use in ambient temperatures ranging from -4°F (-20°C) to 104°F (40°C) with the exception of 10000LM(1X4) 12000LM(2X2) and 24000LM(2X4). These lumen packages are for use in ambient temperatures ranging from -4°F (-20°C) to 77°F (25°C).

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

WARRANTY — 5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C.

Specifications subject to change without notice.

LED Recessed Wet Location Troffer

WRTL

2x2

2x4

1x4

Buy American

A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks marked by a shaded background*

To learn more about A+, visit www.acuitybrands.com/aplus.

*See ordering tree for details

WRTL LED Recessed Wet Location Troffer

A+ Capable options indicated by this color background.

ORDERING INFORMATION Lead times will vary depending on options selected. Consult with your sales representative.

Example: 2WRTL G L48 18000LM IAW AFL 277 EZ1 40K 80CRI WH

Series		Trim type		Length		Nominal Lumens‡					
WRTL	Recessed wet location troffer, 1' wide‡	G	Grid (9/16" - 1 1/2" W x 2" H)	L24	24"	1x4:		2x2:		2x4:	
2WRTL	Recessed wet location troffer, 2' wide	F	Flange	L48	48"	3000LM	3,000 lumens	3000LM	3,000 lumens	3000LM	3,000 lumens
						5000LM	5,000 lumens	5000LM	5,000 lumens	5000LM	5,000 lumens
						7000LM	7,000 lumens‡	7000LM	7,000 lumens	7000LM	7,000 lumens
						10000LM	10,000 lumens‡	10000LM	10,000 lumens‡	10000LM	10,000 lumens
								12000LM	12,000 lumens‡	15000LM	15,000 lumens‡
										18000LM	18,000 lumens‡
										24000LM	24,000 lumens‡

Door frame		Diffuser type		Voltage		Driver		Color temperature		Color rendering index	
OAW	Overlapping aluminum, white	AFL	Acrylic, frosted (.080" Thick)	MVOLT	120-277V	EZ1	eldoLED 0-10V ECOdrive. Linear dimming to 1% min.	30K	3000 K	80CRI	80 CRI
OAN	Overlapping aluminum, silver			120	120V	GZ1	0-10V dimming‡	35K	3500 K	90CRI	90 CRI
OAM	Overlapping aluminum, black			277	277V			40K	4000 K		
IAW	Inset aluminum, white			347	347V‡			50K	5000 K		
IAN	Inset aluminum, silver										
IAM	Inset aluminum, black										

Options				Finish‡	
BGTD	Generator tranfser device‡	Individual Controls: ‡		WH	White
PS1050	Emergency battery pack, 10W, CA Title 20 noncompliant ‡	MSE6NWL	Embedded high mount 360° motion sensor, wet location, On/Off operation	DWAM	Antimicrobial, white
E10WLCP	EM Self-diagnostics battery pack, 10W, Constant Power Certified in CA Title 20 MAEDBS‡	MSE62L3VWL	Embedded high mount 360° motion sensor, wet location, High/Low operation (2-level)	DWHXD	Super durable, white
SF	Single fusing	MSE6NWL DSCNWL	Embedded high mount 360° motion sensor, wet location, On/Off operation from motion sensing, Override Off due to daylight		
FPA	Food processing area‡	MSE10NWL	Embedded low mount 360° motion sensor, wet location, On/Off operation		
ST3	Constructed with US steel	MSE102L3VWL	Embedded low mount 360° motion sensor, wet location, High/Low operation (2-level)		
BAA	Buy America(n) Act Compliant	MSE10NWL DSCNWL	Embedded low mount 360° motion sensor, wet location, On/Off operation from motion sensing, Override Off due to daylight		
		nLight:‡			
		nPS80EZ	nLight® dimming pack controls, 0-10V eldoLED driver		

CONFIGURATIONS

Lumens	1' X 4'	2' X 2'	2' X 4'
3,000LM	X	X	X
5,000LM	X	X	X
7,000LM	X	X	X
10,000LM	X	X	X
12,000LM		X	
15,000LM			X
18,000LM			X
24,000LM			X

INDUSTRIAL: One Lithonia Way, Conyers, GA 30012 Phone: 1-800-705-SERV (7378) www.lithonia.com

 Rev. 04/12/22

OPERATIONAL DATA

WRTL L48 (1' x 4')	Lumen Packages	Wattage	Delivered Lumens (AFL)
30K 80CRI	3000LM	26.8	3115
	5000LM	44.0	5134
	7000LM	58.6	6598
	10000LM	87.6	9962
35K 80CRI	3000LM	26.8	3184
	5000LM	44.0	5248
	7000LM	58.6	6745
	10000LM	87.6	10184
40K 80CRI	3000LM	26.8	3234
	5000LM	44.0	5330
	7000LM	58.6	6850
	10000LM	87.6	10343
50K 80CRI	3000LM	26.8	3353
	5000LM	44.0	5526
	7000LM	58.6	7102
	10000LM	87.6	10724

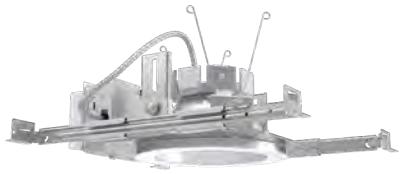
2WRTL L24 (2' x 2')	Lumen Packages	Wattage	Delivered Lumens (AFL)
30K 80CRI	3000LM	26.6	2848
	5000LM	41.8	4526
	7000LM	60.6	6814
	10000LM	87.6	9653
	12000LM	109.6	11739
35K 80CRI	3000LM	26.6	2912
	5000LM	41.8	4627
	7000LM	60.6	6966
	10000LM	87.6	9868
	12000LM	109.6	12001
40K 80CRI	3000LM	26.6	2957
	5000LM	41.8	4699
	7000LM	60.6	7074
	10000LM	87.6	10022
	12000LM	109.6	12188
50K 80CRI	3000LM	26.6	3066
	5000LM	41.8	4872
	7000LM	60.6	7334
	10000LM	87.6	10391
	12000LM	109.6	12637

2WRTL L48 (2' x 4')	Lumen Packages	Wattage	Delivered Lumens (AFL)
30K 80CRI	3000LM	21.5	2627
	5000LM	38.7	4632
	7000LM	58.5	6807
	10000LM	80.0	9377
	15000LM	121.1	13871
	18000LM	148.8	16780
	24000LM	204.1	22293
35K 80CRI	3000LM	21.5	2685
	5000LM	38.7	4735
	7000LM	58.5	6959
	10000LM	80.0	9586
	15000LM	121.1	14180
	18000LM	148.8	17154
	24000LM	204.1	22790
40K 80CRI	3000LM	21.5	2727
	5000LM	38.7	4809
	7000LM	58.5	7067
	10000LM	80.0	9735
	15000LM	121.1	14401
	18000LM	148.8	17421
	24000LM	204.1	23145
50K 80CRI	3000LM	21.5	2827
	5000LM	38.7	4986
	7000LM	58.5	7327
	10000LM	80.0	10093
	15000LM	121.1	14931
	18000LM	148.8	18062
	24000LM	204.1	23997

LITHONIA LIGHTING®

Catalog Number	
Notes	
Type	

LDN6



6" Open and WallWash LED
Non-IC
New Construction Downlight

FEATURES & SPECIFICATIONS

INTENDED USE — Typical applications include corridors, lobbies, conference rooms and private offices.

CONSTRUCTION — Galvanized steel mounting/plaster frame; galvanized steel junction box with bottom-hinged access covers and spring latches. Reflectors are retained by torsion springs.
Vertically adjustable mounting brackets with commercial bar hangers provide 3-3/4" total adjustment.
Two combination ½"-3/4" and four ½" knockouts for straight-through conduit runs. Capacity: 8 (4 in, 4 out). No. 12 AWG conductors, rated for 90°C.
Accommodates 12"-24" joist spacing.
Passive cooling thermal management for 25°C standard; high ambient (40°C) option available. Light engine and drivers are accessible from above or below ceiling.
Max ceiling thickness 1-1/2".

OPTICS — LEDs are binned to a 3-step SDCM; 80 CRI minimum. 90 CRI optional.
LED light source concealed with diffusing optical lens.
General illumination lighting with 1.0 S/MH and 55° cutoff to source and source image.
Self-flanged anodized reflectors in specular, semi-specular, or matte diffuse finishes. Also available in white and black painted reflectors.

ELECTRICAL — Multi-volt (120-277V, 50/60Hz) 0-10V dimming drivers mounted to junction box, 10% or 1% minimum dimming level available.
0-10V dimming fixture requires two (2) additional low-voltage wires to be pulled.
70% lumen maintenance at 60,000 hours.

LISTINGS — Certified to US and Canadian safety standards. Wet location standard (covered ceiling). IP55 rated. ENERGY STAR® certified product.

BUY AMERICAN — Product with the BAA option is assembled in the USA and meets the Buy America(n) government procurement requirements under FAR, DFARS and DOT. Please refer to www.acuitybrands.com/buy-american for additional information.

WARRANTY — 5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C.
Specifications subject to change without notice.

A+ Capable options indicated by this color background.

Buy American

battery pack

ENERGY STAR

ORDERING INFORMATION

Lead times will vary depending on options selected. Consult with your sales representative.

Example: LDN6 35/15 LO6AR LSS MVOLT EZ10

LDN6													
Series		**Color temperature**		**Lumens**[1]				**Aperture/Trim Color**				**Finish**		**Voltage**	
LDN6	6" round	27/	2700K	05	500 lumens	25	2500 lumens	LO6	Downlight	AR	Clear	LSS	Semi-specular	MVOLT	Multi-volt
		30/	3000K	07	750 lumens	30	3000 lumens	LW6	Wallwash	WR[2]	White	LD	Matte diffuse	120	120V
		35/	3500K	10	1000 lumens	40	4000 lumens			BR[2]	Black	LS	Specular	277	277V
		40/	4000K	15	1500 lumens	50	5000 lumens							347[3]	347V
		50/	5000K	20	2000 lumens										

Driver		Options			
GZ10	0-10V driver dims to 10%	SF[4]	Single fuse	N80[8]	nLight™ Lumen Compensation
GZ1	0-10V driver dims to 1%	TRW[5]	White painted flange	JOT[13]	Wireless room control with "Just One Touch" pairing
D10	Minimum dimming 10% driver for use with JOT	TRBL[5]	Black painted flange	NPS80EZ[7]	nLight® dimming pack controls 0-10V eldoLED drivers (EZ10, EZ1).
D1	Minimum dimming 1% driver for use with JOT	EL[6]	Emergency battery pack with integral test switch. 10W Constant Power, Not Certified in CA Title 20 MAEDBS	NPS80EZER[7]	nLight® dimming pack controls 0-10V eldoLED drivers (EZ10, EZ1). ER controls fixtures on emergency circuit.
EZ10	0-10V eldoLED driver with smooth and flicker-free deep dimming performance down to 10%	ELR[6]	Emergency battery pack with remote test switch. 10W Constant Power, Not Certified in CA Title 20 MAEDBS	HAO[11]	High ambient option
EZ1	0-10V eldoLED driver with smooth and flicker-free deep dimming performance down to 1%	ELSD[6]	Emergency battery pack with self-diagnostics, integral test switch. 10W Constant Power, Not Certified in CA Title 20 MAEDBS	CP[12]	Chicago Plenum
EDAB	eldoLED DALI SOLDRIVE dim to dark	ELRSD[6]	Emergency battery pack with self-diagnostics, remote test switch. 10W Constant Power, Not Certified in CA Title 20 MAEDBS	RRL__	RELOC®-ready luminaire connectors enable a simple and consistent factory installed option across all ABL luminaire brands. Available only in RRLA, RRLB, RRLAE, and RRLC12S. Refer to RRL spec sheet on www.acuitybrands.com for the RELOC product specifications.
		E10WCP[6]	Emergency battery pack, 10W Constant Power with integral test switch. Certified in CA Title 20 MAEDB	NLTAIR2[9, 10, 14]	nLight® Air enabled
		E10WCPR[6]	Emergency battery pack, 10W Constant Power with remote test switch. Certified in CA Title 20 MAEDB	NLTAIRER2[9, 10]	nLight® AIR Dimming Pack Wireless Controls. Controls fixtures on emergency circuit, not available with battery pack options
		NPP16D[7]	nLight® network power/relay pack with 0-10V dimming for non-eldoLED drivers (GZ10, GZ1).	NLTAIREM2[9, 10]	nLight® AIR Dimming Pack Wireless Controls. UL924 Emergency Operation, via power interrupt detection. Available with battery pack options.
		NPP16DER[7]	nLight® network power/relay pack with 0-10V dimming for non-eldoLED drivers (GZ10, GZ1). ER controls fixtures on emergency circuit.	BAA	Buy America(n) Act Compliant
				90CRI	High CRI (90+)

Accessories: *Order as separate catalog number.*

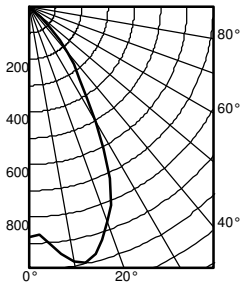
PS1055CP	FMC Power Sentry batterypack, T20 compliant, field installable, 10w constant power
EAC ISSM 375	Compact interruptible emergency AC power system
EAC ISSM 125	Compact interruptible emergency AC power system
GRA68 JZ	Oversized trim ring with 8" outside diameter
SCA6	Sloped Ceiling Adapter. Degree of slope must be specified (5D, 10D, 15D, 20D, 25D, 30D). Ex: SCA6 10D

Notes
1 Overall height varies based on lumen package; refer to dimensional chart on page 3.
2 Not available with finishes.
3 Not available with emergency options.
4 Must specify voltage 120V or 277V.
5 Available with clear (AR) reflector only.
6 12.5" of plenum depth or top access required for battery pack maintenance.
7 Specify voltage. ER for use with generator supply EM power. Will require an emergency hot feed and normal hot feed.
8 Fixture begins at 80% light level. Must be specified with NPS80EZ or NPS80EZ ER. Only available with EZ10 and EZ1 drivers.
9 Not available with CP, NPS80EZ, NPS80EZER, NPP16D, NPP16DER or N80 options.
10 NLTAIR2, NLTAIRER2 and NLTAIREM2 not recommended for metal ceiling installations.
11 Fixture height is 6.5" for all lumen packages with HAO.
12 Must specify voltage for 3000lm and above. 5000lm with marked spacing 24 L x 24 W x 14 H. Not available with emergency battery pack option.
13 Must specify D10 or D1 driver. Not available with nLight options. Not available with CP. Not recommended for metal ceiling installation. Not for use with emergency backup power systems other than battery packs.
14 When combined with EZ1 or EZ10 drivers, can be used as a normal power sensing device for nLight AIR devices and lumiaires with EM options.

PHOTOMETRY

Distribution Curve | **Distribution Data** | **Output Data** | **Coefficient of Utilization** | **Illuminance Data at 30" Above Floor for a Single Luminaire**

LDN6 35/10 LO6AR, input watts: 10.44, delivered lumens: 987.10, LM/W = 94.54, spacing criterion at 0= 1.02, test no. ISF 30716P262.



	Ave	Lumens
0	876	
5	905	89
15	971	269
25	720	322
35	330	214
45	110	87
55	1	4
65	1	1
75	0	0
85	0	0
90	0	

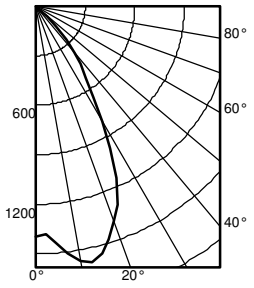
Zone	Lumens	% Lamp
0° - 30°	680.7	69.0
0° - 40°	895.0	90.7
0° - 60°	986.0	99.9
0° - 90°	987.0	100.0
90° - 120°	0.0	0.0
90° - 130°	0.0	0.0
90° - 150°	0.0	0.0
90° - 180°	0.0	0.0
0° - 180°	987.0	*100.0

*Efficiency

pf	20%								
pc	80%			70%			50%		
pw	50%	30%	10%	50%	30%	10%	50%	30%	10%
0	119	119	119	116	116	116	111	111	111
1	111	108	106	109	106	104	104	103	101
2	103	99	95	101	97	94	98	95	92
3	96	91	87	94	90	86	92	88	85
4	89	84	79	88	83	79	86	81	78
5	83	77	73	82	77	73	81	76	72
6	78	72	68	77	72	67	76	71	67
7	73	67	63	73	67	63	71	66	62
8	69	63	59	68	62	58	67	62	58
9	65	59	55	64	59	55	63	58	54
10	61	55	51	61	55	51	60	55	51

		50% beam - 54.5°		10% beam - 82.2°	
Mounting Height	Inital FC Center Beam	Diameter	FC	Diameter	FC
8.0	29.0	5.7	14.5	9.6	2.9
10.0	15.6	7.7	7.8	13.1	1.6
12.0	9.7	9.8	4.9	16.6	1.0
14.0	6.6	11.8	3.3	20.1	0.7
16.0	4.8	13.9	2.4	23.6	0.5

LDN6 35/15 LO6AR, input watts: 17.52, delivered lumens: 1572.9, LM/W = 89.77, spacing criterion at 0= 1.02, test no. ISF 30716P265.



	Ave	Lumens
0	1396	
5	1442	142
15	1547	429
25	1147	514
35	526	342
45	176	139
55	2	6
65	1	1
75	1	1
85	0	0
90	0	

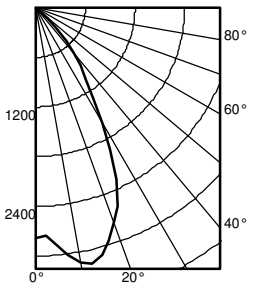
Zone	Lumens	% Lamp
0° - 30°	1084.6	69.0
0° - 40°	1426.2	90.7
0° - 60°	1571.3	99.9
0° - 90°	1572.9	100.0
90° - 120°	0.0	0.0
90° - 130°	0.0	0.0
90° - 150°	0.0	0.0
90° - 180°	0.0	0.0
0° - 180°	1572.9	*100.0

*Efficiency

pf	20%								
pc	80%			70%			50%		
pw	50%	30%	10%	50%	30%	10%	50%	30%	10%
0	119	119	119	116	116	116	111	111	111
1	111	108	106	109	106	104	104	103	101
2	103	99	95	101	97	94	98	95	92
3	96	91	87	94	90	86	92	88	85
4	89	84	79	88	83	79	86	81	78
5	83	77	73	82	77	73	81	76	72
6	78	72	68	77	72	67	76	71	67
7	73	67	63	73	67	63	71	66	62
8	69	63	59	68	62	58	67	62	58
9	65	59	55	64	59	55	63	58	54
10	61	55	51	61	55	51	60	55	51

		50% beam - 54.5°		10% beam - 82.2°	
Mounting Height	Inital FC Center Beam	Diameter	FC	Diameter	FC
8.0	46.2	5.7	23.1	9.6	4.6
10.0	24.8	7.7	12.4	13.1	2.5
12.0	15.5	9.8	7.7	16.6	1.5
14.0	10.6	11.8	5.3	20.1	1.1
16.0	7.7	13.9	3.8	23.6	0.8

LDN6 35/30 LO6AR, input watts: 34.75, delivered lumens: 3138.5, LM/W = 90.31, spacing criterion at 0= 1.02, test no. ISF 30716P274.



	Ave	Lumens
0	2786	
5	2877	284
15	3087	855
25	2289	1025
35	1049	682
45	350	277
55	5	12
65	2	2
75	1	1
85	0	0
90	0	

Zone	Lumens	% Lamp
0° - 30°	2164.3	69.0
0° - 40°	2845.9	90.7
0° - 60°	3135.3	99.9
0° - 90°	3138.5	100.0
90° - 120°	0.0	0.0
90° - 130°	0.0	0.0
90° - 150°	0.0	0.0
90° - 180°	0.0	0.0
0° - 180°	3138.5	*100.0

*Efficiency

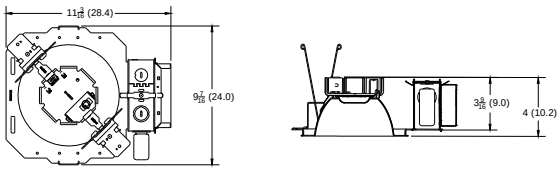
pf	20%								
pc	80%			70%			50%		
pw	50%	30%	10%	50%	30%	10%	50%	30%	10%
0	119	119	119	116	116	116	111	111	111
1	111	108	106	109	106	104	104	103	101
2	103	99	95	101	97	94	98	95	92
3	96	91	87	94	90	86	92	88	85
4	89	84	79	88	83	79	86	81	78
5	83	77	73	82	77	73	81	76	72
6	78	72	68	77	72	67	76	71	67
7	73	67	63	73	67	63	71	66	62
8	69	63	59	68	62	58	67	62	58
9	65	59	55	64	59	55	63	58	54
10	61	55	51	61	55	51	60	55	51

		50% beam - 54.5°		10% beam - 82.2°	
Mounting Height	Inital FC Center Beam	Diameter	FC	Diameter	FC
8.0	92.1	5.7	46.1	9.6	9.2
10.0	49.5	7.7	24.8	13.1	5.0
12.0	30.9	9.8	15.4	16.6	3.1
14.0	21.1	11.8	10.5	20.1	2.1
16.0	15.3	13.9	7.6	23.6	1.5

LDN6

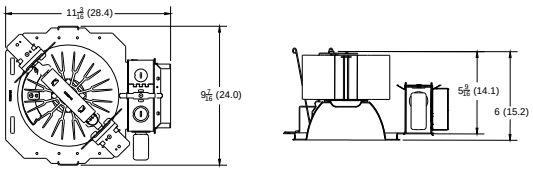
* All dimensions are inches (centimeters) unless otherwise noted.

LDN6 500 - 1500 LUMENS



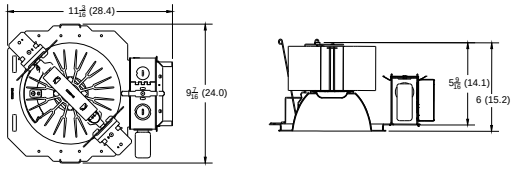
Aperture: 6-1/4 (15.9)
Ceiling Opening: 7-1/8 (18.1)
Overlap Trim: 7-1/2 (19.1)

LDN6 2000 - 3000 LUMENS



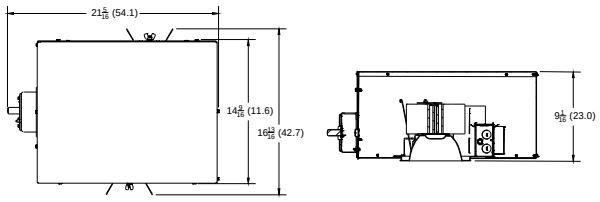
Aperture: 6-1/4 (15.9)
Ceiling Opening: 7-1/8 (18.1)
Overlap Trim: 7-1/2 (19.1)

LDN6 4000 - 5000 LUMENS



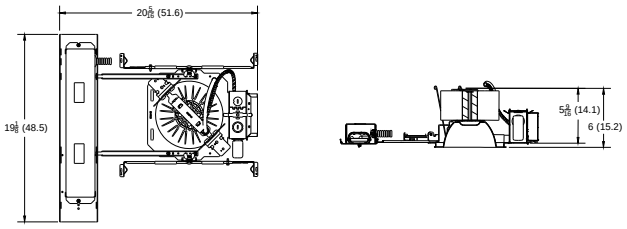
Marked Spacing: 24 x 24 x 10
Aperture: 6-1/4 (15.9)
Ceiling Opening: 7-1/8 (18.1)
Overlap Trim: 7-1/2 (19.1)

LDN6 CP



Aperture: 6-1/4 (15.9)
Ceiling Opening: 7-1/8 (18.1)
Overlap Trim: 7-1/2 (19.1)

LDN6 EL



Marked Spacing above 3000 Lumens: 24 x 24 x 10
Aperture: 6-1/4 (15.9)
Ceiling Opening: 7-1/8 (18.1)
Overlap Trim: 7-1/2 (19.1)

LDN6			
Nominal Lumens	**Lumens**	**Wattage**	**Lm/W**
500	527.9	5.8	90.5
750	758.1	8.9	85.1
1000	950.1	10.4	91.0
1500	1514	17.5	86.4
2000	2006	22.5	89.1
2500	2504	28.3	88.6
3000	3021	34.8	86.9
4000	4008	44.3	90.6
5000	4975	57.7	86.3

HOW TO ESTIMATE DELIVERED LUMENS IN EMERGENCY MODE

Use the formula below to estimate the delivered lumens in emergency mode

Delivered Lumens = 1.25 x P x LPW

P = Ouput power of emergency driver. P = 10W for PS1055CP

LPW = Lumen per watt rating of the luminaire. This information is available on the ABL luminaire spec sheet.
The LPW rating is also available at Designlight Consortium.

LUMEN OUTPUT MULTIPLIERS - FINISH			
	Clear (AR)	**White (WR)**	**Black (BR)**
Specular (LS)	1.0	N/A	N/A
Semi-specular (LSS)	0.950	N/A	N/A
Matte diffuse (LD)	0.85	N/A	N/A
Painted	N/A	0.87	0.73

LUMEN OUTPUT MULTIPLIERS - CCT					
	2700K	**3000K**	**3500K**	**4000K**	**5000K**
80CRI	0.950	0.966	1.000	1.025	1.101

Notes

- Tested in accordance with IESNA LM-79-08.
- Tested to current IES and NEMA standards under stabilized laboratory conditions.
- CRI: 80 typical.

HOLOPHANE®
LEADER IN LIGHTING SOLUTIONS

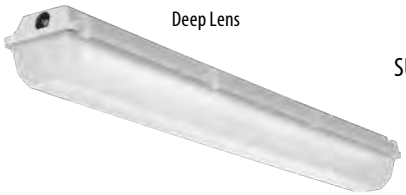
Catalog Number	
Notes	Type

Low-Profile Enclosed and Gasketed Industrial

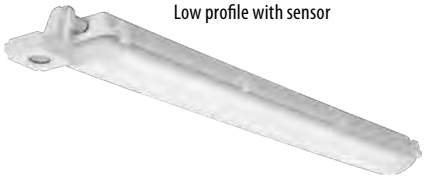
EMS LED

SURFACE/ SUSPENDED / WALL MOUNT

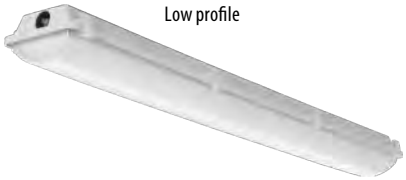
Deep Lens



Low profile with sensor



Low profile



FEATURES & SPECIFICATIONS

INTENDED USE — A general purpose and energy-efficient surface-mounted or suspended LED fixture, suitable for wet, damp and/or cold locations. For vapor-tight demanding environments where moisture or dust is a concern and where relatively low fixture mounting heights and wide fixture spacing are common. Not for use or installation in direct outdoor sunlight. Must be installed under canopy or covered ceiling. For direct sunlight installations, please refer to the EMX product family. Typical applications include industrial facilities, parking garages, retail malls, multi-purpose rooms, garden centers, and food processing. **Certain airborne contaminants can diminish the integrity of acrylic and/or polycarbonate. Click here for Acrylic-Polycarbonate Compatibility table for suitable use.**

Certain airborne contaminants may adversely affect the functioning of LEDs and other electronic components, depending on various factors such as concentrations of the contaminants, ventilation, and temperature at the end-user location. Click here for a list of substances that may not be suitable for interaction with LEDs and other electronic components.

CONSTRUCTION — One-piece 5VA fiberglass housing with integral perimeter channel utilizing continuous poured-in-place NEMA 4X gasket. Approved for through wiring. Captive polymeric latches are standard. Stainless steel latches (#316) available as an option for food processing or more demanding applications.

Power connection is easily accomplished through pre-drilled holes.

OPTICS — Injection molded, acrylic lens (.080" thick) provides high impact-resistance comparable to 100% DR. A UV stabilized polycarbonate diffuser is available (.080" thick) in clear or frosted for additional impact strength where vandal protection is desired.

Expected service life of 60,000 hours at 80% lumen maintenance (L80); predicted life of more than 100,000 hours.

ELECTRICAL — Utilizes high-efficiency LEDs mounted to core circuit boards. High-efficiency drivers operate 120-277 (MVOLT) and 347-480 (HVOLT) offered with 0-10 volt dimming, dims to 10%. Standard Luminaire Surge Protection Level: 6kV/3kA Surge Rated per ANSI C82.77-5-2015.

INSTALLATION — A pair of stainless steel surface mount brackets (SMB) are included (unless another mounting option is chosen) allowing for surface (ceiling) or suspension mount applications using included bail with aircraft cable or chain. Optional pair of dual pendant mount brackets (DPMB) are available for surface (ceiling) or suspension mount applications using either 3/8" threaded rod or included bail with aircraft cable or chain. Optional pair of angle mounting brackets (ANGBKT) for wall mount applications.

LISTINGS — CSA Certified to UL and C-UL Standards. Suitable for wet location. IP65,IP66, IP67 rated and certified to meet NSF Splash Zone 2. NEMA 4X rated. Sensors maintain IP65 and IP66 only. See chart on page 5 for Ambient Temperatures.
DesignLights Consortium® (DLC) Premium qualified product and DLC qualified product. Not all versions of this product may be DLC Premium qualified or DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

BUY AMERICAN — Product with the BAA option is assembled in the USA and meets the Buy America(n) government procurement requirements under FAR, DFARS and DOT. Please refer to www.acuitybrands.com/buy-american for additional information.

WARRANTY — 5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

NOTE: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C.
Specifications subject to change without notice.

Buy American

A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks marked by a shaded background*

To learn more about A+, visit www.acuitybrands.com/aplus.

*See ordering tree for details

A+ Capable options indicated by this color background.

ORDERING INFORMATION

Lead times will vary depending on options selected. Consult with your sales representative.

Example: EMS L48 4000LM IMAFL WD MVOLT GZ10 40K 80CRI

Series	Length	Nominal Lumens	Diffuser	Distribution	Voltage	Driver	Color temperature	CRI
EMS	L24 24" ‡	2000LM 2,000 lumens 3000LM 3,000 lumens 4000LM 4,000 lumens 6000LM 6,000 lumens	IMAFL Acrylic, lineal ribbed frosted lens IMACD Acrylic, clear deep lens IMAFD Acrylic, deep frosted lens LPAFL Acrylic, low profile frosted lens LPACL Acrylic, low profile clear lens LPPCL Polycarbonate, low profile clear lens LPPFL Polycarbonate, low profile frosted lens	MD Medium WD Wide PGD Parking garage	MVOLT 120-277V HVOLT 347-480V ‡ 120 120V 277 277V 347 347V 480 480V	GZ10 0 - 10V dimming	30K 3000K 35K 3500K 40K 4000K 50K 5000K	80CRI 80 CRI 90CRI 90 CRI
	L48 48" ‡	3000LM 3,000 lumens 4000LM 4,000 lumens 6000LM 6,000 lumens 8000LM 8,000 lumens 10000LM 10,000 lumens 12000LM 12,000 lumens						
	L96 96" ‡	9000LM 9,000 lumens 12000LM 12,000 lumens 15000LM 15,000 lumens 18000LM 18,000 lumens 20000LM 20,000 lumens 24000LM 24,000 lumens						

Options

Emergency:

E10WMCP	EM Self-diagnostics battery pack, MVOLT, 10W, Constant Power Certified in the California Title 20 Modernized Appliance Efficiency Database (MAEDBS) ‡
BE6WCP	Cold Weather EM battery pack, 120/277V, 6W, Constant Power Certified in the California Title 20 Modernized Appliance Efficiency Database (MAEDBS) ‡
BGTD	Generator transfer device

Other Options:

ANGBKT	Angle bracket shipped with fixture ‡
BAA	Buy America(n) Act Compliant
DPMB	Dual pendant mounting bracket ‡
SPD	Surge protection device, additional 10kV/6kA
STSL	Stainless steel latches
TRS	Tamper Resistant Torx® T10 screws
WLF	Wet location fitting (two outboard, top) (L24 - 20 inches off-center, L48 - 48 inches off-center, L96 95.7 inches off-center) ‡
WLFEND	Wet location fitting (one end) ‡
WLFEND2	Wet location fitting (both ends) ‡
WLFPMP	Wet location pendant monopoint ‡

Cordsets: ‡

CPSB16YWLBH	Brad Harrsion Mini-Change® cordset with straight blade plug, 16 gauge, 3 conductors, 6ft, yellow ‡
CPSB16YWL12FTBH	Brad Harrsion Mini-Change® cordset with straight blade plug, 16 gauge, 3 conductors, 12ft, yellow ‡
CRSB16YWLBH	Brad Harrison Mini-Change® receptacle ‡
CNP16WWL	Cord only (no plug), 16 gauge, 3 conductors, white, 6ft, wet location ‡
CNP16WWL12FT	Cord only (no plug), 16 gauge, 3 conductors, white, 12ft, wet location ‡
CNP164CWWL	Cord only (no plug), 16 gauge, 4 conductors, white, 6ft, wet location (for use when unswitched circuit is required with battery pack) ‡

Individual Controls: ‡

SBOR10	360° Low mount sensor, (8-15' mounting heights), outdoor PIR, ON/OFF occupancy (LINK)
SBOR10 HL 3V	360° Low mount sensor, (8-15' mounting heights), outdoor PIR, occupancy controlled dimming (bi-level) (LINK)
SBOR10 P	360° Low mount sensor, (8-15' mounting heights), outdoor PIR, ON/OFF photocell (LINK)

nLight® Wireless: ‡

NLTAIR2 RSBOR10	nLight® Air Generation 2 enabled, 360° low mount sensor, (8-15' heights) (LINK)
NLTAIR2 RIO	nLight® Air Generation 2 enabled, fixture embedded network interface, 0-10V dimming output (LINK)

NOTE: ‡ indicates option chosen has ordering restrictions. Please reference ordering restrictions chart, page 3. Options are sorted alphanumerically.

Accessories: *Order as separate catalog number.*

HMHCH36	3 foot (36 inches) jack chain (ships as pair)
MHHK120 M50	10 foot (120 inches) single leg air craft cable (ships as pair)
MHHK120SS PAIR	10 foot (120 inches) single leg air craft cable, stainless steel (ships as pair)
RK1 T10BIT W/PIN U	Hex-base driver bit, Torx TX10, for tamper resistant screws with center reject pin
EMSDPMB	Dual pendant mounting bracket (ships as a pair) ‡
EMSANGBKT	Angle bracket (ships as pair) ‡
EMSSMB	Surface mount bracket (ships as pair) ‡

See ordering restrictions on next page.

OPERATIONAL DATA (80 CRI*, MD**, MVOLT***)

Length	Package	Input Wattage	CCT	Frosted Lens' Lumens (LPW)				Clear Lens' Lumens (LPW)		
				IMAFL	IMAFD	LPAFL	LPPFL	IMACD	LPACL	LPPCL
L24	2000LM	13.4	30K	1962 (147)	2083 (156)	2076 (155)	1861 (139)	2112 (158)	2105 (158)	1890 (142)
			35K	2002 (150)	2126 (159)	2118 (159)	1899 (142)	2155 (161)	2147 (161)	1929 (144)
			40K	2099 (157)	2228 (167)	2220 (166)	1991 (149)	2259 (169)	2251 (169)	2022 (151)
			50K	2122 (159)	2252 (169)	2244 (168)	2013 (151)	2284 (171)	2276 (170)	2044 (153)
	3000LM	19.9	30K	2869 (144)	3046 (153)	3035 (153)	2721 (137)	3088 (155)	3077 (155)	2764 (139)
			35K	2927 (147)	3108 (156)	3096 (156)	2777 (140)	3151 (158)	3139 (158)	2820 (142)
			40K	3069 (154)	3258 (164)	3246 (163)	2911 (146)	3303 (166)	3291 (166)	2956 (149)
			50K	3102 (156)	3293 (166)	3281 (165)	2942 (148)	3339 (168)	3327 (167)	2988 (150)
	4000LM	26.0	30K	3676 (142)	3903 (150)	3889 (150)	3487 (134)	3957 (152)	3943 (152)	3541 (136)
			35K	3751 (145)	3982 (153)	3968 (153)	3558 (137)	4037 (156)	4023 (155)	3613 (139)
			40K	3932 (152)	4174 (161)	4159 (160)	3730 (144)	4232 (163)	4217 (162)	3788 (146)
			50K	3975 (153)	4219 (163)	4204 (162)	3770 (145)	4278 (165)	4263 (164)	3829 (148)
	6000LM	39.2	30K	5287 (135)	5613 (143)	5593 (143)	5015 (128)	5691 (145)	5671 (145)	5093 (130)
			35K	5395 (138)	5727 (146)	5707 (145)	5117 (130)	5806 (148)	5786 (147)	5196 (132)
			40K	5655 (144)	6004 (153)	5982 (153)	5364 (137)	6087 (155)	6065 (155)	5447 (139)
			50K	5717 (146)	6069 (155)	6047 (154)	5422 (138)	6153 (157)	6131 (156)	5506 (140)
L48	3000LM	18.0	30K	2689 (149)	2855 (158)	2844 (158)	2551 (141)	2894 (160)	2884 (160)	2590 (144)
			35K	2743 (152)	2912 (161)	2902 (161)	2602 (144)	2953 (164)	2942 (163)	2643 (146)
			40K	2876 (159)	3053 (169)	3042 (169)	2728 (151)	3095 (172)	3084 (171)	2770 (154)
			50K	2907 (161)	3086 (171)	3075 (170)	2758 (153)	3129 (173)	3118 (173)	2800 (155)
	4000LM	23.8	30K	3543 (149)	3762 (158)	3748 (157)	3361 (141)	3814 (160)	3800 (160)	3413 (143)
			35K	3615 (152)	3838 (161)	3824 (161)	3429 (144)	3891 (163)	3877 (163)	3482 (146)
			40K	3790 (159)	4023 (169)	4009 (168)	3595 (151)	4079 (171)	4064 (171)	3650 (153)
			50K	3831 (161)	4067 (171)	4052 (170)	3634 (153)	4123 (173)	4109 (173)	3690 (155)
	6000LM	37.8	30K	5284 (140)	5609 (149)	5589 (148)	5012 (133)	5687 (151)	5667 (150)	5090 (135)
			35K	5391 (143)	5723 (152)	5703 (151)	5114 (135)	5802 (154)	5782 (153)	5193 (138)
			40K	5651 (150)	6000 (159)	5978 (158)	5361 (142)	6083 (161)	6061 (161)	5444 (144)
			50K	5713 (151)	6065 (161)	6043 (160)	5419 (144)	6149 (163)	6127 (162)	5503 (146)
	8000LM	50.5	30K	6952 (138)	7380 (146)	7354 (146)	6594 (131)	7482 (148)	7456 (148)	6696 (133)
			35K	7093 (141)	7530 (149)	7503 (149)	6728 (133)	7634 (151)	7607 (151)	6832 (135)
			40K	7435 (147)	7894 (156)	7865 (156)	7053 (140)	8003 (159)	7975 (158)	7162 (142)
			50K	7516 (149)	7979 (158)	7950 (158)	7129 (141)	8090 (160)	8061 (160)	7240 (144)
	10000LM	62.0	30K	8646 (140)	9179 (148)	9146 (148)	8201 (132)	9306 (150)	9273 (150)	8328 (134)
			35K	8822 (142)	9365 (151)	9332 (151)	8368 (135)	9495 (153)	9461 (153)	8497 (137)
			40K	9248 (149)	9817 (158)	9782 (158)	8772 (142)	9953 (161)	9918 (160)	8908 (144)
			50K	9348 (151)	9924 (160)	9888 (160)	8867 (143)	10061 (162)	10026 (162)	9004 (145)
	12000LM	75.0	30K	10406 (139)	11047 (147)	11007 (147)	9871 (132)	11200 (149)	11160 (149)	10024 (134)
			35K	10617 (141)	11271 (150)	11231 (150)	10071 (134)	11427 (152)	11387 (152)	10227 (136)
			40K	11130 (148)	11816 (157)	11773 (157)	10557 (141)	11979 (160)	11937 (159)	10721 (143)
			50K	11251 (150)	11944 (159)	11901 (159)	10672 (142)	12109 (161)	12066 (161)	10837 (144)
L96	9000LM	53.4	30K	7962 (149)	8452 (158)	8422 (158)	7552 (141)	8570 (160)	8539 (160)	7669 (144)
			35K	8124 (152)	8624 (161)	8593 (161)	7706 (144)	8743 (164)	8713 (163)	7825 (146)
			40K	8516 (159)	9040 (169)	9008 (169)	8078 (151)	9166 (172)	9133 (171)	8203 (154)
			50K	8608 (161)	9138 (171)	9106 (170)	8165 (153)	9265 (173)	9232 (173)	8292 (155)
	12000LM	75.5	30K	10570 (140)	11221 (149)	11181 (148)	10026 (133)	11377 (151)	11337 (150)	10182 (135)
			35K	10785 (143)	11449 (152)	11408 (151)	10230 (135)	11608 (154)	11567 (153)	10388 (138)
			40K	11306 (150)	12002 (159)	11959 (158)	10724 (142)	12168 (161)	12125 (161)	10890 (144)
			50K	11428 (151)	12132 (161)	12089 (160)	10840 (144)	12300 (163)	12257 (162)	11008 (146)
	15000LM	94.3	30K	13399 (142)	14225 (151)	14174 (150)	12710 (135)	14422 (153)	14371 (152)	12907 (137)
			35K	13671 (145)	14513 (154)	14461 (153)	12968 (138)	14714 (156)	14662 (156)	13169 (140)
			40K	14331 (152)	15214 (161)	15160 (161)	13594 (144)	15425 (164)	15370 (163)	13805 (146)
			50K	14487 (154)	15379 (163)	15324 (163)	13741 (146)	15592 (165)	15537 (165)	13954 (148)
	18000LM	103.4	30K	15901 (154)	16881 (163)	16820 (163)	15083 (146)	17114 (165)	17054 (165)	15317 (148)
			35K	16224 (157)	17223 (167)	17161 (166)	15389 (149)	17462 (169)	17400 (168)	15627 (151)
			40K	17007 (164)	18055 (175)	17990 (174)	16132 (156)	18305 (177)	18240 (176)	16382 (158)
			50K	17192 (166)	18251 (176)	18185 (176)	16307 (158)	18503 (179)	18438 (178)	16560 (160)
	20000LM	125.5	30K	17549 (140)	18630 (148)	18564 (148)	16646 (133)	18888 (150)	18822 (150)	16904 (135)
			35K	17906 (143)	19008 (151)	18940 (151)	16984 (135)	19272 (154)	19204 (153)	17247 (137)
			40K	18770 (150)	19927 (159)	19855 (158)	17804 (142)	20202 (161)	20131 (160)	18080 (144)
			50K	18974 (151)	20143 (160)	20070 (160)	17997 (143)	20421 (163)	20349 (162)	18276 (146)
	24000LM	149.5	30K	21142 (141)	22445 (150)	22364 (150)	20055 (134)	22756 (152)	22675 (152)	20365 (136)
			35K	21571 (144)	22900 (153)	22818 (153)	20461 (137)	23217 (155)	23135 (155)	20779 (139)
			40K	22613 (151)	24006 (161)	23920 (160)	21450 (143)	24339 (163)	24253 (162)	21782 (146)
			50K	22858 (153)	24266 (162)	24179 (162)	21682 (145)	24602 (165)	24516 (164)	22018 (147)

* For 90CRI, reduce lumen output by 17.1%
** For WD reduce output by 4.7%, PGD reduce output by 5.4%
*** For HVOLT use scale factor in HVOLT SCALE FACTOR TABLE

CSA LISTED AMBIENT RATING*

		Standard** (surface)"	Standard** (suspended)"	E10WMCP (surface)	E10WMCP (suspended)	BE6WCP (surface)	BE6WCP (suspended)
L24	2000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	3000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	4000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	6000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
L48	3000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	4000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	6000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	8000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	10000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	12000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
L96	9000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	12000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	15000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	18000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	20000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C
	24000LM	35°C	50°C	5°C - 25°C	5°C - 35°C	-20°C - 25°C	-20°C - 35°C

*Minimum Ambient is -30°C unless noted, when the fixture is suspended at least 12" from the ceiling.
**All options not specifically listed in this table are considered standard

HVOLT SCALE FACTOR

	Factor
2000LM	0.814
3000LM	0.814
4000LM	0.814
6000LM	0.835
8000LM	0.845
9000LM	0.850
10000LM	0.850
12000LM	0.845
15000LM	0.860
18000LM	0.880
20000LM	0.845
24000LM	0.865

CONFIGURATION WEIGHTS

	Standard	w/ Sensor	w/ Battery
L24	8	9	9
L48	11	12	12
L96	23	24	24

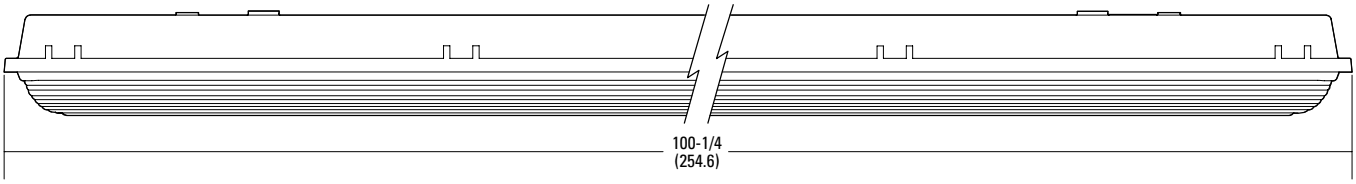
NUMBER OF BOARDS AND DRIVERS

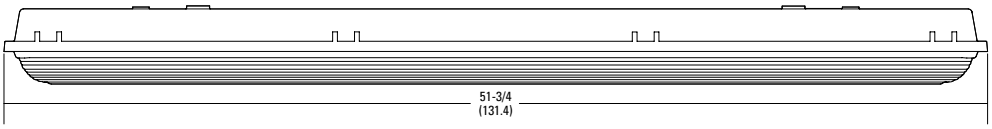
Lumen package	Fixture length	Number of boards	Number of drivers
2000LM	L24	1	1
3000LM		1	1
4000LM		1	1
6000LM		1	1
3000LM	L48	2	1
4000LM		2	1
6000LM		2	1
8000LM		2	1
10000LM		2	1
12000LM		2	1
9000LM	L96	4	1
12000LM		4	2
15000LM		4	2
18000LM		4	2
20000LM		4	2
24000LM		4	2

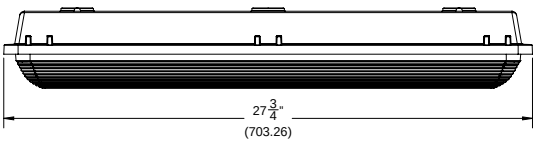
DIMENSIONS

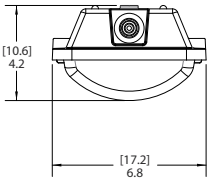
Specifications subject to change without notice.
All dimensions are inches (centimeters) unless otherwise indicated.

Weight (may vary with options or accessories)
EMS L48: 11.9 lbs (5.397kg)
EMS L96: 24.3 lbs (11.022kg)

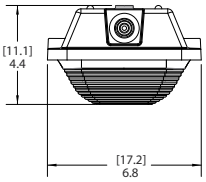




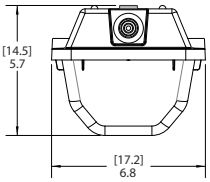




Diffuser Type:
LPAFL
LPACL
LPPFL
LPPCL



Diffuser Type:
IMAFL



Diffuser Type:
IMAFD
IMACD

PHOTOMETRICS

See www.holophane.com for photometry reports.

HOLOPHANE®
LEADER IN LIGHTING SOLUTIONS

Catalog Number	
Notes	Type

Phuzion™

LED High Bay
Wet location listed

Description

The Phuzion LED luminaire takes high-bay lighting to new levels of lumen output and temperature tolerance. By marrying the latest in LED technology with the legendary illuminating dynamics of Holophane's prismatic glass, the Phuzion high bay delivers unparalleled performance and reliability. Phuzion is highly versatile and can be installed with the optics facing down or inverted for maximum uplight.

Optics

- Prismatic borosilicate glass maintains highest levels of luminosity over time.
- Glass doesn't fade, discolor or otherwise degrade in harsh environments.
- Six distributions available to achieve results from any mounting height.
- Prismatic optics combined with high efficiency LED's achieve maximum spacing and superior uniformity.
- IP65 rated optics.
- Injection molded acrylic lens available.
- Optional non-silicone gaskets, ideal for automotive production.
- Certain airborne contaminants can diminish the integrity of acrylic and/or polycarbonate. **Click here for Acrylic-Polycarbonate Compatibility table for suitable uses.**
- Certain airborne contaminants may adversely affect the functioning of LEDs and other electronic components, depending on various factors such as concentrations of the contaminants, ventilation, and temperature at the end-user location. **Click here for a list of substances that may not be suitable for interaction with LEDs and other electronic components.**

Mechanical

- Robust cast aluminum housing with low copper content (0.6% CU content) withstands hot and dirty environments.
- Super durable TGIC thermoset powder coat finish provides 1500 hours salt fog rating. CR (corrosion resistant) optional finish is a five-stage pre-treating and painting process that yields over 5,000 hours salt rating per ASTM B117.
- Pendant mount standard.
- Stainless steel screws ship standard when ordered with the PM mounting option.

Electrical

- 0-10V Dimming driver is standard, dims to 10%.
- XVOLT is an optional robust driver solution designed to assist with power quality issues and a dropped neutral in 277V input as derived from 480V Wye. Supports 277-480V; 6kV surge rated.
- Luminaire Surge Protection Level: Designed to withstand up to 10kV/5kA per ANSI C82.77-5-2015.
- 70, 80, 90 CRI available.
- 3000K, 3500K, 4000K or 5000K CCT available.
- Aluminum core printed circuit board.

Listings

- CSA Certified to meet US and Canadian standards.
- Suitable for use in wet locations.
- -40°F (-40°C) to 158°F (70°C) (see chart on page 5).
- .5G vibration rated.
- IK rated (see chart on page 5)
- DesignLights Consortium® (DLC) Premium qualified product and DLC qualified product. Not all versions of this product may be DLC Premium qualified or DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

Warranty

5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

NOTE: Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C.

Typical Applications

- Heavy industrial
- Manufacturing
- Warehousing
- Large indoor
- Natatorium

Dimensions: *Inches (millimeters) unless otherwise noted.*

Diameter: 21.22 (538.99)
Height: 19.02-23.46 (483.11-595.88)
Weight: 33-38 lbs. (15.0-17.2 kg)

A+ Capable Luminaire

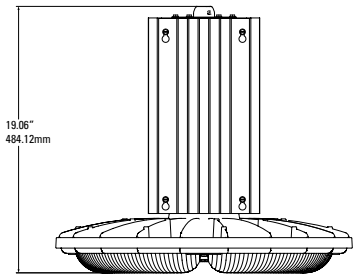
This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks marked by a shaded background*

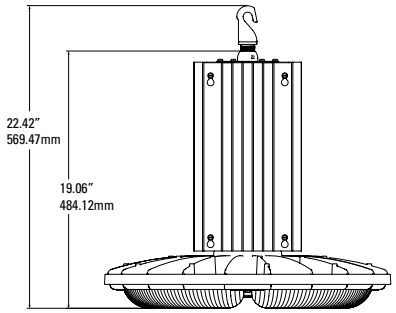
To learn more about A+, visit www.acuitybrands.com/aplus.

*See ordering tree for details

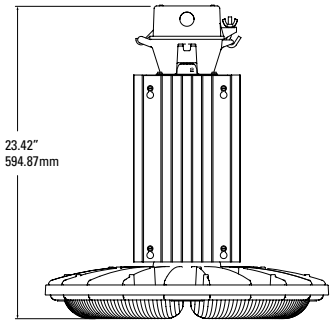
DIMENSIONAL DATA



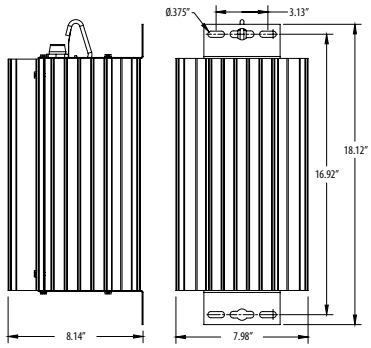
Pendant (PM)



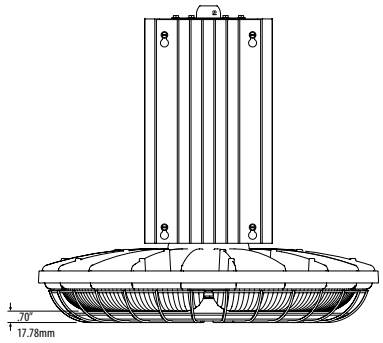
HKMAR Hook (PF-129)



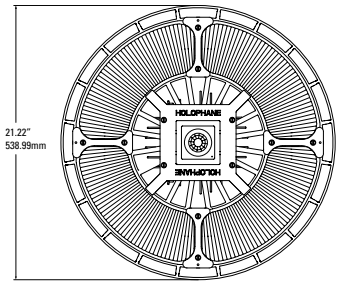
Quick Disconnect (QD) or
Non-Disconnect Thru-Wiring (NDT)



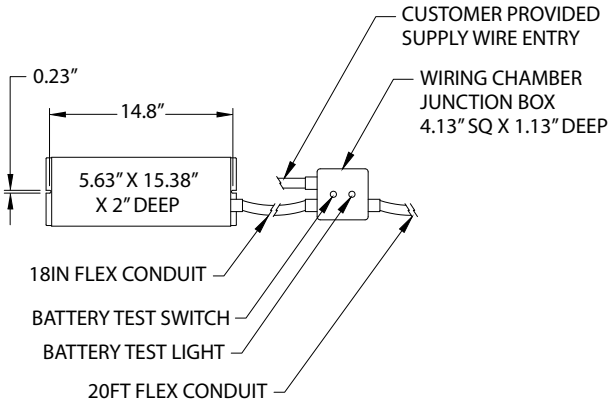
Emergency Remote Bodine BSL722C Battery



Wire Guard (WGX)



Diameter



EMERGENCY REMOTE PS30250R BATTERY

A+ Capable options indicated by this color background.

ORDERING INFORMATION

Example: PHZ 45000LM ND MVOLT 40K 70CRI PM DBXD

Series	Lumens	Distribution	Voltage	Color Temperature	Color Rendering Index	Mounting
PHZ	12000LM 12,000 nominal lumens 18000LM 18,000 nominal lumens 24000LM 24,000 nominal lumens 30000LM 30,000 nominal lumens 35000LM 35,000 nominal lumens 40000LM 40,000 nominal lumens 45000LM 45,000 nominal lumens 50000LM 50,000 nominal lumens 60000LM 60,000 nominal lumens ‡	FD Focus Glass FDFR Focus Frosted Glass FSMG Focus Smooth Glass MD Medium Glass MDFR Medium Frosted Glass ND Narrow Glass NDA Narrow Acrylic NDFR Narrow Frosted Glass WD Wide Glass WDA Wide Acrylic WDFR Wide Frosted Glass	MVOLT Auto sensing (120-277V, 50/60Hz) 120 120V, 50/60Hz 208 208V, 50/60Hz 240 240V, 50/60Hz 277 277V, 50/60Hz HVOLT Auto sensing (347-480V, 50/60Hz) 347 347V, 50/60Hz 480 480V, 50/60Hz XVOLT Enhanced Power Protection (277-480V, 50/60Hz) ‡ 277X 277V XVOLT driver, 50/60Hz ‡ 347X 347V XVOLT Driver, 50/60Hz ‡ 480X 480V XVOLT Driver, 50/60Hz ‡	30K 3000K CCT 35K 3500K CCT 40K 4000K CCT 50K 5000K CCT	70CRI 70 CRI 80CRI 80 CRI 90CRI 90 CRI	PM 3/4" NPT Pendant ‡ QD Quick disconnect ‡ NDT Non-disconnect thru-wiring ‡ QR Quick disconnect retrofit ‡ NR Non-disconnect thru-wiring retrofit ‡

Options

Individual Non-Dimming Sensors: ‡

SBGR6	360° High Mount sensor, (15-30' mounting heights), on/off occupancy (LINK)
SBGR10	360° Low Mount Sensor, (8-15' mounting heights), on/off occupancy (LINK)
SBGR6 P	360° High Mount Sensor, (15-30' mounting heights), on/off photocell (LINK)
SBGR10 P	360° Low Mount Sensor, (8-15' mounting heights), on/off photocell (LINK)

Individual Dimming Sensors: ‡

SBGR6 D 3V	360° High Mount sensor, (15-30' mounting heights), high/low occupancy dimming (LINK)
SBGR10 D 3V	360° Low Mount sensor, (8-15' mounting heights), high/low occupancy dimming (LINK)

Bluetooth® Sensors: ‡

SBG6 OCC BTP	360° High Mount Sensor, (15-45' mounting heights), on/off occupancy, utilizes smart hub for Bluetooth® programmability (LINK)
SBG10 OCC BTP	360° Low Mount Sensor, (7-15' mounting heights), on/off occupancy, utilizes smart hub for Bluetooth® programmability (LINK)
SBG6 HL BTP	360° High Mount Sensor, (15-45' mounting heights), high/low/(off) occupancy dimming, utilizes smart hub for Bluetooth® programmability (LINK)
SBG10 HL BTP	360° Low Mount Sensor, (7-15' mounting heights), high/low/(off) occupancy dimming, utilizes smart hub for Bluetooth® programmability (LINK)
SBG6 ADC BTP	360° High Mount Sensor, (15-45' mounting heights), on/off occupancy with auto dimming photocell, utilizes smart hub for Bluetooth® programmability (LINK)
SBG10 ADC BTP	360° Low Mount Sensor, (7-15' mounting heights), on/off occupancy with auto dimming photocell, utilizes smart hub for Bluetooth® programmability (LINK)
SBG6 ANL BTP	360° High Mount Sensor, (15-45' mounting heights), high/low/(off) occupancy dimming with auto dimming photocell, utilizes smart hub for Bluetooth® programmability (LINK)
SBG10 ANL BTP	360° Low Mount Sensor, (7-15' mounting heights), high/low/(off) occupancy dimming with auto dimming photocell, utilizes smart hub for Bluetooth® programmability (LINK)

Damp Location Cords (no plug): ‡

CNP16W	Cord only, 16-gauge, 3 conductors, white, 6ft
CNP165CD	Cord only, 16-gauge, 5 conductors, includes 0-10V dimming leads, black, 6ft ‡
CNP165CDW	Cord only, 16-gauge, 5 conductors, includes 0-10V dimming leads, white, 6ft ‡

Damp Location Cord Sets: ‡

CPSB16W	Cord with 15-amp straight blade plug, 16-gauge, 3 conductors, white, 6ft (120V only)
CPTL16W	Cord with 15-amp twist lock plug, 16-gauge, 3 conductors, white, 6ft (120, 208, 240 or 277V only)
CPTL20A16W	Cord with 20-amp twist lock plug, 16-gauge, 3 conductors, white, 6ft (347 or 480V only)

nLight® Wired: ‡

NPP16 D	Power/relay pack, 0-10VDC dimming output (LINK)
NPP16 D ER	Power/relay pack, 0-10VDC dimming output, UL924 Emergency operation (not available with a battery pack) (LINK)

nLight® Wireless:

NLTAIR2 RPP20 D	nLight® Air Generation 2 enabled, power/relay pack, 0-10V dimming output (LINK) ‡
NLTAIR2 RPP20 D ER	nLight® Air Generation 2 enabled, power/relay pack, 0-10V dimming output, UL924 EM operation via power sense leads (not available with battery pack) (LINK) ‡
NLTAIR2 RSBG6	nLight® Air Generation 2 enabled, 360° high mount sensor, (15-30' mounting heights), IP66 rated (LINK) ‡
NLTAIR2 RSBG6 ER	nLight® Air Generation 2 enabled, 360° high mount sensor, (15 to 30' mounting heights), UL924 Emergency Operation utilizing Iota ETS (not available with battery pack) (LINK) ‡
NLTAIR2 RSBG10	nLight® Air Generation 2 enabled, 360° low mount sensor, (8-15' mounting heights) (LINK) ‡
NLTAIR2 RSBG10 ER	nLight® Air Generation 2 enabled, 360° low mount sensor, (8-15' mounting heights), UL924 Emergency Operation utilizing Iota ETS (not available with battery pack) (LINK) ‡
NLTAIR2 RSBG40	nLight® Air Generation 2 enabled, 360° high bay sensor, (40' mounting heights) (LINK) ‡
NLTAIR2 RSBG40 ER	nLight® Air Generation 2 enabled, 360° high bay sensor, (40' mounting heights), UL924 Emergency Operation utilizing Iota ETS (not available with battery pack) (LINK) ‡
NLTAIR2 RIO	nLight® Air Generation 2 fixture embedded network interface, 0-10V dimming output (LINK) ‡
NLTAIR2 RIO ER	nLight® Air Generation 2 fixture embedded network interface, 0-10V dimming output, includes ETS for UL924 operation when using auxiliary generator or central inverter (LINK) ‡

UPH Cord Sets: ‡

PHCB	Cord with locking plug for use with power hook (UPH) only, 16-guage, 3 conductors, white, 2ft (120-347V only), includes LPMD loop
PHCBL8480	Cord with locking plug for use with power hook (UPH) only, 16-guage, 3 conductors, white, 2ft (480V only), includes LPMD loop

Modular Wiring: ‡

OCS	Reloc® One Pass® circuit selector system drop, 18-gauge, 3 conductors, 6ft (120-480V) (LINK) ‡

Wet Location Cords (no plug): ‡

CNP16WWL	Cord only, 16-gauge, 3 conductors, white, 6ft

Wet Location Cord Sets: ‡

CPTL16WWL	Cord with 15-amp twist lock plug, 16-gauge, 3 conductors, white, 6ft (120-277V only)

Hooks:

HKMAR	Anti-rotational hook, 3/4" male (PF-129) ‡
LPMD	Loop, 3/4" male (PF-105) ‡
HKMD	Safety hook, 3/4" male (PF121-A) ‡
HKMW	Gasketed hook, 3/4" male (PF-291) ‡

Emergency:

PS30250R	Power Sentry PS30250, 30W remote constant current emergency driver, 0°C min, UL924 compliant, CA title 20 non-compliant (LINK) ‡
E10WCP	Power Sentry PS1055CP, 10W internal constant power emergency driver, 5°C min, UL924 compliant, Certified in CA Title 20 MAEDBS (LINK) ‡
E15WCPR	Power Sentry PS1555CP, 15W remote constant power emergency LED driver, 5°C min, UL924 compliant, self-diagnostic, Certified in CA Title 20 MAEDBS (LINK) ‡
BSL722CR	BSL722 Cold, 23.1W remote emergency LED driver, -20°C min, UL924 compliant, CA title 20 non-compliant ‡
ETS	IOTA® ETS DR, automatic load control relay device (ALCR) for UL924 operation when using auxiliary generator or central inverter (LINK) ‡

UPH Hangers: ‡

UPH35	Thru-way powerhook for use with PHCB, surface mount
UPH36	Thru-way powerhook for use with PHCB, pendant mount

Other Options:

AO	Field adjustable output dimming ‡
CR	Corrosion resistant paint
DL	Damp Location ‡
DIM	Dimming terminal ‡
NSG	Non-silicone gasket
SCKX	Safety chain factory installed ‡
WGX	Wire guard factory installed

Finish

DBXD	Black super durable
DGRXD	Graphite super durable
DGXD	Gray super durable
DNXD	Satin nickel super durable
DWHXD	White super durable

SEE NEXT PAGE FOR ACCESSORIES AND NOTES

OPERATIONAL DATA

Ambient Temperature Ratings

Mounting	Occ Sensor	QDH or Non-Disconnect	BTP or NLTAIR2	Battery				Voltage	Ambient									Supply Wire
				BSL722C	PS30250	E10WCP	E15WCPR		12000LM	18000LM	24000LM	30000LM	35000LM	40000LM	45000LM	50000LM	60000LM	
Pendant	N	N	N	N	N	N	N	120-277	70	70	70	65	65	60	60	60	55	90C
Pendant	N	N	N	N	N	N	N	347-480	70	70	70	65	65	60	60	60	55	90C
Pendant	Y	N	N	N	N	N	N	120-277	55	55	55	45	45	40	40	40	40	90C
Pendant	Y	N	N	N	N	N	N	347-480	55	55	55	45	45	40	40	40	40	90C
Pendant	N	N	Y	N	N	N	N	120-277	55	55	55	45	45	40	40	40	40	90C
Pendant	N	N	Y	N	N	N	N	347-480	55	55	55	-	-	-	-	-	-	90C
Pendant	Y	N	Y	N	N	N	N	120-277	55	55	55	45	45	40	40	40	40	90C
Pendant	Y	N	Y	N	N	N	N	347-480	55	55	55	-	-	-	-	-	-	90C
Pendant	N	N	N	Y	N	N	N	120-277	50	50	50	50	50	50	50	50	50	90C
Pendant	N	N	N	N	Y	N	N	120-277	45	45	45	45	45	45	45	45	45	90C
Pendant	N	N	N	N	N	Y	N	120-277	50	50	50	-	-	-	-	-	-	90C
Pendant	N	N	N	N	N	N	Y	120-277	55	55	55	50	50	50	50	50	50	90C
Pendant	Y	N	N	Y	N	N	N	120-277	50	50	50	45	45	40	40	40	40	90C
Pendant	Y	N	N	N	Y	N	N	120-277	45	45	45	45	45	40	40	40	40	90C
Pendant	Y	N	N	N	N	Y	N	120-277	50	50	50	-	-	-	-	-	-	90C
Pendant	Y	N	N	N	N	N	Y	120-277	55	55	55	45	45	40	40	40	40	90C
Pendant	N	N	Y	Y	N	N	N	120-277	50	50	50	45	45	40	40	40	40	90C
Pendant	N	N	Y	N	Y	N	N	120-277	45	45	45	45	45	40	40	40	40	90C
Pendant	N	N	Y	N	N	Y	N	120-277	50	50	50	-	-	-	-	-	-	90C
Pendant	N	N	Y	N	N	N	Y	120-277	55	55	55	45	45	40	40	40	40	90C
Pendant	Y	N	Y	Y	N	N	N	120-277	50	50	50	45	45	40	40	40	40	90C
Pendant	Y	N	Y	N	Y	N	N	120-277	45	45	45	45	45	40	40	40	40	90C
Pendant	Y	N	Y	N	N	Y	N	120-277	50	50	50	-	-	-	-	-	-	90C
Pendant	Y	N	Y	N	N	N	Y	120-277	55	55	55	45	45	40	40	40	40	90C
Ceiling	N	Y	N	N	N	N	N	120-277	70	70	70	65	65	60	60	60	55	90C
Ceiling	N	Y	N	N	N	N	N	347-480	70	70	70	65	65	60	60	60	55	90C
Ceiling	Y	Y	N	N	N	N	N	120-277	55	55	55	45	45	40	40	40	40	90C
Ceiling	Y	Y	N	N	N	N	N	347-480	55	55	55	45	45	40	40	40	40	90C
Ceiling	N	Y	Y	N	N	N	N	120-277	55	55	55	45	45	40	40	40	40	90C
Ceiling	N	Y	Y	N	N	N	N	347-480	55	55	55	-	-	-	-	-	-	90C
Ceiling	Y	Y	Y	N	N	N	N	120-277	55	55	55	45	45	40	40	40	40	90C
Ceiling	Y	Y	Y	N	N	N	N	347-480	55	55	55	-	-	-	-	-	-	90C

Impact Resistance (IK Ratings)

Lens Material	Rating
Glass	IK06
Acrylic	IK07

OPERATIONAL DATA

Operating Characteristics

Lumen Package	Distribution	Delivered Lumens												Watts @ 120V	LPW @ 5000K, 70CRI
		3000K 70CRI @25°C	3000K 80CRI @25°C	3000K 90CRI @25°C	3500K 70CRI @25°C	3500K 80CRI @25°C	3500K 90CRI @25°C	4000K 70CRI @25°C	4000K 80CRI @25°C	4000K 90CRI @25°C	5000K 70CRI @25°C	5000K 80CRI @25°C	5000K 90CRI @25°C		
12000LM	FD ‡	11921	11142	8804	11921	11453	9194	13011	11843	9973	13401	11999	10908	89	151
	FDFR ‡	10878	10167	8034	10878	10452	8390	11874	10807	9101	12229	10949	9954	89	137
	FSMG ‡	12068	11279	8913	12068	11594	9307	13172	11989	10096	13566	12147	11042	89	152
	MD	12832	11261	9843	13085	11717	10054	12983	11852	10172	12848	12097	10924	81	159
	MDFR	11858	10407	9096	12092	10828	9291	11998	10953	9400	11873	11179	10095	81	147
	ND	12927	11345	9916	13182	11804	10129	13080	11940	10248	12944	12187	11005	81	160
	NDFR	11864	10413	9101	12099	10834	9296	12005	10959	9406	11880	11185	10100	81	147
	NDA	13041	11445	10004	13299	11909	10129	13196	12046	10339	13058	12295	11102	81	161
	WD	12839	11267	9848	13092	11724	10060	12991	11859	10178	12855	12104	10930	81	159
	WDFR	11145	9781	8549	11365	10177	8733	11277	10294	8835	11159	10507	9488	81	138
	WDA	13090	11488	10041	13348	11953	10256	13245	12091	10377	13107	12340	11143	81	162
18000LM	FD ‡	17256	16128	12745	17256	16579	13308	18835	17143	14436	19399	17369	15790	132	147
	FDFR ‡	15747	14718	11630	15747	15129	12145	17188	15644	13174	17703	15850	14409	132	134
	FSMG ‡	17469	16327	12902	17469	16784	13473	19067	17355	14614	19638	17583	15984	132	149
	MD	20350	17860	15611	20752	18583	15945	20591	18797	16133	20377	19185	17324	130	157
	MDFR	18806	16505	14426	19177	17173	14735	19029	17371	14909	18831	17730	16010	130	145
	ND	20501	17992	15726	20905	18721	16063	20744	18936	16252	20528	19327	17453	130	158
	NDFR	18816	16514	14434	19188	17182	14744	19039	17380	14917	18841	17739	16019	130	145
	NDA	20683	18152	15866	21091	18887	16206	20928	19104	16397	20710	19499	17608	130	159
	WD	20361	17870	15619	20763	18593	15954	20602	18807	16142	20388	19196	17334	130	157
	WDFR	17675	15512	13559	18024	16140	13849	17884	16326	14012	17698	16663	15047	130	136
	WDA	20760	18219	15925	21169	18957	16266	21005	19175	16457	20787	19571	17673	130	160
24000LM	FD ‡	22374	20912	16525	22374	21497	17256	24422	22228	18718	25153	22521	20473	178	141
	FDFR ‡	20418	19084	15080	20418	19617	15747	22286	20285	17082	22954	20551	18683	178	129
	FSMG ‡	22650	21170	16729	22650	21762	17469	24723	22502	18949	25463	22799	20726	178	143
	MD	25585	22454	19626	26090	23363	20047	25888	23632	20283	25619	24121	21781	170	151
	MDFR	23643	20750	18137	24110	21590	18526	23923	21839	18744	23675	22290	20128	170	139
	ND	25774	22620	19772	26283	23536	20196	26080	23807	20433	25808	24299	21942	170	152
	NDFR	23657	20762	18147	24123	21602	18536	23937	21851	18754	23688	22302	20139	170	139
	NDA	26003	22821	19947	26516	23745	20375	26311	24019	20614	26037	24515	22137	170	153
	WD	25599	22466	19637	26104	23376	20058	25902	23645	20294	25633	24134	21793	170	151
	WDFR	22222	19503	17046	22660	20292	17412	22485	20526	17617	22251	20950	18918	170	131
	WDA	26100	22906	20021	26615	23833	20450	26409	24108	20691	26134	24606	22219	170	154
30000LM	FD ‡	25560	23889	18877	25560	24557	19713	27899	25393	21383	28734	25727	23388	218	132
	FDFR ‡	23325	21800	17227	23325	22410	17989	25459	23172	19514	26221	23477	21343	218	120
	FSMG ‡	25875	24184	19110	25875	24860	19956	28243	25706	21647	29088	26044	23677	218	133
	MD	27294	25510	20159	27294	26224	21050	29792	27116	22834	30684	27473	24975	218	141
	MDFR	25223	23575	18629	25223	24234	19453	27531	25058	21102	28355	25388	23080	218	130
	ND	27496	25699	20308	27496	26418	21206	30012	27317	23003	30911	27676	25160	218	142
	NDFR	25237	23588	18639	25237	24247	19464	27546	25072	21113	28371	25402	23093	218	130
	NDA	27740	25927	20488	27740	26653	21395	30279	27559	23208	31185	27922	25383	218	143
	WD	27309	25524	20170	27309	26238	21062	29808	27131	22847	30700	27488	24989	218	141
	WDFR	23706	22157	17509	23706	22777	18283	25876	23551	19833	26650	23861	21692	218	122
	WDA	27843	26023	20564	27843	26751	21474	30391	27661	23294	31301	28025	25478	218	144
35000LM	FD ‡	28779	26898	21255	28779	27650	22195	31412	28591	24076	32352	28967	26333	254	127
	FDFR ‡	26262	24546	19396	26262	25232	20255	28665	26091	21971	29524	26434	24031	254	116
	FSMG ‡	29134	27229	21517	29134	27991	22469	31799	28943	24373	32752	29324	26658	254	129
	MD	30732	28723	22697	30732	29526	23702	33544	30531	25710	34548	30932	28120	254	136
	MDFR	28400	26543	20975	28400	27286	21903	30998	28214	23759	31926	28585	25987	254	126
	ND	30959	28936	22865	30959	29745	23877	33792	30757	25900	34804	31161	28329	254	137
	NDFR	28415	26558	20986	28415	27301	21915	31015	28230	23772	31944	28601	26001	254	126
	NDA	31234	29193	23068	31234	30009	24089	34092	31030	26130	35113	31438	28580	254	138
	WD	30748	28739	22710	30748	29543	23714	33562	30547	25724	34567	30949	28136	254	136
	WDFR	26692	24947	19714	26692	25645	20586	29134	26517	22330	30007	26866	24424	254	118
	WDA	31350	29301	23154	31350	30120	24178	34218	31145	26227	35243	31555	28686	254	139

OPERATIONAL DATA CONTINUED

Emergency Lumen Output

How to Estimate Delivered Lumens in Emergency Mode
Use the formula below to estimate the delivered lumens in emergency mode
Delivered Lumens = P x LPW
P = Output power of emergency driver
LPW = Lumen per watt rating of the luminaire. (See charts on pages 6 and 7)
The LPW rating is also available at Designlight Consortium

P = 10 watts for E10WCP
P = 15 watts for E15WCPR
P = 21.3 watts for BSL722CR
P = 30 watts for PS30250R

Emergency Lumen Output Example - 30 Watt Battery

Approximate Luminaire Efficacy	Approximate Lumens at 1 Minute	Approximate Lumens at 45 Minutes	Approximate Lumens at 90 Minutes
100 LPW	3000	3000	3000
110 LPW	3300	3300	3300
120 LPW	3600	3600	3600
130 LPW	3900	3900	3900
140 LPW	4200	4200	4200
150 LPW	4500	4500	4500

Lumen Maintenance 12000LM Package

Ambient °C	0 Hours	15000 Hours	30000 Hours	36000 Hours	45000 Hours	60000 Hours	100000 Hours
25	1.00	0.98	0.97	0.96	0.96	0.95	0.92
30	1.00	0.98	0.97	0.96	0.96	0.95	0.92
35	1.00	0.98	0.97	0.96	0.96	0.95	0.92
40	1.00	0.98	0.97	0.96	0.96	0.95	0.92
45	1.00	0.97	0.96	0.96	0.95	0.94	0.91
50	1.00	0.97	0.96	0.95	0.95	0.93	0.90
55	1.00	0.97	0.95	0.95	0.94	0.93	0.89
60	1.00	0.97	0.95	0.94	0.93	0.92	0.88
65	1.00	0.96	0.95	0.94	0.93	0.91	0.87
70	1.00	0.96	0.94	0.93	0.92	0.9	0.85

Lumen Maintenance 18000LM Package

Ambient °C	0 Hours	15000 Hours	30000 Hours	36000 Hours	45000 Hours	60000 Hours	100000 Hours
25	1.00	0.98	0.97	0.96	0.96	0.95	0.92
30	1.00	0.98	0.97	0.96	0.96	0.95	0.92
35	1.00	0.97	0.96	0.96	0.95	0.94	0.91
40	1.00	0.97	0.96	0.95	0.95	0.93	0.90
45	1.00	0.97	0.95	0.95	0.94	0.93	0.89
50	1.00	0.97	0.95	0.94	0.94	0.92	0.88
55	1.00	0.96	0.95	0.94	0.93	0.91	0.87
60	1.00	0.96	0.94	0.93	0.92	0.90	0.85
65	1.00	0.95	0.92	0.91	0.90	0.88	0.83
70	1.00	0.94	0.91	0.9	0.88	0.85	0.78

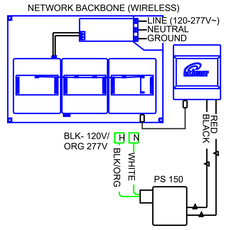
Lumen Maintenance 24000LM Package

Ambient °C	0 Hours	15000 Hours	30000 Hours	36000 Hours	45000 Hours	60000 Hours	100000 Hours
25	1.00	0.98	0.97	0.96	0.96	0.95	0.92
30	1.00	0.98	0.97	0.96	0.96	0.95	0.92
35	1.00	0.97	0.96	0.95	0.95	0.94	0.91
40	1.00	0.97	0.96	0.95	0.94	0.93	0.90
45	1.00	0.97	0.95	0.95	0.94	0.92	0.88
50	1.00	0.96	0.95	0.94	0.93	0.91	0.87
55	1.00	0.96	0.94	0.94	0.92	0.91	0.86
60	1.00	0.96	0.94	0.93	0.92	0.90	0.84
65	1.00	0.94	0.92	0.90	0.89	0.86	0.80
70	1.00	0.93	0.9	0.89	0.87	0.83	0.76

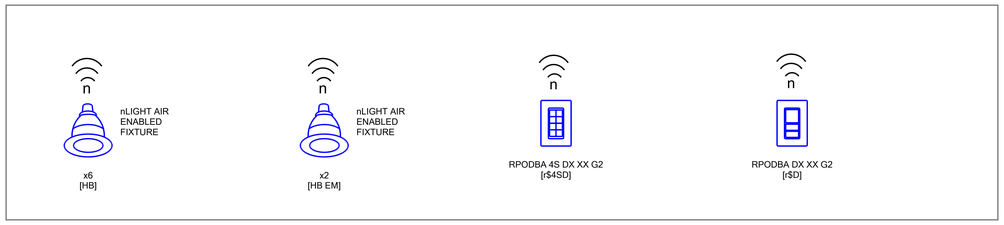
Appendix G:

Proposed Lighting Control Network and Equipment Cutsheets

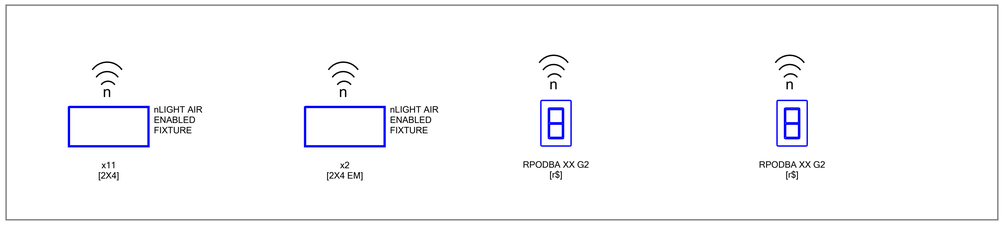
APPENDIX G - LIGHTING CONTROL NETWORK AND EQUIPMENT CUTSHEETS



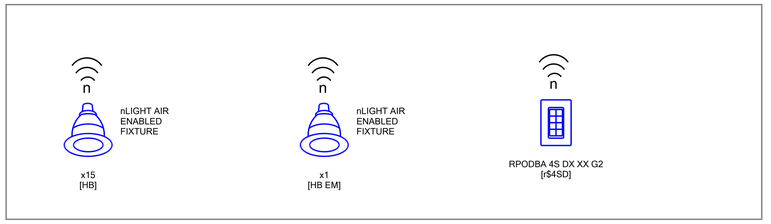
2 Network Riser - NETWORK BACKBONE (WIRELESS)
WIRELESS



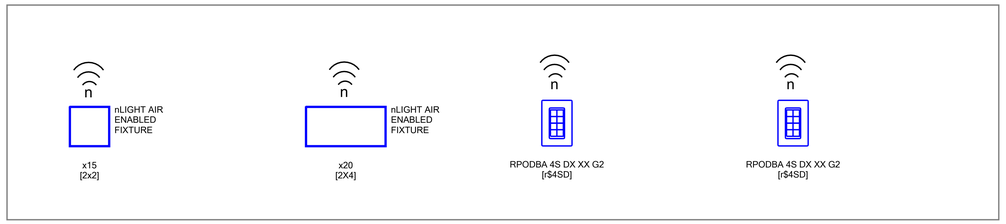
13 nLight Air NLIGHT AIR ADAPTOR - TYP AUDITORIUM (QTYS MAY VARY)
WIRELESS



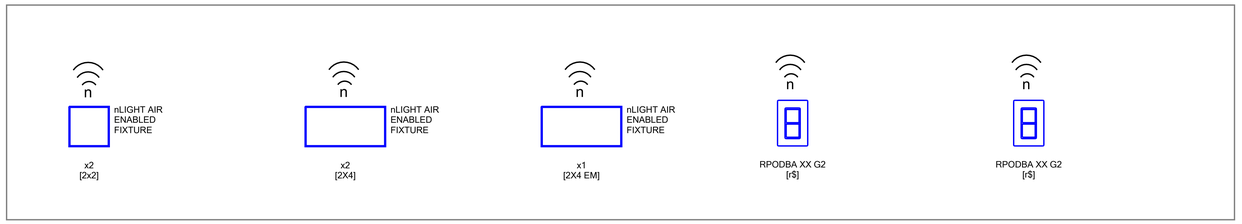
14 nLight Air NLIGHT AIR ADAPTOR - TYP CORRIDOR (QTYS MAY VARY)
WIRELESS



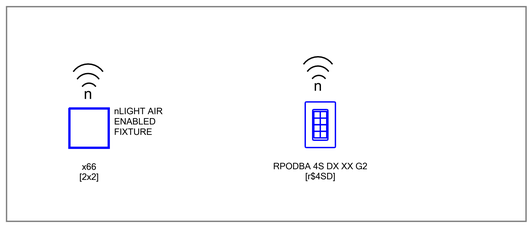
15 nLight Air NLIGHT AIR ADAPTOR - TYP GYM (QTYS MAY VARY)
WIRELESS



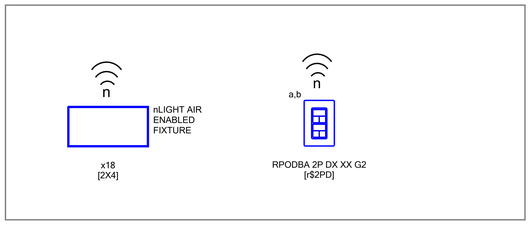
16 nLight Air NLIGHT AIR ADAPTOR - TYP LIBRARY (QTYS MAY VARY)
WIRELESS



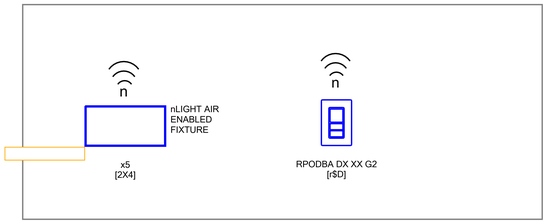
17 nLight Air NLIGHT AIR ADAPTOR - TYP LOBBY (QTYS MAY VARY)
WIRELESS



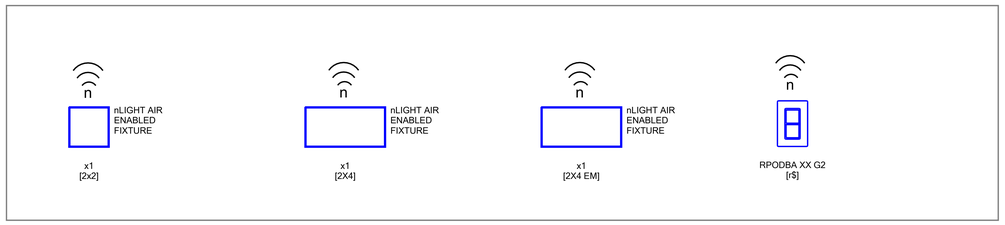
18 nLight Air NLIGHT AIR ADAPTOR - TYP STUDENT DINING (QTYS MAY VARY)
WIRELESS



19 nLight Air Standalone - TYP CLASSROOM (QTYS MAY VARY)
WIRELESS

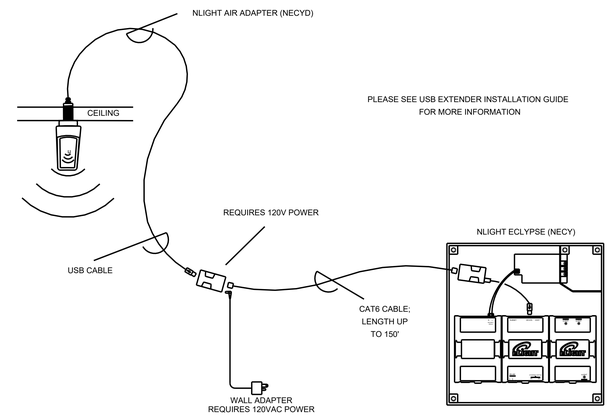


20 nLight Air Standalone - TYP OFFICE (QTYS MAY VARY)
WIRELESS



21 nLight Air Standalone - TYP RESTROOM (QTYS MAY VARY)
WIRELESS

PLEASE NOTE THAT RPODBA (BATTERY) SWITCHES SHOWN IN THESE LIGHTING CONTROL DIAGRAMS HAVE BEEN REPLACED WITH RPODLA (LINE POWERED) SWITCHES IN LIGHTING REPORT. COSTING WAS CONFIRMED TO BE THE SAME.



USB EXTENDER FOR NLIGHT AIR ADAPTER INSTALLATION
N.T.S.

AcuityBrands

SCA STUDY
NEW YORK, NY

Drawing Type: Riser	Prepared For:
Revision	Date
A	5/25/2022
Date:	5/24/2022
Scale:	NOT TO SCALE
Drawn By:	AG
Project #:	
DWG Ref:	
Sheet:	WIRELESS 1

OVERVIEW

The nLight ECLYPSE™ system controller connects an nLight® lighting network to support connectivity and management over an IP network, control and device setting adjustment, integration with building management, integration with demand response, and more.

FEATURES

- Communicates over IP, allowing the system controller and connected lighting controls devices to be accessed and configured across a local area network
- Each system controller supports up to 750 nLight and nLight AIR devices. Additional controllers can connect and scale a system of lighting controls to a maximum of 20,000 devices
- BACnet Testing Laboratories (BTL) listed as a BACnet Building Controller (B-BC)
- Can be discovered and managed through free SensorView software and through an onboard web GUI
- Provides time-of-day and astronomical time clock capabilities for scheduled lighting control events
- Manages forwarding of global control channels and system profiles to affect devices on multiple controllers at the same time
- Enhanced security through toggleable HTTP or HTTPS connections, a FIPS 140-2, Level 1 compliant security interface, SSO or Radius Server capabilities, and more
- Optional demand response client allows activation of configurable load shed dimming levels by utility DRAS through OpenADR 2.0a

nLight ECLYPSE™
System Controller

Warranty
Five-year limited warranty. Complete warranty terms located at:
www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. Specifications subject to change without notice.

BACnet is a registered trademark of ASHRAE.
ASHRAE does not endorse, approve or test products for compliance with ASHRAE standards. Compliance of listed products to the requirements of ASHRAE Standard 135 is the responsibility of BACnet International (BI). BTL is a registered trademark of BI.

Patents:
- US9819544B2
- US10073423B2
- EP3250970B1
- US9608538B2
- EP3139697B1
- CA2971061A1
- US9924243B2

ORDERING INFORMATION

NECY							Example: NECY MVOLT BAC ENC
Series	**Voltage**	**BACnet**	**AutoDR**	**Visualization Software**	**Enclosure**	**Wi-Fi Adapter**	**Options**
nECY nLight ECLYPSE	MVOLT 120-277 VAC 347 347 VAC	[blank] Not Enabled BAC BACnet/ IP & MS/TP Enabled	[blank] Not Enabled ADR Open ADR VEN	[blank] Not Enabled SVS[1] Envysion	ENC NEMA Type 1 metal enclosure	[blank] Includes Wi-Fi Adapter NW No Wi-FI Adapter Included	[blank] None SEP Single Ethernet Port GFXK[2] Touchscreen interface (model nGWY2 GFX, mounted separately), PS 150 power supply, CAT5 cable AIR[3] Includes NECYD NLTAIR G2

ACCESSORIES	
nECY ENC	NEMA 1 Enclosure and pre-mounted 120-277VAC input, 24VDC output (Max 50W) power supply
nECYD NLTAIR G2	nLight AIR wireless adapter
nECYREPL INTF	nLight Interface module (introduces 750 device limit if added to an ECLYPSE with AIR option)
nECYUPG SVEA[4]	nLight ECLYPSE License, adds support of up to 5 MODBUS devices[4]

Notes
1. Requires BACnet option.
2. If 347 voltage option is selected, includes PS150 347.
3. AIR option supports 150 devices. RJ45 ports for connecting nLight wired devices are not available with the AIR option. GFXK option is not available with AIR option.
4. SVEA license requires SVS and BAC licenses as prerequisites. See nLight ECLYPSE Replacement Parts Guide for more information.

SPECIFICATIONS

Control Module

Size:	4.74" H x 3.57" W x 2.31" D (12.03 cm x 9.07 cm x 5.86 cm)
Mounting:	DIN rail mounted
nLight ECLYPSE Assembly Size:	4.74" H x 14.76" W x 2.43" D (12.03 cm x 37.5 cm x 6.16 cm)
Ports:	Ethernet: (2) switched RJ-45 Ethernet ports USB Connections: 2 x USB 2.0 ports RS-485 Serial Communications: Screw terminals (Used for either BACnet MS/TP Subnet: RJ-45
Real Time Clock (RTC):	Real Time Clock with rechargeable battery. Supports SNTP network time synchronization
RTC Battery:	20 hours charge time, 20 days discharge time. Up to 500 charge / discharge cycles
Enclosure:	FR/ABS UL94-V0 flammability rating
Environmental:	Operating Temperature: 32°F to 122°F (0 to 50°C) Storage Temperature: -22°F to 158°F (-30 to 70°C) Relative Humidity: 0 to 90% non-condensing Ingress Protection Rating: IP20
Security:	FIPS Publication 140-2, Level 1 Compliant Complies with California Civil Code Title 1.81.26, Security of Connected Devices, approved under Senate Bill No. 327 (2018)

nLight Network Interface Module

Size:	4.74" H x 3.20" W x 2.31" D (12.03 cm x 8.12 cm x 5.86 cm)
Mounting:	DIN rail mounted
Ports:	3 nLight bus ports (RJ-45)
nLight Bus Power Output:	0mA per port

Power Supply Module (24V)

Size:	24V: 4.74" H x 2.85" W x 2.31" D (12.03 cm x 7.24 cm x 5.86 cm)
Operating Voltage:	24V: 24VAC/DC; ±15%; Class 2
Output Voltage, Rated Current & Power:	24V: 18VDC regulated, 0-1.6A, 30W max

Enclosure

Type:	NEMA 1 rated surface mount screw cover
Size:	14.25"H x 14.25"W x 4.00"D (36.20cm x 36.20cm x 10.16cm)
Rating:	UL 2043 (Plenum) Rated

COMMUNICATION

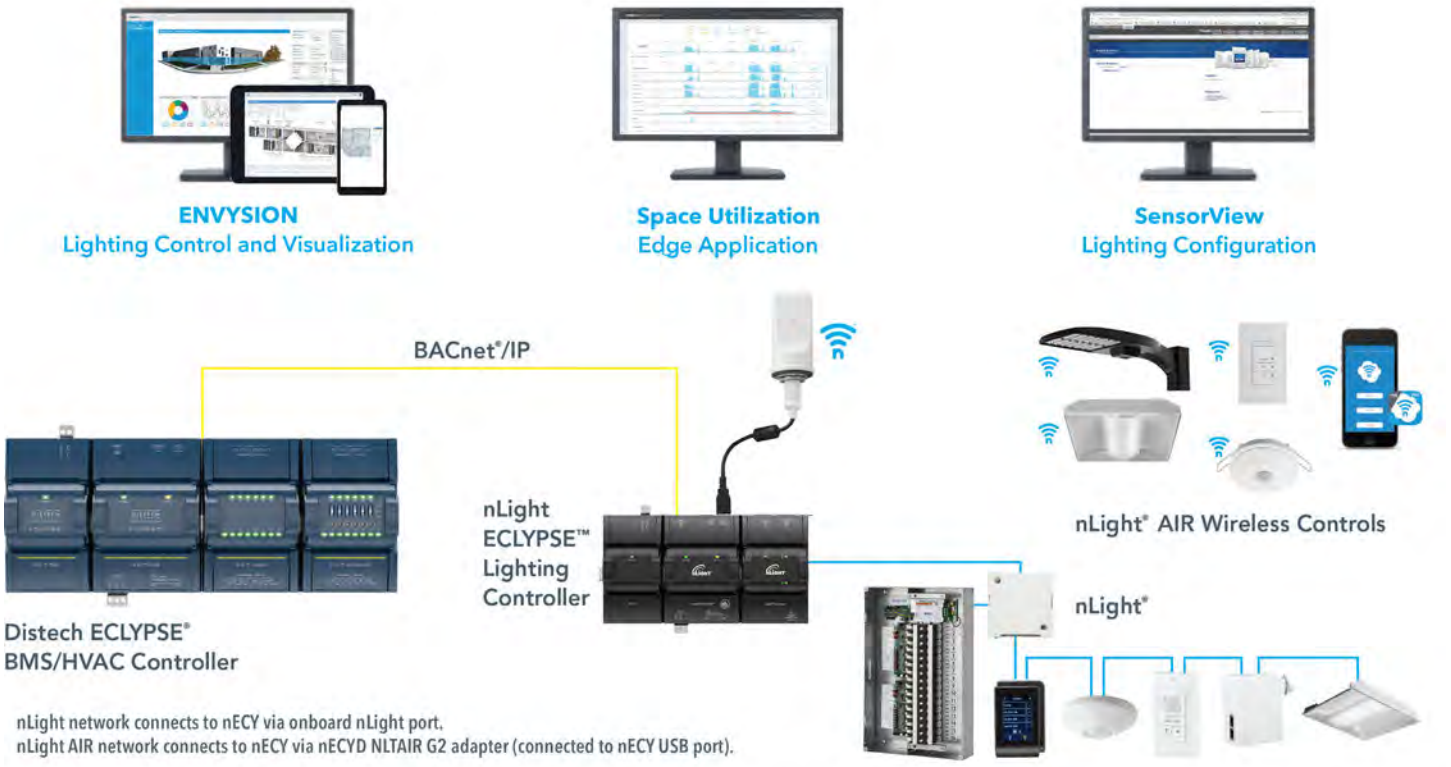
Ethernet Connection Speed:	10/100 Mbps
Addressing:	IPv4 or Hostname
BACnet Profile:	BACnet Building Controller (B-BC)
BACnet Listing:	BTL, B-BC
BACnet Interconnectivity:	BBMD forwarding capabilities BACnet/IP to BACnet MS/TP routing
BACnet Transport Layer:	MS/TP & IP (optional)
Web Server Protocol:	HTML5
Web Server Application Interface:	REST API

Supported BACnet MS/TP and Modbus RTU Connectivity:
- BACnet MS/TP OR Modbus RTU 1 × RS-485 serial communications ports
- Each RS-485 port supports one communication protocol at a time
- RS-485 Wiring – 1-pair + Common/shield
- RS-485 EOL Resistor – Built-in
- RS-485 Baud Rates – 9600, 19200, 38400, or 76800 bps
- RS-485 Addressing – Controller's Web Configuration Interface

Supported Wireless Connectivity:
- Wireless Adapter – USB Port Connection
- Wi-Fi Communication Protocol – IEEE 802.11b/g/n
- Wi-Fi Network Types – Client, Access Point, Hotspot

SYSTEM ARCHITECTURE

The nLight ECLYPSE serves as the backbone for nLight and nLight AIR digital lighting networks. The nLight ECLYPSE provides networked devices with schedule management and remote software programming via SensorView web-based software. The backbone also provides support for system-wide controls such as master override switches, automated demand response, and BACnet integration. One nLight ECLYPSE is capable of handling up to 750 total devices and up to 128 global channels for the entire network. The nLight ECLYPSE is also compatible with other Distech ECLYPSE products, offering a full suite of BAS capabilities.



HVAC Integration with ECLYPSE and Third Party Controllers

Lighting Management and Control Through Web Applications

Connection with nLight Wired and nLight AIR Devices

EXAMPLE NLIGHT ECLYPSE NOMENCLATURE AND OPTIONS

Example Nomenclature	Connection to Wired Devices	Maximum of 150 Wireless Devices	Maximum of 750 Wireless Devices	All License Options Available (BAC, SVS, SVEA)
NECY MVOLT ENC	✓	No AIR Adapter	No AIR Adapter	✓
NECY MVOLT ENC + NECYD NLTAIR G2	✓	Not Limited at 150	✓	✓
NECY MVOLT ENC AIR	No Wired Interface Module	✓	Reduced Capability	✓
NECY MVOLT ENC AIR + NECYREPLY INTF	✓	Not Limited at 150	✓	✓

OVERVIEW

The nLight® AIR Adapter is used to connect an nLight AIR control system to the nLight ECLYPSE®, enabling time-based configuration, remote programming, and control via BACnet, Automated Demand Response, and RESTful API. Using browser based software, users can control their wired and wireless nLight devices through a graphic floor plan, configure settings through the floor plan view or a tree view, and perform firmware updates.

The nLight AIR Adapter gives secure network capability to devices within a single space or across multiple spaces. A network of nLight AIR devices can be zoned, programmed, and controlled through an nLight ECLYPSE and Adapter with protection from nLight AIR's robust five-tier security framework.

FEATURES

- Enables wireless network control of up to 750 nLight AIR devices (per nLight AIR Adapter) in a single space or across multiple spaces
- Allows control of devices through SensorView software, BACnet commands, Automated Demand Response, and RESTful API
- Easy wiring through a USB connection to the nLight ECLYPSE.
- 5-tier security prevents unauthorized control of the wireless network.
- IP66 rating for indoor and outdoor use.
- Includes a 16-foot cable, mounting bracket, and an optional extender for remote mounting.
- Supports web-based update of devices using SensorView software

nLight® AIR Adapter

Wirelessly enables nLight AIR devices to communicate with nLight ECLYPSE Controller

Warranty

Five-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/customer-support/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. Specifications subject to change without notice.

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ORDERING INFORMATION

NECY			Examples: NECYD NLTAIR G2
Series		**Generation**	
NECYD NLTAIR	Networked nLight AIR wireless adapter	G2	Generation 2 compatibility

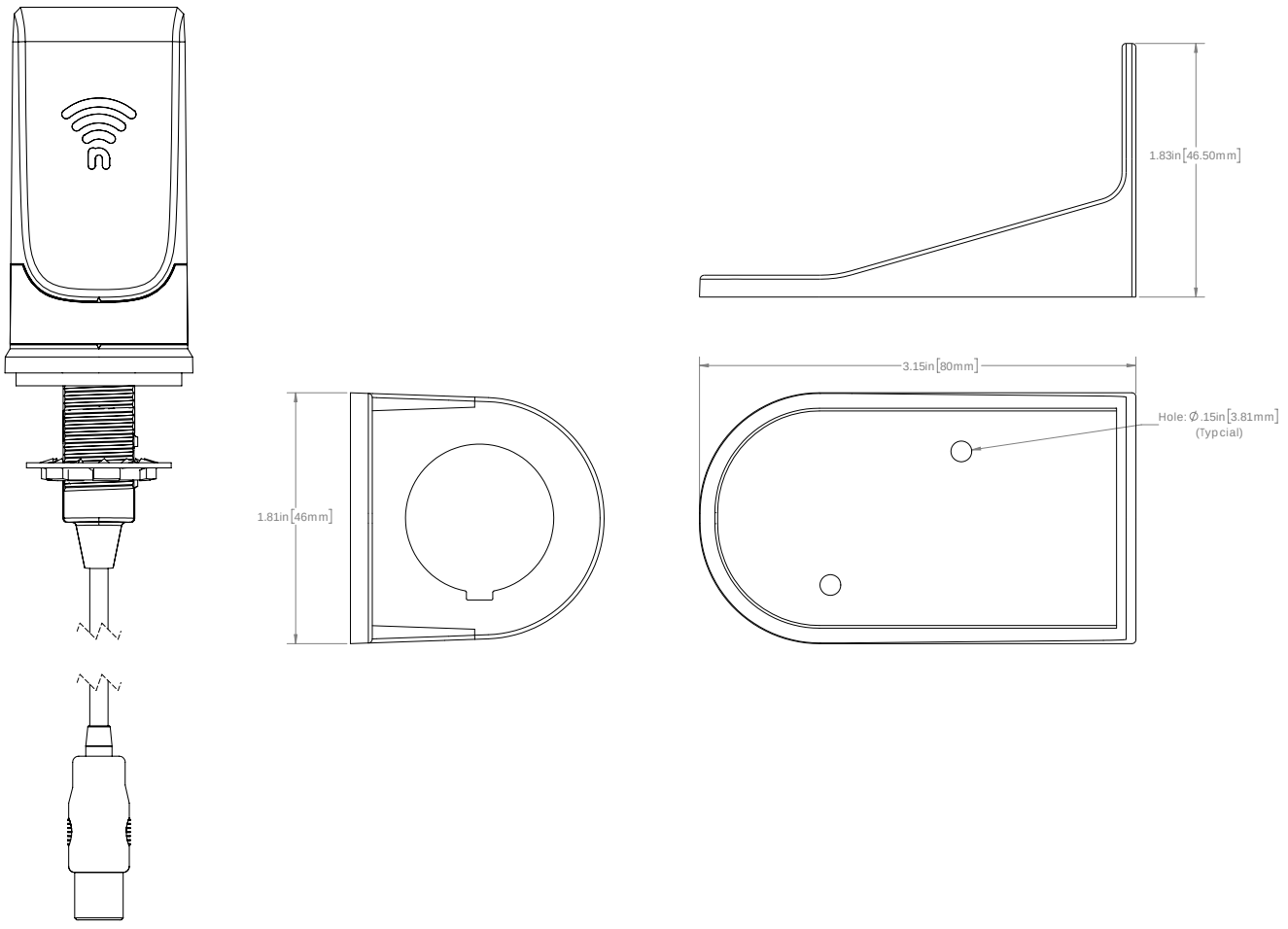
Additional Accessories: *Order as separate catalog number.*	
NECYD EXT150	USB to CAT6 extender to add up to 150 feet of length [1,3]

Notes:
1. USB extender requires 120V. Wall adapter is included for connection closest to the NECYD NLTAIR G2. Requires use of CAT6 cable (provided by others). CAT5 and CAT5e cable should not be used with this product.
2. Wireless Range is subject to site-specific conditions. See nLight AIR Design Guide for more information.
3. The USB extender accessory is manufactured by CommFront. Five-year limited manufacturer warranty. Please reference www.acuitybrands.com/support/customer-support/terms-and-conditions regarding third party manufacturer warranty terms.

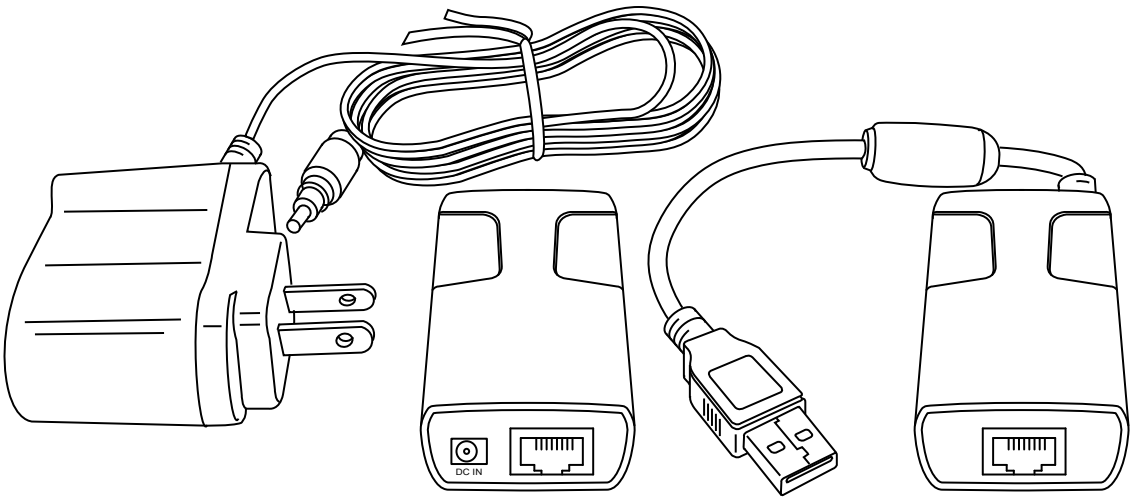
SPECIFICATIONS

Dimensions:	5" h x 1.62" l x 1.62" d
Product Weight:	5.8 oz
Trim Color:	White
Enclosure Material:	Technomelt™ (high performance thermoplastic polyamide)
Max Humidity:	0-95% non-condensing
Operating Temperature:	-40°C to 65°C
Mounting:	Ceiling mount, wall mount, panel mount (with included bracket)
Radio Frequency:	Dual Radio: 900MHz & 2.4GHz
RF Transmit Power:	900Mhz: up to 27 dBm
	2.4GHz: up to 10.4 dBm
Wireless Standard:	900MHz: IEEE 802.15.4-based
	2.4GHz: Version 4.0+ of the Bluetooth specification
Wireless Range:	1,000 ft line of sight, 150 ft range in standard indoor construction [2]
	Connected nLight AIR devices support repeating broadcasts to increase initial broadcast range [2]
Security:	Application Data Encryption: AES-128 bit
	Mutual Entity Authentication
	Message Confidentiality
	Message Authentication and Replay Prevention
	Limited Anonymity
	Complies with California Civil Code Title 1.81.26, Security of Connected Devices, approved under Senate Bill No. 327 (2018)
Regulatory Compliance:	FCC: 2ADCB-RMODITHP, IC: 6715C-RMODITHP
	Safety: Canada & US UL Listed; RoHS Compliant
Cable:	16 ft; not plenum rated

MECHANICAL AND MOUNTING DETAILS



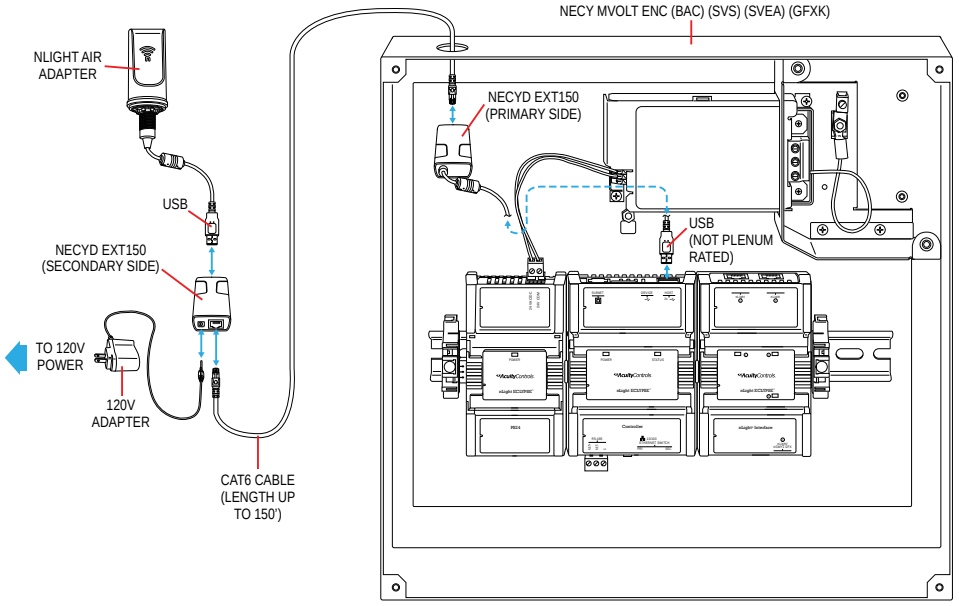
nECYDEXT



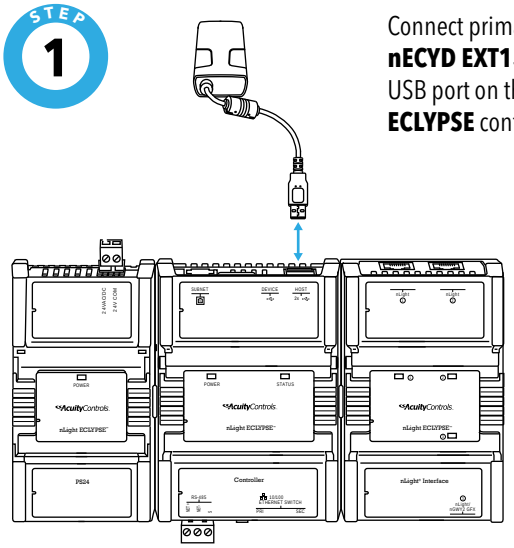
nECYD EXT150
Installation Guide

Installation

The **nECYD EXT150** is a rugged, industrial-grade USB 2.0 repeater/extender that can be used to extend the distance between an **nLight ECLYPSE (nECY)** and an **nLight Air Adapter (nECYD NLTAIR G2)** by up to 150ft (45m). The nECYD EXT150 works in pair (one transmitter and one receiver) to extend the distance over CAT6 cables.

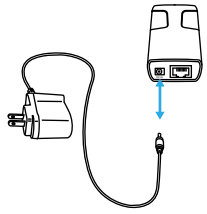


STEP 1



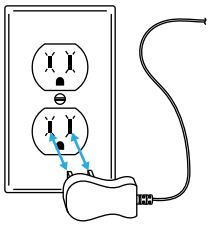
Connect primary side of **nECYD EXT150** to either USB port on the nLight **ECLYPSE** controller module.

STEP 2



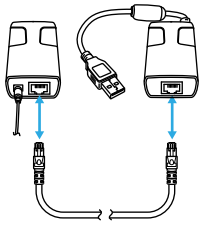
Connect the secondary side of the **nECYD EXT150** to the wall adapter.

STEP 3



Plug the wall adapter into a **120VAC** source.

STEP 4

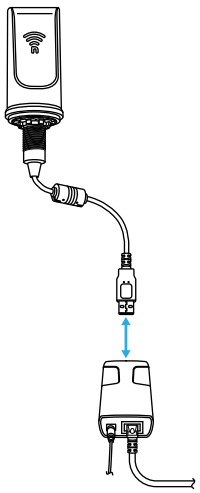


Connect the primary and secondary components using **CAT6** cable.

NOTE

CAT5e/CAT5 cable is not approved for use with this device. Cable length of CAT6 cable shall not exceed 150 ft. (45m) in length.

STEP 5



Connect the secondary side to the **nECYD NLTAIR G2**.

Catalog Number: r$, r$2PD, r$4SD, r$D | Date: | Project:

OVERVIEW

The nLight® AIR rPODLA is a wireless, line-powered wall switch that provides a user with local control of a lighting zone. These single gang decorator style devices have soft-click buttons and a green LED indicator for each button. The rPODLA wall switches communicate with other nLight AIR devices via radio frequency (RF). A line-powered wall switch can work with any nLight AIR enabled fixture or power pack to provide toggle switch operation with multi-pole and preset scene control. Wall switches with the DX option have the added ability to adjust the level of any nLight AIR controlled dimmable light fixture or on/off/dimimng control of a single zone for preset scene switches.

FEATURES

- Communicates with nLight® AIR devices via radio frequency (RF) in the 900MHz spectrum
- Soft-click push-button control with LED feedback upon press
- Remotely configurable/upgradeable
- Single pole or two pole on/off control with optional raise/lower option ("DX" option)
- 2 or 4 preset scene control fully configurable via CL**AIR**ITY™+ mobile app
- Maximum of 4 total preset scenes per nLight AIR group
- Wireless multi location preset scene recall and on/off/dimming control

CUSTOM BUTTON ENGRAVING

- Custom lettering for units can be specified and ordered at: nGrave Form
- To ensure color uniformity, ordering templates facilitate specifying all buttons on a unit as custom lettered. Replacing single buttons not recommended
- Custom buttons will ship separately and require field installation

Warranty

Five-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. Specifications subject to change without notice.

A+ Capable

This item is an A+ capable component, which has been designed and tested to provide out-of-the-box luminaire compatibility with simple commissioning, when included as part of an A+ Certified™ Solution.

To learn more about A+, visit www.acuitybrands.com/aplus.

nLight® AIR rPODLA:

Wireless Line powered Wall Switches

Note: nLight® AIR devices are only compatible with other nLight AIR enabled devices; and is not cross compatible with other nLight product lines at this time.

ORDERING INFORMATION

rPODLA — **Example: RPODLA 2P DX MVOLT WH G2**

Series	Poles & Scenes	Dimming Control	Voltage	Color	Generation
RPODLA	[blank] Single Pole 2P Two Pole 2S Two Preset Scene Control 4S Four Preset Scene Control	[blank] On/off Control DX On/off + Raise/Lower Control	MVOLT 120-277 VAC 347 347 VAC	WH White IV Ivory AL Light Almond GY Gray RD Red BK Black	G2 Generation 2 Compatibility

ORDERING INFORMATION

All rPODLA switches are shipped with wall plates, however, the following order information is available to acquire replacement wall plates.

Wall Plate - Additional or Replacement

Series	# of Gangs	Color			Packaging
WS XPODA Wall Plates (Standard) SSW Sealed Covers	1 GNG Single Gang	WH White IV Ivory GY [2] Gray	AL [2] Light Almond BK [2] Black RD Red	VP [2] Variety Pack	[blank] Single Unit [3] M5 [2] 5 Pack M6 [1,2] 6 Pack

Accessories

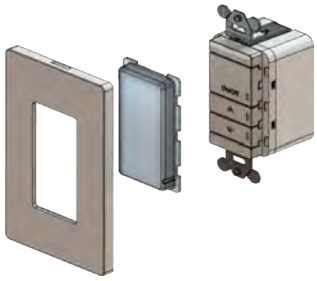
RPODLA MOUNTRING	Replacement mounting ring for rPODBA and rPODB switches

1. Available only for variety pack.
2. Not available for SSW series
3. Single units only available for SSW series

WALL SWITCH CLEANING

It will occasionally be necessary to clean the wall switches. All rPODLA switches may be wiped down with a soft cloth or paper towel dampened with glass cleaner, vinegar and water, hydrogen peroxide, or a mild abrasive. Spray a limited amount on the cloth or paper towel prior to applying. Do not spray cleaner on the switches directly, and do not wipe the switches down with a towel saturated (drips when wrung out) with cleaner.

If the ability to clean the switches using chemical spray disinfectants is desired, we recommend the use of the Sealed Screwless Wall Plate (SSW). The Sealed Screwless Wall Plate is a cover for the standard wall plate, designed with an IP54 rating. It consists of a transparent silicone rubber layer that covers the wall switch to prevent liquids from entering the wall switch while maintaining a tactile button feel. The Sealed Screwless Wall Plate is the ideal solution to prevent liquids from entering the wall switch while maintaining a tactile button feel. The Sealed Screwless Wall Plate is the ideal solution to help protect a wall switch from fluid entering the device while enabling the use of disinfectants recommended by the EPA for use against SARS-CoV-2, the coronavirus that causes COVID-19, which often require spraying or saturating the surface..

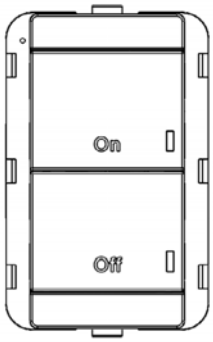


For more information on the Sealed Screwless Wall Plates

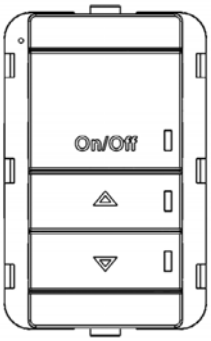
SPECIFICATIONS

Dimensions	2.74" H x 1.68" W x 1.78" D (6.96 cm x 4.27 cm x 4.52 cm)
Weight	4.25 oz
Mounting	Single Gang Switch Box or Low Voltage Ring
Color	White, Ivory, Lt. Almond, Gray, Red, Black
Operating Temperature	0C to 60C (Indoor Use Only)
Relative Humidity	Standard: 20 to 75% non-condensing
Input Power	< 1 watt
Radio Frequency	Dual Radio: 900Mhz & 2.4GHz
RF Transmit Power	900Mhz: +20dBm; 2.4GHz: Variable
Wireless Standard	900MHz: IEEE 802.15.4-based 2.4GHz: Version 4.0+ of the Bluetooth specification
Security	Application Data Encryption: AES-128 bit Mutual Entity Authentication Message Confidentiality Message Authentication and Replay Prevention Limited Anonymity
Regulatory Compliance	FCC ID: 2ADCB-RMODIT3 IFETEL, RoHS IC: 6715C-RMODIT3 IFETEL: RCPNLNL20-2057
Programming Tool	CL**AIR**ITY+ mobile app

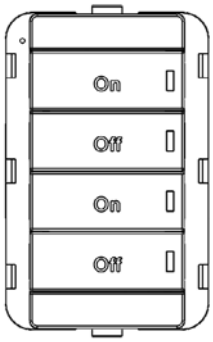
DEFAULT LABELING



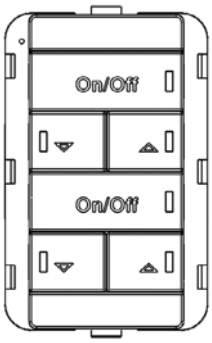
rPODLA
On/Off Control



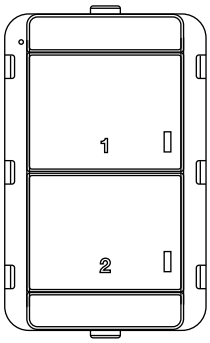
rPODLA DX
On/Off +Raise/Lower Control



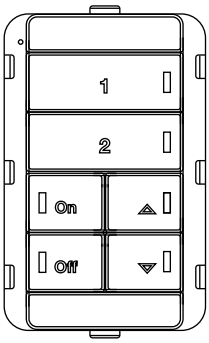
rPODLA 2P
Two Pole On/Off Controls



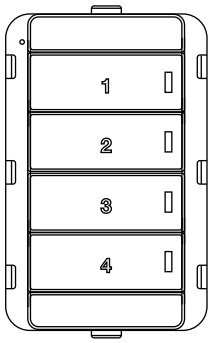
rPODLA 2P DX
Two Pole On/Off + Two Raise/Lower Controls



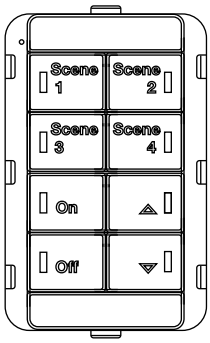
rPODLA 2S
2 Preset Scene Control



rPODLA 2S DX
2 Preset Scene Control with On/Off/Raise/Lower

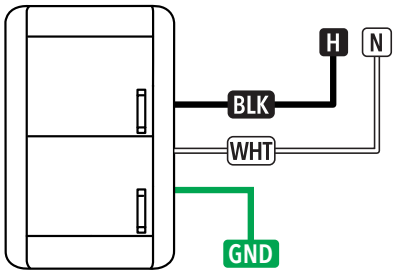


rPODLA 4S
4 Preset Scene Control



rPODLA 4S DX
4 Preset Scene Control with On/Off/Raise/Lower

WIRING



Catalog Number: rPP20 and rPP20ER | Date: | Project:

OVERVIEW

nLight AIR rPP power packs are designed to offer flexible control for commercial and industrial lighting applications. The rPP consists of a relay, 0-10V dimming control, and a low voltage power supply output to power and wireless sensors. The rPP is capable of switching loads up to 20 A via a latching relay designed with robust inrush protection. Select power packs provide +24VDC low voltage output to power up to 4 nLight AIR mounted occupancy sensors and photocells. The nLight AIR rPP is designed for use as part of an nLight AIR group of devices or with the nLight ECLYPSE™.

POWER PACK FEATURES

- On/Off and dimming control of a luminaire or group of luminaires
- 24VDC output to power up to 4 nLight AIR rCMS low voltage sensors or other low voltage devices
- Suitable for plug load control
- UL 924 listed options for simplified lighting control on emergency lighting circuits
- Power Monitoring with Current Measurement +/- 3% accuracy

INSTALLATION FEATURES

- Wireless communication enables simple retrofits - no communication wires to pull between devices
- Chase nipple or side output dimming options
- UL 2043 listed for plenum applications
- An optional external antenna (CP option) for meeting code specific requirements or IP-rated applications
- Simple app-based configuration of space behaviors

ADVANCED WIRELESS FEATURES

- Devices intercommunicate to provide grouped-response to motion and on/off and dimming response to daylight conditions when wirelessly connected to a motion or daylight sensor, or on/off/dimming when connected to a wireless switch
- Fully compatible with other nLight AIR devices on the site
- Easy to integrate with the nLight ECLYPSE, which provides site-wide lighting control through nLight's SensorView software and provides optional BMS integration
- Comprehensive wireless security

Warranty

Five-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. Specifications subject to change without notice.

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

nLight® AIR rPP20

Power/Relay Pack

LISTED

ORDERING INFORMATION

rPP20 — **Example: rPP20 D 24V EFP G2**

Series		Dimming and Low Voltage Output				Emergency		Fault Protection	
RPP20	nLight AIR Power/Relay Pack	[blank]	None	DS	0-10VDC dimming output (via side leads), no 24V output terminals	[blank][1]	None	EFP	External Fault Protection
		24V	No dimming, 24V Output Terminals	DS 24V	0-10VDC Dimming output (via side leads), 24V Output Terminals	ER	UL924 Emergency Operation, via power sense leads		
		D	0-10VDC Dimming output (via chase nipple), no 24V Output Terminals			EM[2]	UL924 Emergency Operation, via separate normal power sensing device		
		D 24V	0-10VDC dimming output (via chase nipple), 24V output terminals						

Territory Compliance		Voltage		Power Monitoring		Generation	
[blank]	None	[blank][4]	120-277V	[blank]	None	G2	Generation 2 compatibility
CP[3]	Chicago Plenum	UVOLT[4]	120-480V	IM	Current Monitoring		

ACCESSORIES

NPP FUSE J10	Replacement Fuse

Notes

1. Can provide normal power sensing information to nLight AIR devices with EM option. See the UL 924 Response section for more information.
2. EM option requires an nLight AIR device connected to normal power for wireless normal power detection. See the UL 924 Response section for more information.
3. Not available with UVOLT model.
4. All phase-to-phase applications, including 208VAC and 480VAC, require factory installation.

SPECIFICATIONS

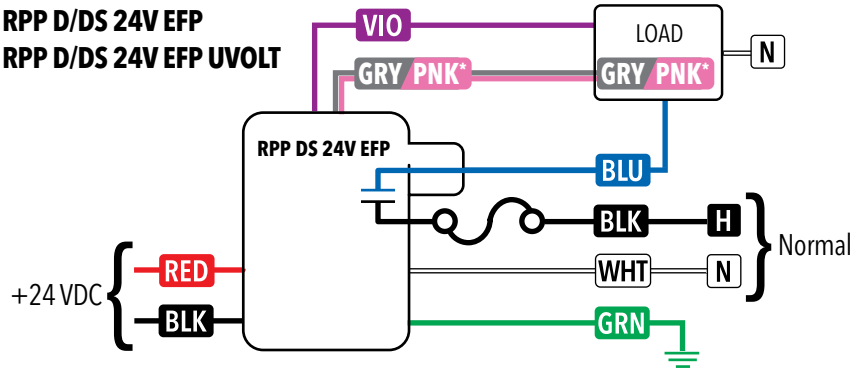
Size:	3.50" x 3.52" x 1.82" (120-277V model) 4.725" x 4.80" x 1.865" (UVOLT model)
Weight:	6 oz
Mounting:	1/2" Knockout
Color:	White (standard), Red (ER & EM)
Humidity:	5 to 95% non-condensing
Location:	Damp Location Rating
Wires:	Line and load 12 AWG stranded Neutral, ground, and power sense (ER version) 18 AWG stranded 0-10V, 20 AWG stranded
Operating Voltage:	120-277VAC, 120-480VAC (UVOLT)
Relay type:	Latching
Frequency:	50/60Hz
Current Monitoring:	MVOLT versions include automatic voltage detection for power calculation. HVOLT versions require user input of voltage via SensorView to calculate power Minimum Current required to ensure +/- 3% Accuracy MVOLT - 425mA UVOLT - 625mA
DC Output Terminals:	Push-in Terminals, solid or tinned 16-20AWG
DC Output Voltage/Current:	24 VDC, 100 mA max output
0-10V Dimming:	Sinks 150mA; 0-10VDC dimmable ballasts or LED drivers;
Radio Frequencies:	900 MHz up to +20dBM, 2.4 GHz up to +10 dBM
Wireless Standard:	900 MHz: IEEE 802.15.4-based; 2.4 GHz: Version 4.0+ of the Bluetooth specification
Security:	Application Data Encryption AES-128 bit, Mutual Entity Authentication, Message Confidentiality, Message Authentication and Replay Prevention, Limited Anonymity Complies with California Civil Code Title 1.81.26, Security of Connected Devices, approved under Senate Bill No. 327 (2018)
Regulatory Compliance:	FCC ID: 2ADCB-RMODIT3 IC: 6715C-RMODIT3 IFETEL: RCPNLNL20-2057 cULus RoHS

Temperature and Load Ratings

Model	rPP20 (-10 to 50 C)		rPP20 (-10 to 60 C)		rPP20 UVOLT (-10 to 70C)			
Voltage	120 VAC	277 VAC	120 VAC	277 VAC	120 VAC	277 VAC	347 VAC	480 VAC
General Purpose	20 A	20 A	5 A	5 A	20 A	20 A	20 A	5 A
Tungsten	20 A	20 A	5 A	5 A	20 A	20 A	20 A	5 A
Standard Ballast	20 A	20 A	5 A	5 A	20 A	20 A	20 A	5 A
Electronic Ballast	16 A	16A	5 A	5 A	16 A	16 A	16 A	5 A
Motor	1.5 HP	1.5 HP	1.5 HP	1.5 HP	1.5 HP	1.5 HP	3/4 HP	1/2 HP

WIRING (Do not wire hot)

RPP D/DS 24V EFP
RPP D/DS 24V EFP UVOLT



Legend

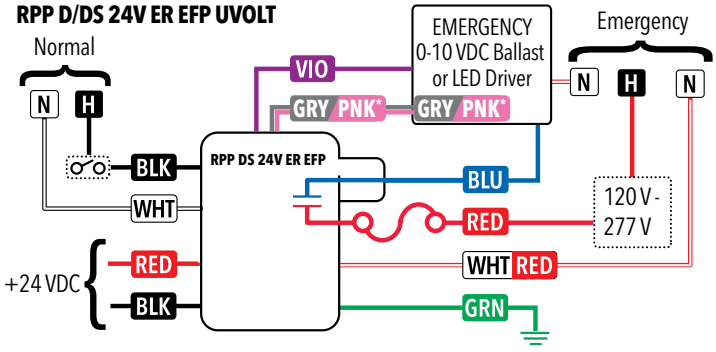
BLK – Unswitched Hot 120-277, 347VAC**
WHT – Neutral
BLU – Switched Output
VIO – 0-10V Dim
PNK* – 0-10V Common
RED (Terminal) – +24VDC
BLK (Terminal) – DC Common
GRN – Ground

*0-10V Dimming Common from luminaire may be pink or as otherwise indicated per section 410.69 of the 2020 NEC.

**347 only supported by UVOLT option.

WIRING FOR EMERGENCY (-ER) UNITS

RPP D/DS 24V ER EFP
RPP D/DS 24V ER EFP UVOLT



Legend

RED – 120-277, 347VAC** Emergency Hot
WHT/RED – Emergency Neutral
BLK – Unswitched Norm. Hot
WHT – Norm. Neutral
BLU – Switched Output
VIO – 0-10V Dim (+)
PNK* – 0-10V Com (-)
RED (Terminal) - +24VDC
BLK (Terminal) - DC Com
GRN – Ground
- Optional Test Switch (by others)

*0-10V Dimming Common from luminaire may be pink or as otherwise indicated per section 410.69 of the 2020 NEC

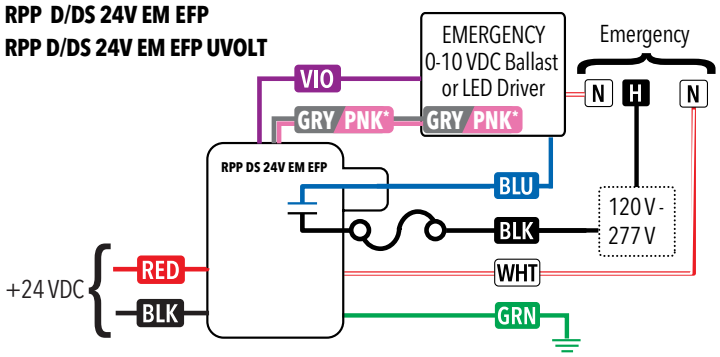
**347 only supported by UVOLT option.

UL924 Sequence of Operation: When normal power sense leads have absence of voltage

- Relay is closed and 0-10V dimming is at high end trim level
- Device ignores wireless lighting control commands

WIRING FOR EMERGENCY (-EM) UNITS

RPP D/DS 24V EM EFP
RPP D/DS 24V EM EFP UVOLT



Legend

BLK - 120-277, 347VAC** Emergency Hot
WHT – Emergency Neutral
BLU – Switched Output
VIO – 0-10V Dim (+)
PNK* – 0-10V Com (-)
RED (Terminal) - +24VDC
BLK (Terminal) - DC Com
GRN – Ground

*0-10V Dimming Common from luminaire may be pink or as otherwise indicated per section 410.69 of the 2020 NEC

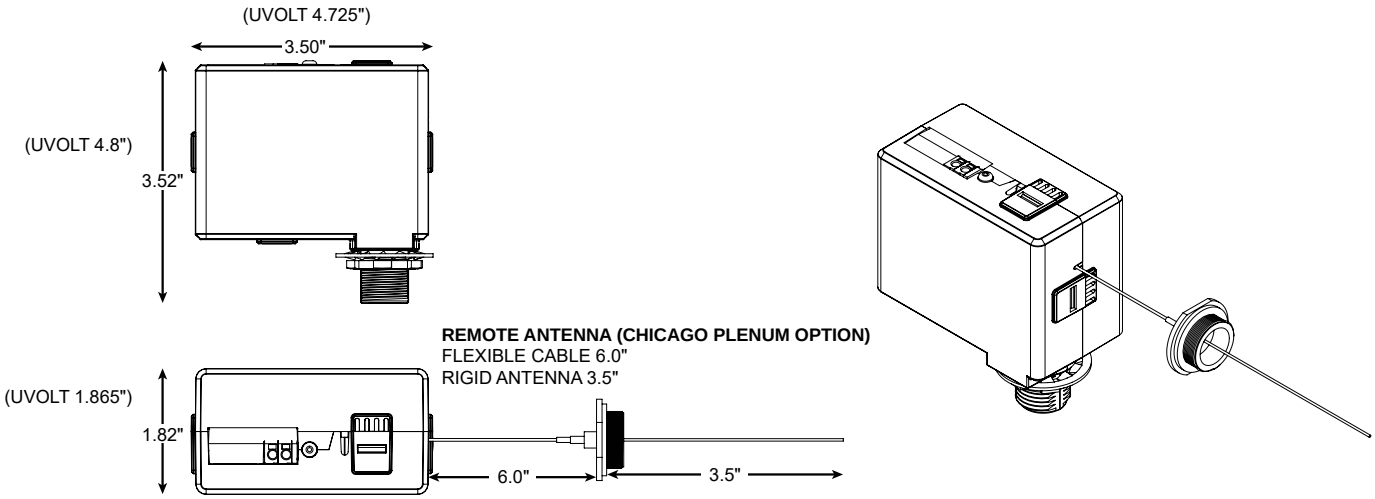
**347 only supported by UVOLT option.

UL 924 Response – nLight AIR Devices with EM Option

The below information applies to all nLight AIR devices with an EM option.

- EM devices will remain at their high-end trim and ignore wireless lighting control commands, unless a normal-power-sensed (NPS) broadcast is received at least every 8 seconds.
- Using the CL**AIR**ITY™+ mobile app, EM devices must be associated with a group that includes a normal power sensing device to receive NPS broadcasts.
- Only non-emergency rPP20, rLSXR, rSBOR, rSDGR, and nLight AIR luminaires with version 3.4 or later firmware can provide normal power sensing for EM devices. See specification sheets for control devices and luminaires for more information on options that support normal power sensing.

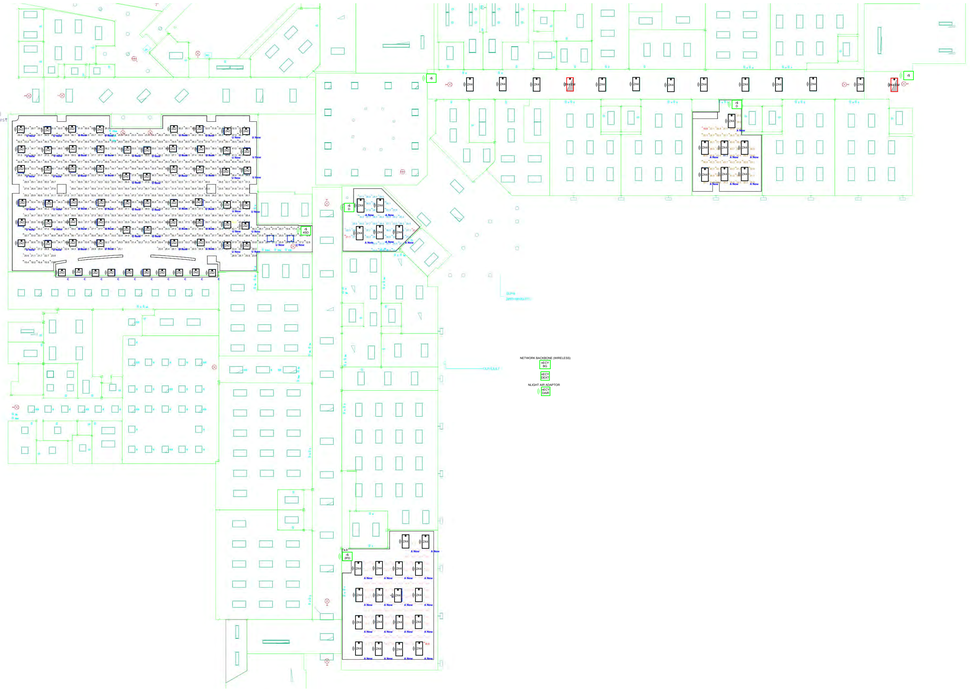
DIMENSIONS



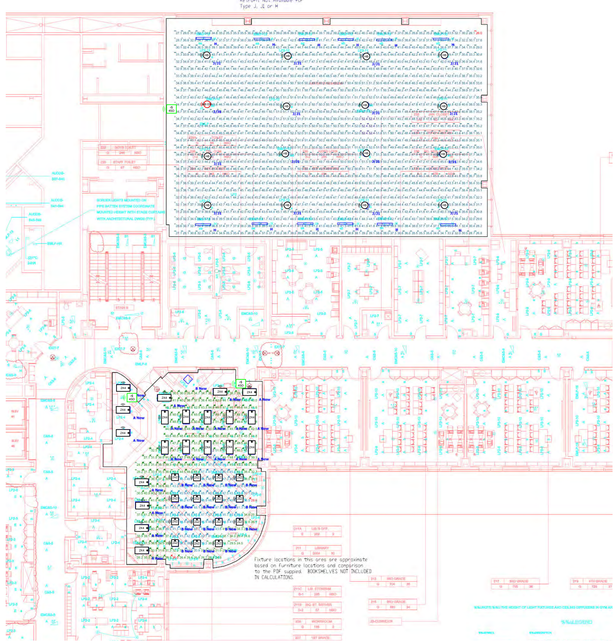
Appendix H:

Wireless Lighting Control Plan

APPENDIX H - WIRELESS LIGHTING CONTROL DESIGN PLAN



A WIRELESS
1/16" = 1'



A WIRELESS
1/16" = 1'

DESIGN FOR REFERENCE ONLY. ALL EMERGENCY CONTROLS ARE ASSUMED. PLEASE CONFIRM IF NEEDED.

Disclaimer
THIS ACUITY CONTROLS LAYOUT IS FOR REFERENCE OF PRODUCT LOCATIONS ONLY AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES. PLEASE SEE THE CONSTRUCTION DOCUMENT (E-SHEET) REFERENCED IN THE TITLE BLOCK "DWG REF" SECTION, FOR MORE INFO.

illuminations

Created by AG
WIRELESS
Project: SCA STUDY

81	2x2	2x2 Luminaire nLight Air enabled, wireless control Integral combination occupancy & daylight sensor with 7-15' mounting height lens
61	2X4	2X4 Luminaire nLight Air enabled, wireless control Integral combination occupancy & daylight sensor with 7-15' mounting height lens
2	2X4 EM	2X4 EM Luminaire nLight Air enabled, wireless control Fixture-integral emergency transfer device Integral combination occupancy & daylight sensor with 7-15' mounting height lens
15	HB	HB Luminaire nLight Air enabled, wireless control Integral combination occupancy & daylight sensor with 15-40' mounting height lens
1	HB EM	HB EM Luminaire nLight Air enabled, wireless control Integral combination occupancy & daylight sensor with 15-40' mounting height lens
1	nECY BG	nECY BG NECY MVOLT BAC ENC GFXK nLight Eclypse, 120-277 VAC, BACnet, 14 1/4"H x 14 1/4"W x 4"D Metal Enclosure, NGWY2 GFX Touchscreen and PS-150 Power Supply With CAT5 Cable
1	nECY DAIR	nECY DAIR NECYD NLTAIR G2 nLight AIR Antenna for nLight Eclypse, Generation Two
1	nECY DEXT	nECY DEXT NECYD EXT150 nLight Eclypse, nLight AIR 150-foot USB to CAT6 extender. Requires 120VAC connection. Requires CAT6 cable between (2) USB-to-CAT6 converters. CAT6 cable not included.
2	rS	rS RPODBA XX G2 nLight Preset Wall control, Generation Two
1	rS 2PD	rS 2PD RPODBA 2P DX XX G2 nLight Preset Wall control, 2-Pole, Raise/Lower Dimming Without Wires, Generation Two
4	rS 4SD	rS 4SD RPODBA 4S DX XX G2 nLight Preset Wall control, 4 scene control, Raise/Lower Dimming Without Wires, Generation Two
2	rS D	rS D RPODBA DX XX G2 nLight Preset Wall control, Raise/Lower Dimming Without Wires, Generation Two

AcuityBrands

SCA STUDY
NEW YORK, NY

Drawing Type: Control Layout
Prepared For:

Date: 5/24/2022
Scale: NOT TO SCALE
Drawn By: AG
Project #:
DWG Ref: unknown
Sheet: WIRELESS

Created in Visual Controls